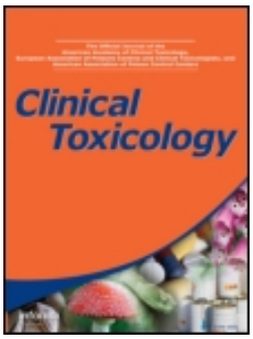

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NACCT ABSTRACTS

Abstracts of the 2008 North American Congress of Clinical Toxicology Annual Meeting, September 11–16, 2008, Toronto, Canada

1. Poison Centers and Medical Cost Avoidance: Revisiting the Concept $7 Saved for Every $1 Spent

Hilton J,[1] Wahl M.[2,3] [1]*Northwestern Memorial Hospital, Chicago, IL, USA;* [2]*Illinois Poison Center, Chicago, IL, USA;* [3]*Evanston Northwestern Healthcare, Evanston, IL, USA.*

Background: The current value statement that poison centers save $7 for every $1 dollar spent is largely based on a paper written by Miller and Lestina in 1997 with conclusions based on 1992 dollars. A 2008 Annals of EM paper indicates that ED charges have increased ~9% per year from the time period 1996 to 2004, well above the rate of inflation in general. A poison center survey by Seger showed that 70% of people triaged at home would seek ED care if poison center services were not available. The cost avoidance value statement should be periodically updated using current dollars. *Methods:* The charges for a community hospital system were obtained for a basic level 4 visit. Only nursing, medical and non-invasive charges were included (labs, IV, charcoal were excluded).

Summary of charges

Charges	Amount
Nursing Level 4	$924
Physician Level 4	$319
Pulse Ox	$112
Total	$1355

Results: In 2007, 1,801,766 callers were managed at home according to the NPDS system. Should 70% of callers seek care if poison center services were not available, over $1.7 billion in unnecessary ED charges would be incurred. *Discussion:* According to the 2004 AAPCC survey, the cost of providing basic poison center funding and outreach is ~$130 million per year. Using this model, over $13 dollars in ED charges are saved for every dollar spent. This underestimates the true charges as labs, imaging and decontamination are not included in the cost analysis. This limited cost avoidance analysis also does not account for those patients who would choose ambulance transport or for an increase in hospital admissions if poison center services were not available. *Conclusion:* Healthcare inflation has far outstripped the general rate of inflation over the past decade. It is unlikely that poison center costs have kept pace. This dichotomy may have led to an increasing amount of healthcare resources saved over time.

2. Health Care Costs Associated with the Management of Childhood Poisonings: Impact of the Poison Control Center

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Background: The purpose of this study was to assess the impact of the San Francisco Poison Control Center on health care costs and estimate the share of costs of poisoning management to both patient and insurer. *Methods:* We modeled costs based on a survey of 261 respondents who called the San Francisco Poison Control Center for treatment advice of a child (≤ 19 years) in 2003. The survey asked respondents a series of questions regarding what treatment advice they had received, what they would have done if the poison center had not been available for consultation, and collected demographic data of the respondents, including the patients' insurance status and insurer. Societal perspective of health care costs were calculated for the type of poisoning management utilized (e.g., ED visit, call 911, call physician). We compared health care costs between poison center advice and the hypothetical situation without poison center advice. Using health insurance status information and co-pay and coverage details, we then calculated the share of costs for both patients and insurers. *Results:* Patients receiving poison center advice were more likely to be treated at home and showed an estimated 67% reduction in 911 calls (21 vs. 7) and 60% reduction in ED visits (60 vs. 24) compared to the hypothetical situation without poison center advice. The conservative estimate of the total cost of poisoning management with poison center advice was $61,805 compared to without poison center advice of $134,334. Analysis of the share of costs for an ED visit to patients and insurers indicates that patients with state or federal insurance plans had a lower share of cost (range $0–$20), whereas those with private insurance had a higher share of cost (range $100–$1352). Conversely, state and federal insurers had the greatest share of costs (range $1332–$1352), while private insurers had wide variation in share of costs (range $0–$1352). *Discussion:* See Conclusion. *Conclusion:* Poison center services reduce poisoning management costs. State and federal government insurance programs may benefit most from poison center services.

3. Analysis of Data from a Novel Drug Identification Service

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Background: The majority of drug identification calls (Drug ID) answered by our Poison Center are for controlled substances. In the past, most of these calls were handled by Specialists in Poison Information with little to no formal training in substance abuse, addiction, harm reduction or motivational interviewing. *Methods:* A separate Drug ID service staffed with substance abuse counselors was implemented in October 2006. The counselors were asked to identify the tablets and provide safety information (eg. avoiding overuse of acetaminophen, avoiding mixing of sedative/hypnotics with opioids/ethanol) whenever possible. The counselors were also asked to provide screening, brief intervention, referral for treatment (SBRT) whenever appropriate. A data collection tool specific to the Drug ID service was developed. It was adjusted/modified after 13 months to include more specific data. *Results:* Over a 15 month period, 4633 Drug ID calls were documented by the Drug ID service. Age distribution of the callers: 9% < 21, 38% 21 to 30, 24% 31 to 40, 19% 41 to 50, 7% 51 to 60 years of age. Ethnicity: 87% were Caucasian, 10% African-American and 3% others. Identified drugs: 33% opioids, 33% other prescription drugs (eg. antihypertensives, antibiotics,etc), 11% benzodiazepines, 9% unknown, 6% non-prescription drugs, 5% muscle relaxants and 1% prescription stimulants. Safety information was delivered in 55% of calls. SBRT was performed in 35.3% of calls. Interest was present in 30% of callers, 63% were neutral and 7% were not interested. In the adjusted/modified version of the data collection (604 calls total), we identified 47% of the callers as drug users themselves, 23% as family members and 30% other. *Discussion:* The Drug ID service was able to provide safety information and SBRT. Approximately one third of callers were receptive to this information and only a small percentage was unreceptive. *Conclusion:* The implementation of a Drug ID service staffed by substance abuse counselors was successful in delivering safety messages and providing SBRT to drug ID callers and their family members.

4. Hazardous Materials Incidents: Should Poison Centers Be More Involved?

Sutter ME,[1,2,3] Hon S,[2] Chang A,[1,2] Schwartz M,[1,2,3] Algren DA,[3] Schier J,[1,2,3] Lando J.[3] [1]*Emory University;* [2]*Georgia Poison Center;* [3]*CDC.*

Background: Serious hazardous materials (HAZMAT) incidents require immediate mandated reporting to the Department of Transportation (DOT). Examples of serious incidents include evacuations of 25 or more people, and closures of major traffic arteries. Despite mandated DOT reporting, poison centers (PCs) who specialize in the medical management of patients are not required to be notified. *Methods:* Retrospective analysis was performed on serious HAZMAT incidents as reported by DOT from 2002–2006. Incidents without patient transport were excluded. The incidents were matched with the American Association of Poison Centers (AAPC) database. AAPC database was queried for both exact chemical name and general category to limit missing incidents. Incidents were divided into two categories: PC notified or PC not notified. Analyses were performed on variables including date, time, substance, and time to notification. *Results:* There were 2447 serious incidents, with 154 meeting our inclusion criteria. 134 incidents (87%) occurred without PC notification. PCs were notified in only 20 incidents (12.9%). 15 incidents (9.7%) were notified between 0–360 minutes (avg 115 min, range 5–359 min), 4 incidents (2.6%) between 361 and 1440 minutes (avg 652 min, range 566–750 min) and 1 incident (0.7%) was notified after 4,320 minutes. No statistical differences were demonstrated based on time of day or day of the week. Gasoline was the most common HAZMAT incident (45/154, 29%), but only 1 case was reported to the PC. *Discussion:* These data demonstrate that most serious HAZMAT incidents involving patient transport are not reported to PCs. All incidents notified to the PC reported symptoms. Of concern are asymptomatic patients who are not transported yet may progress to develop sub-acute toxidromes. PCs may help identify asymptomatic patients who are at risk for developing delayed clinical effects. *Conclusion:* Strategies to increase reporting of serious HAZMAT incidents to PCs are warranted. Notification may improve decontamination, management, and ED disposition. PC notification would also benefit real-time sentinel event detection for public health threats via nationally coordinated toxicosurveillance.

5. Quantitative Bedside Screening Test for Methaemoglobin

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Background: Methaemoglobinemia from agrochemicals ingestion is a problem in rural Sri Lanka associated with a mortality of 10%. Treatment is complicated by the lack of

laboratory facilities. Objective: To develop and validate a bedside test for detection of the amount of methaemoglobin (MetHb). *Methods:* 10% to 100% MetHb blood samples were prepared and the amount was determined using the method described by Evelyn and Malloy. The prepared MetHb samples were subsequently used to develop a bedside test. One drop (10µl) of prepared MetHb sample was placed on piece of white absorbent and scanned using a flatbed Cannon Scan LiDE 25 scanner. The mean RGB (red, green, blue) values of the spots were measured using an image program; ImageJ 1.37v. The RBG values were used to prepare a colour chart which was rescanned to check the RGB accuracy of the printed version. Inter observer agreement was assessed using Kappa statistics. *Results:* The colour gradient was linearly (inverse) related to MetHb concentration (r = 0.9938). There was no significant effect of Hb levels (9 g /dl –17 g /dl) on MetHb RGB value. Inter observer (N = 21) mean agreement and mean weighted kappa for scanned MetHb spots using the colour chart were 94% (92% to 95%) and 0.83 (0.82 to 0.87) respectively. Inter-observer (N = 09) mean agreement and mean weighted kappa for freshly prepared MetHb sample with colour chart were 87% (82% to 94%) and 0.71 (0.58 to 0.83) respectively. *Discussion:* The results indicate that the colour chart is a valid and reliable method for quantitative assessment of MetHb with good inter observer agreement. As observers were asked to match colors in both natural light (at different times of the day) and artificial light, it seemed that ambient light has little effect on the test and that any change in color perception would affect both the chart and patient sample. *Conclusion:* The RGB value of scanned blood sample accurately estimates the percentage of MetHb. A colour chart produced from these RGB values can be used by multiple observers to give a clinically meaningful quantitative estimate of MetHb %.

6. The Effect of Acetadote on Prothrombin Time in Plasma Samples from Healthy Subjects

Pizon AF, Jang DH, Wang HE. *University of Pittsburgh-Affiliated Residency in Emergency Medicine, Pittsburgh, PA, USA.*

Background: N-acetylcysteine's (NAC) ability to artificially elevate prothrombin time (PT) in patients has been debated. This may alter management if a clinician is following the PT as a marker of liver damage after acetaminophen toxicity. The purpose of this study is to evaluate the ability of NAC to inhibit coagulation factors in human plasma. *Methods:* A single blood draw was obtained from 33 volunteer subjects. The plasma sample from each subject was divided into four 1 ml aliquots. Each subject acted as their own control. The remaining three 1 mL aliquots had 5 µL of decreasing concentrations of NAC, as Acetadote (Cumberland Pharmaceuticals, Nashville, TN), added. The serial concentrations of Acetadote (20, 10, and 2%) were created in order to maintain the same volume of drug added to each plasma sample. The dilution of the samples never exceeded 0.5% and no correction for the PT was made. After mixing Acetadote with the plasma samples, this made 3 concentrations of Acetadote (250, 500, 1000 mg/L) plus the control. All samples were mixed and incubated at 37 C for one hour. PT's were obtained on all samples and analyzed using the fix regression for continuous variables. *Results:* Acetadote was found to have a linear dose-dependent effect upon the measurement of PT. Means for the control, 100, 500, 1000 mg/L were 13.9 (SD = 1.01), 14.2 (SD = 1.08), 15.5 (SD = 1.21), 17.4 (SD = 1.72) secs, respectively. At the 1000 mg/L concentration, two PT's exceeded 22 sec and 50% of the samples exceeded 17 sec. All Acetadote concentrations were significantly higher than the control ($p < 0.001$). *Discussion:* Previous studies describe the effect of NAC on PT in vivo and in vitro. These studies were either underpowered or used non-physicologic concentrations of NAC. The 1000 mg/L samples approximate Acetadote levels during the bolus while the other concentrations represent levels obtained later in the infusions. Not only were physiologic concentrations of NAC used, the appropriate power to detect a clinically significant difference in PT was obtained. *Conclusion:* Using an in vitro model of human plasma, Acetadote was found to have a clinically significant linear dose-dependent effect on the measurement of PT.

7. Fomepizole Inhibit Diethylene Glycol Toxicity and Metabolism in Rats

McMartin KE, Besenhofer LM, Cain M, Latimer B. *LSU Health Sciences Center - Shreveport, Shreveport, LA, USA.*

Background: Mass epidemic poisonings with diethylene glycol (DEG) have occurred often, due to its mistaken use in oral medications. There is nothing known about the mechanism of its toxicity, which involves the kidneys, liver and nervous system. Although DEG is metabolized by alcohol dehydrogenase (ADH) to potent toxicants, the precise toxic component of the metabolic pathway is not known. This study will determine which of the DEG metabolites produces toxicity in rats using varying doses of DEG as well as the ADH inhibitor, fomepizole. *Methods:* Male Wistar rats, implanted with indwelling catheters, were treated PO with water; 2 g/kg DEG; 10 g/kg DEG; or 10 g/kg DEG + fomepizole (15 mg/kg IP at 15 min, followed at 12 h intervals by 10 mg/kg). Urine and blood were collected at timed intervals. At 48 h, rats were perfused through the left kidney with ethidium homodimer to determine cell death *in situ*. Then, the nonperfused kidney and the liver were either frozen on dry ice for metabolite analysis or fixed in formalin for histopathology. After analysis of pH and bicarbonate, blood was stored at –80°C for metabolite analysis or processed to produce plasma for markers of renal and hepatic function. Urine aliquots were stored at –80°C for metabolite and biomarker analysis. *Results:* DEG produced a time- and dose-dependent metabolic acidosis that was completely blocked by fomepizole. DEG-induced diuresis was transient and was not affected by fomepizole. DEG induced both kidney and liver damage (elevated plasma markers), both of which were prevented by fomepizole. Plasma DEG levels indicated an elimination half-life at the high dose of 8–12 h. *Discussion:* A threshold for metabolite accumulation occurs between the low and high dose. An intriguing variability in toxicity exists at the high dose, where some had total organ failure, while others showed lesser degrees of damage. This variability is a key to determine which metabolite is responsible for the organ damage, since the organ levels of the specific metabolites are being examined for differences in accumulation that explain variability in organ damage. *Conclusion:* This study shows that the metabolic acidosis and organ damage induced by DEG results from its metabolism.

8. Escitalopram Causes Fewer Seizures in Human Overdose Than Citalopram

Yilmaz Z,[1] Rauber C,[1] Sauer O,[2] Stedtler U,[3] Prasa D,[4] Seidel C,[5] Hackl E,[6] Hoffmann P,[7] Gerber G,[8] Bauer K,[9] Kupferschmidt H,[1] Kullak G,[10] Wilks M.[1] *[1]Poison Control Centre (PCC), Zurich, Switzerland; [2]PCC Mainz; [3]PCC Freiburg; [4]PCC Erfurt; [5]PCC Bonn, Germany; [6]PCC Vienna, Austria; [7]PCC Berlin; [8]PCC Munich; [9]PCC Goettingen, Germany; [10]Division of Clinical Pharmacology and Toxicology, University Hospital, Zurich, Switzerland.*

Background: Seizures are a recognised complication of acute overdose with the racemic (1:1 ratio of R- and S-enantiomers) selective serotonin reuptake inhibitor citalopram. This investigation was performed to test the hypothesis that escitalopram (the pharmacologically active S-enantiomer of citalopram) causes fewer seizures in overdose than citalopram. *Methods:* Multicentric retrospective analysis of all well documented cases of acute human citalopram and escitalopram monointoxications reported to German, Austrian and Swiss Poison Centres between 1991–2006. Inclusion criteria: patient age ≥16, known ingested dose (limit of uncertainty ±10%), confirmed or likely causal relationship between overdose and clinical effect. The Poisoning Severity Score (1) was used to assess the severity of intoxication. *Results:* 316 citalopram and 63 escitalopram cases were analysed. The ingested dose was 80–4200mg (mean 712mg) in the citalopram (corresponding to 40–2100mg, mean 356mg, of the S-enantiomer) and 40–1860mg (mean 322mg) in the escitalopram cases (p=0.45 t-test). The most frequent symptoms were:

	Citalopram (N = 316)		Escitalopram (N = 63)		Chi^2 p=
somnolence	138	44%	25	40%	0.56
vomiting	56	18%	9	14%	0.51
tachycardia	54	17%	7	11%	0.24
seizures	43	14%	1	2%	0.0065
prolonged QT-interval	27	9%	5	8%	0.87
tremor	26	8%	8	13%	0.26

Discussion: At comparable ingested doses of the S-enantiomer the symptom profile for citalopram and escitalopram intoxications is similar except for seizures which occur more frequently in citalopram than in escitalopram poisoning. *Conclusion:* Escitalopram causes fewer seizures in overdose than citalopram through an as yet unknown mechanism which may be related to the absence of the pharmacologically inactive R-enantiomer of citalopram. Ref.: 1) Persson H et al. J Toxicol Clin Toxicol 36: 205–213, 1998.

9. Probable Benefit of Hyperinsulinemia-Euglycemia and Hyperventilation Oxygenation on Aluminium Phosphide Poisoning

Hassanian-Moghaddam H. *Shaheed Beheshti Medical University, Tehran, Islamic Republic of Iran.*

Background: Aluminium phosphide through liberating phosphin which is a protoplasmic poison and by interferering cellular enzymes and protein synthesis causes high mortality rates. Severe hypotension, metabolic acidosis, cardiac disturbances and adult respiratory distress syndrome are common in deadly subjects. Histopathology of various organs shows changes suggestive of cellular hypoxia. *Case Report:* This case series documents the clinical courses of 5 patients after ALP poisoning. All subjects had hypodynamic circulatory shock, metabolic acidosis or cardiac disturbances. The mean ingested dose and minimum systolic blood pressure was 5.1±4.2 gr and 68±9 mmHg respectively. After initiation of insulin-dextrose infusion and hyperventilation oxygenation beside the other usual treatment modalities, 4 patients survived. The mean insulin dose was 0.5 IU/kg/h. The mean time delay before ALP consumption and initiation of insulin-dextrose was 4.8±3.5 hours while the mean time elapsed during insulin-dextrose administration was 38.2±19.4 hours. The mean minimum pH, base excess and bicarbonate concentrations were 7.16±0.16, -16.6±6.1 mmol/l, and 10.1±3.3 mmol/l respectively. All five subjects underwent intubation and mechanical ventilation. All three ECG abnormalities resolved finally. *Case Discussion:* The inotropic effect of insulin has been long established.Insulin administration switches cell metabolism from fatty acids to carbohydrates and restores calcium fluxes, resulting in improvement in cardiac contractility.In some severe poisonings in human, the administrations of high-dose insulin produce cardiovascular stabilisation, decrease the catecholamine vasopressor infusion rate and improve the survival rate.During shock, substrate preference shifts from free fatty acid to carbohydrate oxidation. In ALP poisoning, the inotropic effect of insulin when combine with hyperventilation and oxygenation can resolve acidemia and further difficulty in oxygen affinity and tissue delivery. *Conclusion:* This report provides preliminary evidence toward a larger trial of insulin-dextrose with hyperventilation to treat shock, cardiac disturbances and metabolic acidosis from ALP poisoning.

10. Effect of Cyclodextrin Infusion in a Rat Model of Verapamil Toxicity

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Background: Cyclodextrins are hydrophilic circular oligosaccharides containing a hydrophobic core. Lipophilic molecules fit into this core as a function of size, van der Waals forces, and hydrostatic forces. Cyclodextrins bind target drugs as a function of a complexation constant, and may form micelle-like aggregates of CD and drug-CD complexes. Sulfobutylether-β-cyclodextrin(CD) is known to bind verapamil(VP) in vitro and is used for separation of VP enantiomers. After intravenous administration, CD clearance approximates GFR. We hypothesized that CD might complex with VP in vivo, enhance renal elimination, and increase time to death in a rat model of VP toxicity. *Methods:* Ten male Wistar rats were assigned to a control or intervention group. All rats received isoflurane by nose cone for 20 minutes to establish a stable anesthesia plane. At time 0 all rats received VP infusion at 32 mg/kg (2x LD50) to run over one hour. Rats 1–5 (control) received saline bolus (7.5mL/kg) at T + 5 minutes, over 2 minutes. Rats 6–10 (intervention) received CD infusion at T + 5 minutes(2.25gm/kg, 16:1 molar ratio CD to VP,

7.5mL/kg). Primary outcome was time to death, secondary outcome was average heart rate. *Results:* Time to death was 22.8 min in the control group, 16.4 min in the intervention group(28% reduction in time to death, paired t-test p<0.05). Average heart rate was lower in the intervention group between times 12 to 20 min (repeated measures ANOVA p<0.05). There was a significant difference at times 13–17(post-hoc t-tests p<0.05). *Discussion:* Contrary to our hypothesis, CD infusion shortened time to death and lowered average heart rate. Preliminary work in our lab demonstrated no effect in a CD only model. The effect in our intervention group may have been related to the large hyperosmolar CD infusion in combination with a VP poisoned cardiovascular system. This may have masked any benefit. *Conclusion:* A 30% weight to volume, 7.5mL/kg CD infusion decreased time to death and averate heart rate in a rat model of VP cardiotoxicity. No beneficial effect was demonstrated. Work with lower CD concentrations is warranted.

11. Treatment of Experimental Verapamil Poisoning with Levosimendan and 4-Aminopyridine

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Background: In experimental verapamil poisoning, levosimendan (Levo) increases cardiac output (CO) but not BP (1). This may result from Levo augmenting verapamil-induced vasodilation through vascular K^+-channel agonism. 4-Aminopyridine (4AP), is a K^+-channel antagonist. It improves hypotension in experimental and clinical verapamil poisoning most likely by increasing peripheral vascular tone. Our aim was to assess whether co-administration of Levo and 4AP improves CO and BP greater than either drug alone. *Methods:* Male Wistar rats were anesthetized, ventilated and cannulated with jugular vein, carotid and femoral artery catheters. Six mg/kg/h verapamil was administered until SBP dropped to 50% of baseline. Verapamil was continued at 4mg/kg/h. Ten animals per group received: 1). Normal saline (Control); 2). Levo 6.25µg/kg loading dose and 36µg/kg/h infusion (Levo); 3). 4AP 2mg/kg loading dose and 2mg/kg/h infusion; 4). Levo+4AP infusions; 5); $CaCl_2$ 0.2 mmol/kg load and infusion, 6) Levo+$CaCl_2$ infusion. CO, SBP and heart rate (HR) were recorded for 60 min. *Results:* All treatments improved CO significantly in comparison with Control. 4AP also produced a significant increase in CO compared to Levo. SBP increased significantly with 4AP, Levo+4AP and $CaCl_2$ compared to Control from t=10min. Levo and Levo+ $CaCl_2$ treated animals did not improve BP from toxicity levels. HR was maintained in all treatment groups. There was no added benefit on CO or BP with the combination of Levo with either 4AP or $CaCl_2$. 4AP produced muscle twitching and hypersalivation which were evident following the loading dose. *Discussion:* As observed previously (1), the positive effect of Levo on CO in experimental verapamil poisoning was negated by a lack of improvement in BP most likely due to its vasodilatory effects. Although 4AP produced positive hemodynamic effects, these were at doses that resulted in neurotoxicity in the animals. There was no additive benefit on CO or BP by using the two drugs together. *Conclusion:* Both 4AP and Levo had side-effects in this animal model of verapamil poisoning that could potentially limit their utility in clinical verapamil poisoning. (1) Graudins A, *et al*. *Clin Toxicol* 2008,46(1):50–56.

12. Glucose Uptake Sensitivity in Cardiac and Adipose Cells Exposed to Three Classes of Calcium Channel Blockers

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Background: Calcium channel blocker (CCB) toxicity is associated with hyperglycemia requiring high dose insulin therapy (HDIT). It is likely that the hyperglycemic effects of CCBs are more complicated than simply inhibiting insulin release. CCB toxicity may include differential inhibition of peripheral glucose uptake in various. The objective of this study was to determine the toxicity of 3 classes of CCBs on glucose uptake in a cardiac cell model system compared to our adipocyte model. *Methods:* Glucose metabolism was monitored in two cell culture model systems: adipose 3T3-L1 and cardiac H9C2 cell lines. The cells were incubated in Krebs-Ringer-Hepes (KRH) buffer and glucose uptake was measured using [^{3}H]-2-deoxyglucose ([^{3}H]-2DG) assays in the presence of increasing amounts of three classes of CCBs: dihydropyridine (nifedipine), phenylalkylamine (verapamil), and benzothiazepine (diltiazem). Uptake was terminated by washing cells three times with ice-cold 20 mM phyloretin. The presence of cellular [^{3}H]-2DG was quantified using a scintillation counter. The total accumulation of [^{3}H]-2DG uptake was subtracted from [^{3}H]-2DG uptake in cytochalasin B-treated cells to normalize for nonspecifically bound and deoxyglucose trapped intracellularly. *Results:* All 3 classes of CCBs inhibited glucose uptake in adipose 3T3-L1 and cardiac H9C2 cell lines. In both model systems the toxicity for these three classes of CCBs demonstrated similar profiles: nifedipine > verapamil > diltiazem. The inhibitory concentration for nifedipine was similar in adipocytes and cardiomyocytes (IC_{50} = 20 µM and 15 µM, respectively). Verapamil exhibited more toxic effects on glucose uptake in adipocytes compared to cardiomyocytes (IC_{50} = 280 µM and 345 µM, respectively). Diltiazem was the least potent inhibitor of glucose uptake in adipocytes and cardiomyocytes (IC_{50} = 1000 µM and 580 µM, respectively). *Discussion:* In this study, three classes of CCBs demonstrated similar inhibitory effects on glucose uptake: nifedipine > verapamil > diltiazem in adipose and cardiac cell lines. *Conclusion:* These data suggest that the effect of CCBs on glucose uptake is not differentially regulated in adipose compared to cardiac cells.

13. Olanzapine Attenuates Cocaine Toxicity in a Mouse Model

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Background: Cocaine toxicity is mediated by increasing neurotransmission at dopamine and serotonin receptors (Ritz, 1993). Prior studies reported that pretreatment with ziprasidone, an atypical antipsychotic medication that blocks dopamine and serotonin receptors, attenuates cocaine toxicity. The purpose of this study was to evaluate the effects olanzapine (OLZ- an antipsychotic similar to ziprasidone) pretreatment on acute cocaine toxicity. *Methods:* We conducted randomized, placebo controlled trial to evaluate the effectiveness of OLZ pretreatment to decrease mortality and seizures following an LD50 of cocaine. Subjects were male CF-1 mice weighing between 25 and 35 g. Preliminary studies suggested an OLZ dose of 1mg/kg would be protective and safe. Animals were treated with OLZ or saline ip 15 minutes prior to administration of 105 mg/kg (LD50) of cocaine. We observed the animals for 30 minutes for seizures or death. The main outcome was proportion of animals with seizures or dying within 30 minutes, the secondary outcome was time to seizure or death. Proportions in each group were compared with chi square and times to event were compared with survival analysis. *Results:* Twenty animals were randomized into each group. Two animals in the OLZ group were excluded due to errors during injection. The mortality was 11/20 in placebo and 4/18 in OLZ (p=0.051). However, OLZ decreased the proportion of animals with seizures (11/20 vs 3/18; p=0.02) and the median times to death (p=0.03) and seizure (p=0.00). *Discussion:* The prolonged time to death and decrease in seizures support the hypothesis that OLZ, like ziprasidone, attenuates cocaine toxicity. While the exact mechanism cannot be determined from these experiments, it may involve serotonin or dopamine receptor antagonism. *Conclusion:* Pretreatment with 1 mg/kg of OLZ attenuates severe cocaine toxicity in a mouse model. While these findings are limited to a pre-treatment animal model, they suggest that OLZ may be an effective treatment of cocaine toxicity.

14. A Medicine Safety Needs Assessment Conducted with Directors of Programs for Older Adults

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Background: Consideration was given toward developing a new medicine safety program to reach older adults and raise awareness about the PCC. A survey was distributed to program directors at senior centers, Naturally Occurring Retirement Communities (NORCs), and other agencies to gather feedback about program development, ways to disseminate information, and beliefs about medicine safety. *Methods:* The survey was developed, collected, and analyzed using online survey software (www.surveymonkey.com). A total of 100 surveys were sent to older adult program directors in 22 low call rate (<3 per 1,000 population) and primarily immigrant communities in January 2008. An additional 37 surveys were sent to NORC program directors citywide. Surveys were sent via email or fax. *Results:* A total of 63 surveys were completed by program directors. More than half of these were from senior center directors (54%). The remaining surveys were from directors of NORCs (25%), public housing programs (6%), faith-based organizations (6%), and community agencies (8%). The majority of directors rated the topic of medicine safety as "very important" (85%) and stated that clients want more information about this topic (89%). Directors answered it was "somewhat" (67%) or "very difficult" (30%) for their clients to understand medicine labels. Many (89%) had heard of the PCC but only 3% had referred clients with questions about medicines. Workshops were noted as the best way to present medicine safety information. Newspapers were rated as the best media choice. Many directors (89%) were interested in hosting workshops and 98% would like to distribute PCC materials about medicine safety. Directors reported that clients speak many languages—English (97%), Spanish (81%), Mandarin (33%), Cantonese (35%), Russian (17%), and Haitian Creole (6%). *Discussion:* Directors of programs working with older adults felt the topic of medicine safety was very important for clients. They were generally unaware of the PCC as a resource for questions about medicine. *Conclusion:* The use of a simple survey tool can gain valuable information to help with program development.

15. The Success of Poison Prevention Education Technology

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Background: In 2001 the PCC established a Satellite Education Network (SEN) which consists of 12 satellites education centers affiliated with hospitals located throughout the state. The satellite coordinators/educators conduct poison prevention (PP) trainings, health fairs and presentations throughout their service area. By 2004, the growing number of requests from the public for PP trainings and outreach events exceeded the PCC/SEN ability. In 2004, the PCC received funding from the National Library of Medicine for the *"Bridging the Gap: Bringing Distance Learning to IPC Volunteers in Rural Communities"* project that would make the PP training and trainer materials available to anyone in the state, at their convenience. *Methods:* The goal was to develop an online education tool and volunteer/information management system that would allow the PCC to better train, service and track all outreach activity throughout the state and more efficiently and effectively communicate with the volunteer educators (VE) on an ongoing basis: 1. Developed the Poison Prevention Education Resource Center (PPERC) that consists of: training course, resource center, and ordering, reporting and admin. management systems. 2. Tracked monthly registered volunteer educator (RVE) events, people reached and event demographics via the online ordering system. 3. Communicated with RVE via quarterly newsletters, seasonal material updates, PCC news releases and media clips. 4. Evaluated the system by distributing event evaluations (weekly) and conducted annual surveys. *Results:* Since the launch of the PPERC system in Jan. 2005: 1. A total of 2,176 VE have been trained online and registered with PPC as RVEs. 2. RVE conducted 2,680 events reaching 289,495 in 95 of 102 counties. 3. The number of VE trained online in 2007 (1,015) surpassed the number trained by IPC staff and Satellite educators combined (901) in the same period. 4. In 2007, a total of 30% of the 2,258 RVE completed the survey; 95.4% rated the overall program as "good to excellent". *Conclusion:* The creation and action implementations of the PPERC, has resulted in expanded opportunities for cooperation between the PCC and those interested in sharing poison and safety with their community regardless of location, vocation and/or education.

16. Magnet, Memory or Referral?

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Background: Poison exposure cases and information calls to the Poison Center (PC) originate from a variety of sources. Some callers are referred by health care providers (HCP), use a website or phone book or already have a magnet or sticker. Knowing where callers get the phone number is useful to measure effectiveness of current education efforts and to execute an education-related needs assessment. *Methods:* For one month, PC callers were asked where they obtained the PC phone number. Open-ended responses were grouped into pre-determined categories and recorded in the medical record. The question was a mandatory field in the

medical record which assured each caller would be included in the study. *Results:* Data were collected on 2,991 exposure calls. The source for the PC phone number varied by exposure reason, patient age, caller site and the caller's relationship to the patient. For instance, among unintentional general exposure callers (n=1170), a magnet/sticker was the top source for the PC number among child exposures (35%, n=354), where as, the phone book was the top source for adult exposures (44%, n=27). The source for all unintentional general exposures were: 33% (n=379) magnet/sticker, 26% (n=293) the phone book and 15% (n=165) referred to the PC from a HCP. Only 5% (n=58) of callers obtained the number from a website and 4% (n=50) from an information service such as 411. *Discussion:* Asking for this information from each caller did not add significant time to the call, and in nearly all cases, the callers willingly shared this information. These data will be useful in measuring the effect of various targeted material distributions and may identify new agencies and contacts to promote the phone number. One limitation of the data is reliability of coding because of the multiple data collectors. *Conclusion:* A third of callers already had a sticker or magnet, which clearly demonstrates the effectiveness of education efforts. These data also highlight the value of partnering with HCPs to distribute our materials and refer patients directly to the PC for immediate answers about exposures. Even though the website was not identified as a top source of the phone number, it is an inexpensive information tool to promote the PC phone number.

17. The Impact of Public Education Efforts on Wyoming's Call Volume – "I've Been Everywhere Man"

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Background: The Nebraska Regional Poison Center (NRPC) has provided service to the state of Wyoming (WY) since 1992. However, resources to support public education efforts were minimal until 2002 when HRSA funds became available. Over the last 6 years (2002–2007), increased efforts were made to expand public education in WY. NRPC's educator made annual trips throughout the state doing media interviews and visiting hospitals, health departments, schools and pharmacies to distribute materials, develop relationships and raise awareness. Since 2002, there has been a steady increase in the number of presentations given, materials distributed and amount of time spent by the educator in WY. This study measures whether those efforts were effective. *Methods:* Retrospective reviews of all WY human exposure calls received by NRPC and all human exposures reported to the American Association of Poison Control Centers (AAPCC) from 1/1/98 to 12/31/07 were performed. Population trends in the United States (US) and WY were also examined. *Results:* Analysis using Poisson regression revealed an association between year and number of WY human exposure calls ($p<0.001$). Specifically, the number of human exposure calls was significantly higher in 2007 compared with all previous years. We conducted post hoc analysis to examine the number of WY human exposure calls in comparison with the previous year. The number of calls increased marginally in 1999 from 1998 ($p=0.06$) and in 2000 from 1999 ($p=0.06$). There was no significant difference in the number of calls from 2001 to 2003. The number of calls increased significantly in 2004 from 2003 ($p=0.0002$), and again in 2006 from 2007 ($p=0.0001$). Between 1998 and 2007, human exposures reported to AAPCC increased by 9.4% (2,241,082 to 2,474,268), while WY human exposures reported to NRPC increased by 25.7% (4,409 to 5,931). According to the US Census Bureau, between 4/1/2000 and 7/1/2006 the population of the US increased by 6.4 % and of WY by 4.3%. *Conclusion:* Our data suggests that an increase in public education efforts lead to a statistically significant increase in human exposure calls from WY.

18. Raising Poison Control Centers' Visibility through Multi-Disciplinary Interactions

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Background: Many people, including healthcare providers, are not familiar with the services, clinical expertise, and surveillance capabilities of poison centers. The management of the poisoned patient requires input from various healthcare professionals. To foster optimum treatment of the poisoned patient, collaboration among health care disciplines including emergency medical technicians (EMT), emergency department nurses and physicians, and poison center staff is required. For this reason, our poison center has established an educational program for healthcare providers to raise awareness of our availability, clinical expertise, and epidemiologic surveillance studies related to exposures. *Methods:* Working in conjunction with our university's colleges of nursing, pharmacy, medicine, and dentistry, our center established on-site clinical toxicology lectures, site visits, and practicum rotations. Training programs include center orientation, listening to live and pre-recorded poison calls, case review, and comprehensive discussions related to these cases. Our successes have also led us to include EMT students in our program. *Results:* Our multi-disciplinary training program has enhanced post graduate communication and collaboration. We note that face-to-face interactions foster a better understanding and appreciation of the various disciplines involved in the care of the patient. These activities raise the awareness of the poison center's role, diverse functions, and clinical expertise related to the poisoned patient. *Discussion:* Our multi-disciplinary training program has enhanced post graduate communication and collaboration. We note that face-to-face interactions foster a better understanding and appreciation of the various disciplines involved in the care of the patient. These activities raise the awareness of the poison center's role, diverse functions, and clinical expertise related to the poisoned patient. *Conclusion:* A multi-disciplinary approach to treatment of the poisoned patient helps ensure optimal patient outcome. Poison centers can raise their visibility, enhance communication, and foster better patient care through outreach programs directed towards a variety of health-care students and providers.

19. Benzonatate Ingestion Reported to the National Poison Center Database System (NPDS)

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Background: Little has been published on benzonatate ingestion, with the few case reports suggesting significant risk after poisoning. *Methods:* A seven year retrospective review of all single substance ingestion of benzonatate reported to NPDS from 2000 to 2006. *Results:* In this review, there were 2197 patients, of which 1280 (58%) were female. Mean age was 20 years, with 676 (30%) <6 yrs. Serious outcomes occurred in 116 (moderate n=81, 4%; Major n=31, 1%; and death n=4, 0.2%). Mean age of those with serious outcome was 21 years, with 41 (35%) < 6 yrs. 1,084 patients (49%) were treated in a HCF of which 148 (7%) were admitted for medical care. Clinically significant effects included tachycardia (n=31, 1%), agitation (n=30, 1 %), seizure (n=23, 1%), coma (n=14, 0.6%), ventricular dysrhythmia (n=9, 0.4%), cardiac arrest (n=8, 0.3%) hypotension (n=7, 0.3%) and asystole (n=6, 0.2%). Of patients with seizures reported, 8 patients (0.4%) had multiple/discrete seizures and 2 had status epilepticus. Dose ingested versus outcome severity is presented in Table 1.

Outcome	# Patients with recorded dose	Mean and median dose (mg)	Range (mg)
Death	1	3,000	
Major	20	1,410 and 1000	100–3,200
Moderate	68	629 and 200	50–4,900
Minor	329	415 and 100	25–3,000

Discussion: Dysrhythmias but not seizures occurred in all fatalities. Significant cardiac and CNS effects occurred in a small subset of this study (<1%), while half the patients received direct medical care in a HCF. No correlation between age and severity of medical outcome was detected by statistical analysis. A prospective study to evaluate potential HCF triage criteria such as dosage, age, or preexisting conditions may be warranted. *Conclusion:* The fatalities from this study were due to dysrhythmias rather than seizures as previously reported in the case reports. There were no clinical correlations between severity of outcomes and dose ingested. A median dose 200 mg or greater suggests a potential for producing serious outcomes in a benzonatate exposure.

20. A Case of Life-Threatening Cesium Chloride Poisoning Treated by Prussian Blue

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Background: We report a case of life threatening cesium poisoning from naturopathic medicine. Prussian blue was given for enhanced elimination. Serial serum cesium level showed its serum half life before and during treatment were 61.7 days and 12.2 days respectively. To our knowledge, this is the first case report of non-radioactive cesium poisoning treated by Prussian blue. *Case Report:* A 65 year old lady with rectal cancer presented with diarrhoea and recurrent syncope. Electrocardiogram showed a corrected QT interval of 0.616 seconds. Serum electrolytes showed mild hypokalemia (2.8mmol/l) and normal calcium and magnesium. Despite correction of hypokalemia, she developed repeated symptomatic episodes of polymorphic ventricular tachycardia (Torsades de Pointes). Further history revealed that she had been taking naturopathic medicine for her cancer. Target analysis for cesium found an extremely high serum level of 288μmol/l (0.0045–0.0105μmol/l) which is about 27,000 times the upper normal limit. One of the naturopathic medicine was subsequently confirmed to be cesium chloride. Based on Prussian blue information in managing radioactive cesium poisoning, we treated her with oral Prussian blue (3gm, 3 times a day) for 4 weeks. Serum cesium half life during Prussian blue treatment was 12.2 days, which was more than 5 times shorter than that before the treatment. Finally, she was discharged uneventfully on day 14 and subsequent follow up showed normal corrected QT interval. *Case Discussion:* Cesium chloride has been advocated to treat cancer in alternative medicine although its efficacy has never been proven. Physicians may not be familiar with its toxicity which includes diarrhoea, electrolytes disturbance, seizure, prolonged QT interval and arrhythmias. Management include immediate discontinuation of cesium intake; electrolytes replacement as needed; monitoring and treatment of arrhythmia; and chelation with Prussian blue which was shown to enhance elimination in our case. *Conclusion:* Naturopathic health products could be highly toxic. One should consider cesium poisoning in managing cancer patient on alternative medicine with compatible features. Prussian blue could be considered as a treatment option.

21. Envenomation by the Malayan Spitting Cobra, *Naja Naja Sputatrix*: A Case Series

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Background: There is only one report of a bite by the Malayan spitting cobra, *Naja n. sputatrix* in PubMed. We present three envenomations in the same patient, with two of the bites by the same snake in a two-week period. *Case Report:* A 38 year-old male was bitten by a captive *Naja n. sputatrix* (patient identified) on the right middle-finger 1.5 hours prior to presentation. There was a single puncture with minimal bleeding and mild tenderness, but no erythema, ecchymosis, or edema. He complained of tinnitus, tunnel vision, and chest pain. Vital signs were notable for BP 164/92 and RR 40. There was no diplopia or weakness. Over 24 hours he developed a prolonged INR (max 1.27) and elevated D-dimer (max 0.61; $n < 0.5$), without abnormal fibrinogen, platelets, PTT, or bleeding. No tissue injury developed. Queen Saovabha Cobra Antivenom was obtained from a zoo 600 miles away. It arrived 22 hours after the bite, and as no weakness had developed, it was not given. He was discharged at 24 hours. Two weeks prior, he had been bitten by the same snake, had the same clinical symptoms, and also had a prolonged INR (max 1.21) and elevated D-dimer (max 1.0). Similarly, he had no tissue injury or motor weakness and was discharged at 24 hours without receiving antivenom. He was also bitten by a different snake of the same species a decade earlier, with the same complaints but no hematologic, neurologic or local tissue effects and he was not treated with antivenom for that bite. *Case Discussion:* The venom of *Naja n. sputatrix* is reported to have neurotoxic, hemotoxic and cytotoxic effects. Our patient's clinical syndrome was consistent and did not occur with prior bites by other species. He developed coagulation abnormalities

but not tissue injury or neurotoxicity. In the only published report, that patient developed severe local injury resulting in amputation, and abnormal D-dimer and fibrinogen levels, but no neurotoxicity. *Conclusion:* We describe 3 envenomations by the Malayan spitting cobra, *Naja n. sputatrix*. The bites resulted in mild hemotoxicity in two cases, and no local tissue injury or objective neurotoxic effects. Obtaining species-specific antivenom required nearly 24 hours.

22. Law Enforcement Drug Identifications – A Growing Concern for Poison Centers

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Background: Law enforcement (LE) agencies consider poison centers (PCs) a valuable resource for drug identification (DID). DID calls may divert resources away from more core-related functions of PCs. This study was designed to evaluate the trend in LE use of PCs for DIDs. *Methods:* PC records of DIDs from 2003–2007 were reviewed. Data points documented: total number of LE DID calls, monthly and hourly distribution of calls and the number of individual tablet/capsule identifications per call. *Results:* The number of LE DIDs has increased annually from 5,156 in 2003 to 13,873 in 2007.

LE DIDs 2003–2007

	2003	2004	2005	2006	2007
LE DID calls	5,156	6,510	7,781	9,916	13,873

The monthly distribution of calls varied each year with no remarkable trends. Of all LE DIDs received, 35% occurred between 5 PM and midnight, while 24% occurred between midnight and 7 AM. Most LE DID calls involved multiple tablets/capsules. *Discussion:* LE DIDS have increased an average of roughly 23% annually over the study period. This reflects a 269% increase int 5 years. The calls were distributed consistently throughout the year and almost 60% of LE DIDs came in during the busiest periods of the day when staff are most taxed. Each LE DID call averaged more than one tablet/capsule to be identified. This coupled with routine requests by LE agents for FDA schedule status and basic drug information easily consumes as much time as an exposure call. *Conclusion:* The rise in LE DIDs poses an increasing drain on already dwindling PC resources. Potential solutions to this problem include: pursue additional funding directly from LE agencies, establishing designated times and/or days of week for ID requests. DIDs requests emailed/faxed. DID requests could be emailed or made on a dedicated phone number/voice mail system with lower level providers (PIPs, students, etc) fielding these inquiries.

23. Poison-Related 911 Calls Managed by Emergency Medical Dispatch (EMD) and Poison Control Center (PCC) Services

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Background: The objective of this study was to characterize poison-related 911 calls managed by EMD and to match calls diverted to PCC. *Methods:* A retrospective study of poison-related 911 dispatch calls in 2 counties (SMC and SFC) during 2006. Probabilistic match analysis was performed to match 911 calls to cases in the PCC database. In SFC, matching was done for only one month due to high volume of calls. Primary outcomes included descriptive statistics of cases, number and type of case by category and identification of who initiated and when the call to PCC was made. *Results:* In 2006, there were 402 poison-related 911 calls in SMC and 1,424 calls in SFC. The mean age of cases was 37. There were more females in SMC than SFC (59.7% vs 39.1%, p<.05). The most common substances in both counties were alcohol, sedatives, narcotics and illicit drugs. 9.7% of 911 calls in SMC and 4.8% in SFC were identified in the EMD database as using PCC consults. However, the matching analysis revealed more calls managed through PCC consults (44.55% in SMC; 12.1% in SFC). The majority of matched calls into PCC originated from a paramedic (38.1%) or a HCF (40.7%). Many of these calls (23.7%) originated from ≥2 sources (home, EMD, paramedic and/or HCF).

Characteristics of unmatched vs matches cases

	SMC (2006)			SFC (9/06)		
	Unmatched (N=223)	Matched (N=179)		Unmatched (N=109)	Matched (N=15)	
Mean age	39.5	33.9	p<.05	37.2	39.6	ns
% female	57.0%	63.1%	ns	41.3%	60.0%	ns
Top substances	EtOH (24%) narcotics (13%)	sedatives (17%) household agt (13%)		EtOH (22%) illicits (19%)	sedatives (27%) APAP (27%)	
Mean # subs percase	1.2	1.2	ns	1.1	1.2	ns

Discussion: The generalizability of results are uncertain due to individualized protocols for poisonings used by county-based EMDs as shown by the variability in PCC consults between the 2 counties. *Conclusion:* Poison-related 911 cases are managed by PCC at various and multiple points of patient contact. Poisonings first reported to 911 most commonly involve adults with intentional exposures to CNS depressants and alcohol. Alcohol ingestions are the least likely to obtain PCC consults.

24. Role of N-Acetyl Cycteine in Treatment of Organophosphate Poisoning

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Background: Organophosphates compounds are widely used. Atropine and oximes are used in the management, but they have failed to reduce the mortality and morbidity. Agents like N-Acetyl Cycteine (NAC) have been found to reduce the toxicity of organophosphates. *Methods:* This trial was conducted during two years. Establishment of the diagnosis was based on the clinical features and decrease in the level of choline esterase (CE) activity. We studied 46 patients. 34 patients (16 male and 18 female) received gastric decontamination, bathing and appropriate doses of atropine and pralidoxime. Twelve patients (seven male and five female) received NAC at a dose of 140 mg/kg as a loading dose and then 70 mg/kg every 4 hours for 17 doses intravenously plus routine treatment. The patients were under tight observation. The CE levels were analyzed on admission time. *Results:* 46 (23 male, 23 female) patients were assigned. The average age of the treatment and control group was 27.6 and 34.2 years respectively. Demographic characteristics were not statistically different between 2 groups. There was no significant difference in mean daily pralidoxime requirements. There was significant difference in mean daily atropine requirements. The hospitalization days in treated group were significantly lower than that of control group. There was no significant difference in blood CE activity on admission and in the outcome of the patients. *Discussion:* It has been reported that organophosphates may induce oxidative stress. Good evidence supports the hypothesis that oxidative stress may be involved in pesticide-induced cell injury. On the basis of the present study, we recommend administration of NAC throughout hospital management. *Conclusion:* However, regarding the limitations in the number of this trial, we recommend that multicenter studies with a larger number of patients should be performed to elaborate the value of NAC in the management and outcome of human organophosphates poisoning.

25. Tetramethylammonium Hydroxide Poisoning: An Emerging and Potentially Life-Threatening Hazard in Semi-Conductor and Photoelectric Industries

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Background: Tetramethylammonium hydroxide (TMAH), a quaternary ammonium salt with high alkalinity, is widely used in semiconductor and photoelectric industries. Its toxic mechanisms other than alkalinity have been of concern in Taiwan over the past 3 years because three male workers who did not have severe corrosive injury suddenly died after dermal exposure to 25% TMAH. We herein reported 5 cases of TMAH (2.38%) exposure. *Case Report:* The first case, a 33-year-old male worker, noticed accidental spill of TMAH from a TMAH supply system. When he tried to shut down the system, TMAH sprayed over his whole body. Despite immediate wash of skin, he developed general weakness, salivation, and dyspnea within 10 minutes. He received endotracheal intubation at a local hospital and was referred to our service 2 hours later. Physical examinations revealed first-to-second degree chemical burn of 28% body surface area (BSA). Laboratory studies, including serial cholinesterase levels, were remarkable for leukocytosis and slight elevation of creatine kinase. He was extubated 27 hours post-exposure and was discharged on day 7. One of his 3 coworkers had mild chemical burn (5% BSA) and the other two had mild conjunctivitis. All of them recovered well. The last case manifested skin rashes after dermal exposure to TMAH in a maintenance work. He recovered within 5 days. *Case Discussion:* Although the exact mechanisms of TMAH-related sudden death and respiratory failure remain unclear, they are unlikely to be attributable solely to the corrosive effect of TMAH. We postulated that TMAH might exert neuromuscular blocking effect through TMA ion, a well-known autonomic ganglionic agent. Given the above noted proposition, early skin decontamination followed by prompt respiratory support would be the mainstay in the management of severe TMAH poisoning after dermal exposures. *Conclusion:* Dermal exposure to TMAH may result in respiratory failure and/or sudden death, which is possibly a dose-related effect on neuromuscular junctions.

26. Toddler with Ventricular Tachycardia after Diphenhydramine Overdose

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Background: Diphenhydramine, a first-generation antihistamine agent, is responsible for a large proportion of accidental ingestions in children. The anticholinergic effects of diphenhydramine in overdose have been well documented. In adults, there have been reports of cardiac arrhythmias and conduction abnormalities in the context of diphenhydramine overdose, but few cases have been reported in children. We report a 14-month old child who developed ventricular ectopy and monomorphic ventricular tachycardia after an accidental ingestion of diphenhydramine. *Case Report:* A 14-month old boy was found with an open bottle of diphenhydramine. He arrived at a local hospital approximately one hour after the suspected ingestion, where he was found to be flushed, agitated and tachycardic. It was estimated that the patient ingested between 200 and 500 mg of diphenhydramine(18–45 mg/kg). Two and a half hours post-ingestion, he developed a monomorphic wide-complex tachycardia with a heart rate ranging from 220 to 250 beats per minute. The patient remained hemodynamically stable with a blood pressure of 110/86 mmHg and good perfusion on physical examination. He was given four doses of lidocaine IV and six doses of sodium bicarbonate IV with no improvement in his ECG tracing. He was started on a lidocaine drip without improvement, followed by a sodium bicarbonate drip. His cardiac rhythm converted back to sinus tachycardia with narrow QRS complex one hour after the sodium bicarbonate drip was started. *Case Discussion:* In children, reports of ventricular tachycardia in the setting of diphenhydramine poisoning are rare. In addition, all previous reports have described a polymorphic ventricular tachycardia, rather than the repetitive monomorphic ventricular tachycardia seen in this patient. *Conclusion:* To our knowledge, this is the first reported case of monomorphic ventricular tachycardia in a hemodynamically stable child after an overdose of diphenhydramine without preceding seizure activity. Clinicians should be aware of diphenhydramine's potential cardiotoxicity, and be prepared to treat with sodium bicarbonate and lidocaine if neccesary.

27. Ciguatera Poisoning Successfully Treated with Delayed Mannitol

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Background: Ciguatera poisoning is second to scromboid in nonbacterial fish poisonings in the US. While treatment is mainly supportive, some advocate mannitol within the first 48 hours after symptoms onset. We describe a patient with substantial improvement when treated nearly one month after symptom onset. *Case Report:* A 52 y/o male with a PMH of ulcerative colitis (UC) developed watery diarrhea, chills, myalgias, and parasthesias in his hands and lips days after eating amberjack at a local restaurant. He had diarrhea every 2 hours with pain in his masseters, pectorals, and occipital muscles. After 2 days he developed abdominal pain and began taking indomethacin. He then began to have hot/cold dyesthesias in his hands and feet that were relieved by hot baths. He took prednisone. His gastroenterologist prescribed ciprofloxacin and metronidazole for presumed UC. Blood work showed an elevated WBC, CRP, and Cr. Otherwise all studies, including stool cultures, were normal. He bathed in his hot tub 4 times a day due to the burning pains and bought a new hat and gloves due to pain from the cold weather. Two weeks later the local health department identified a cluster of ciguatera poisonings from contaminated amberjack from the same restaurant. The diarrhea improved but he developed dysuria, intense burning/parasthesias in his hands, feet and face, and cold intolerance. He was still symptomatic one month after exposure and went to a local ED, where he received mannitol 1 gm/kg IV. The neurologic symptoms resolved almost immediately. Later he is diagnosed with Clostridium difficile colitis and the abdominal cramps improved with more treatment. Interestingly after receiving mannitol, his migraines improved from multiple episodes a week to 2 total episodes in the next 3 months. *Case Discussion:* There are reports of improvement in patients who have had symptoms for up to 8 weeks. Eastaugh described a couple that received mannitol with partial symptom resolution 13 days after exposure. *Conclusion:* This patient had symptoms for nearly one month. After treatment with mannitol, he had complete resolution of symptoms due to ciguatera poisoning. This suggests that physicians may consider increasing the window of treatment with mannitol past 48 hours.

28. Atypical Clinical Course Following Rattlesnake Envenomation

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Background: North-American rattlesnake bites (RSBs) typically produce rapid swelling. Immediate hypotension is unusual but may occur with anaphylaxis or hemorrhage. Progressive erythema without swelling or infection is also unexpected. A child with atypical findings after RSB is presented. *Case Report:* A 7 yo girl was bitten on the right leg by a rattlesnake. She cried, reported pain, and 40 min later EMS found her vomiting with BP = 72/40, HR=139. She was given 200ml NS, 25µg fentanyl, 12.5mg promethazine IV and was somnolent. In the ED 20 min later, BP=61/44, HR=153, RR=31, sat=91% RA, T=36.8°C. She was lethargic with closed eyes and no response to commands. A puncture was present on the anterior right shin, mid-range between the ankle and knee. The wound was slightly red without edema. There was no rash, lungs were clear, and distal pulses were weak. Perfusion was poor despite 60 cc/kg IVF in the first 30 min. 6 vials CroFab™ antivenom (AV) and epinephrine were started, with epi titrated to .2 mcg/kg/min. ABG = pH 7.27, pCO2 38, pO2 207 with base deficit 9. PT=13.7s, fibrinogen (FIB)=271mg/dl, Hgb=14.7g/dl, and platelets (PLT)=398K/mm^3. 2 h after the bite pt had received 100cc/kg IVF, 10 vials AV and she was alert. BP=124/65, HR=118, RR=30, sat=100%. Epi was weaned. 6 h later, T=38°C with an 8 cm area of hot, tender erythema surrounding the wound. Antibiotics were given despite suspicion of inflammatory cause. The erythema expanded to encompass the medial lower leg from 2 in below the knee to the foot. The area was warm and tender without swelling or necrosis. Ultrasound was negative. ID consult felt the erythema was not infection. Antibiotics were stopped on day 3 while erythema was still expanding. On day 4 erythema improved and pt was discharged. Day 4 PLT=254, PT=12.4, FIB=268. *Case Discussion:* Severe shock is unexpected as the sole initial manifestation of RSB, but may be due increased vascular permeability from venom. Erythema along lymph vessels may occur early post-envenomation (~24 h) as venom is absorbed. In this case it progressed for 3 days, and the absence of associated venom-induced swelling was surprising. *Conclusion:* RSB may cause immediate shock and local inflammatory reactions in the absence of typical findings such as swelling or heme abnormalities.

29. A Retrospective Review of Unintentional Pediatric Buprenorphine Ingestions Reported to a Regional Poison Center

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Background: In 2002 the Food and Drug Administration approved buprenorphine hydrochloride and buprenorphine hydrochloride/naloxone hydrochloride sublingual tablets for the management of opioid dependence. These medications are available only through a certified physician and can be dispensed for in-home administration. The objective of this study was to profile the outcomes of pediatric buprenorphine exposures. *Methods:* A retrospective review of all ingestions of buprenorphine and buprenorphine/naloxone involving children less than seven years of age as reported to a regional poison information center (RPIC) from 2002–2007 was conducted. *Results:* Fifty-eight (58) exposures met the inclusion criteria. No multiple tablet ingestions occurred and a single tablet (not in a CRC) was available to the child in 54 of the exposures. The medication belonged to a parent (17), another family member (4), a friend (7), a pet (1) or the origin was undetermined (29). Six patients were managed at home for 'taste' amounts, 51 were referred to an emergency department and one refused to comply with poison center recommendations. Adverse findings included drowsiness 50%, emesis 15.5%, miosis 10.3%, behavioral change 6.8%, decreased oxygen saturation 3.4%, slurred speech and ataxia 1.7%.each. Treatment included naloxone (7), intravenous fluids (4), activated charcoal (2), oxygen (1) and ipecac (1). Sixteen children had no effects, there were minor effects in 29 patients, moderate effects in two children, it was undetermined if the symptoms were related in two children and nine patients were lost to follow-up. *Discussion:* We have observed an increasing number of pediatric exposures to buprenorphine over the last six years. Children have become symptomatic and have required medical treatment following the ingestion of less than one tablet. *Conclusion:* All children ingesting buprenorphine should be referred to an emergency department. Exposures occurred after the tablet was taken out of a child-resistant container. Prescribing physicians should educate patients about the potential dangers of this medication in children.

30. Bupropion Overdose Causing Serotonin Syndrome: A Retrospective Chart Review

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Background: Bupropion is a medication that has been widely used for the treatment of depression and smoking cessation. In overdose and therapeutic use, much attention has been brought to the significant incidence of its common adverse effect--seizure. The association of bupropion causing Serotonin Syndrome (SS) is unknown. *Methods:* Retrospecitive chart review was utilized to identify patients that were admitted to our Regional Toxicology Referral Center for the period of September 2005 to September 2006 in which bupropion was ingested in overdose. We used a data collection worksheet to record by history any medications taken in overdose concomitantly with bupropion, as well as the patient's current medications. Comprehensive urine drug screen results were recorded to confirm suspected ingestions when available. We distinguished the relevant clinical symptoms which manifested, and determined whether the patient met the Hunter Serotonin Toxicity Criteria. *Results:* 24 of 33 patients that ingested bupropion required admission and treatment for SS. 11 of 12 patients, in which bupropion was the sole toxicant, developed SS. 3 of these 11 patients had comprehensive drug screens which confirmed the sole ingestion, bupropion. Of the remaining 13 patients who ingested more than one toxicant, and developed SS, at least one other serotonergic toxicant was involved, except one. *Discussion:* Various drugs have been implicated in the development of SS. These drugs have known mechanisms of action, which have been widely accepted as serotonergic. However, there is only one case report of bupropion, in combination therapy with sertraline (a SSRI) responsible for the development of SS. This may be due to the belief that although bupropion's pharmacology is not well understood, it is thought to strongly inhibit neuronal reuptake of norepinephrine and dopamine, but to a milder degree, serotonin reuptake. However, bupropion's influence on the development of SS may be related to its well-established specific inhibition of the cytochrome P450 2DP pathway increasing blood levels of serotonin, and its activity as a dopamine agonist. *Conclusion:* This study demonstrates the high association of bupropion overdose causing SS.

31. Analysis of Biological Samples and Beads from a Case of Bindeez Beads (Aqua Dots) Ingestion

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Background: There have been several cases of children with drowsiness, bradycardia and seizures associated with ingestion of Bindeez toy beads (Aqua Dots in US). Urine toxicology was positive for γ-hydroxybutyrate (GHB) due to 1,4 Butanediol (1,4BD) being used in the manufacture of the beads instead of the non-toxic plasticiser 1,5 Pentanediol (1,5PD). Following cases reported in Australia, the beads were recalled worldwide. However, since the product withdrawal, cases of ingestion have continued, including a recently reported case in the UK (Runnacles JLM *BMJ* 2008;336:110). We report here analytical results of biological samples from this case together with preliminary results of analysis of the beads. *Methods:* GHB, 1,4BD and 1,5PD were analysed using a gas-chromatograph with mass spectrometric detection. GHB in biological samples was converted to γ-butylactone (GBL) for analysis. *Results:* Blood and serum samples from the child were positive for GHB (90mg/L, 96mg/L respectively). Beads analysed from recalled packets were screened to determine the GHB source, and were positive for 1,4BD at a concentration of greater than 10mg of 1,4BD per bead. Neither GHB or 1,5PD were found on the beads. Further investigations showed that 1,4BD is slowly released from the beads over time, with at least 10mg per bead being released in the first 48 hours. *Discussion:* The source of the GHB was the 1,4BD in the beads and the delayed release of 1,4BD resulted in the atypical, ongoing GHB toxicity seen in this case. Accurate quantification of total 1,4BD per bead has been impeded by the nature of the bead itself. *Conclusion:* This is the first report of blood concentrations measured following ingestion of Bindeez beads and highlights the continued public health hazard presented by these beads despite their worldwide recall and publications in the medical and public press. Further studies are needed to determine the rate of dissolution of 1,4BD from the beads and factors which alter this. Clinical toxicologists can then determine the optimal length of observation and appropriate management of children following ingestion of the beads.

32. Yam Bean Seed Poisoning with Diffused Brain Injury

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Background: Yam bean (Pachyrrhizus erosus(L.)Urban) is a tuberous-root plant and is a common food in southern Taiwan. However, its seeds are rarely consumed and have been noted to be toxic. A small outbreak of Yam bean seed poisoning occurred a few years ago and one life-threatening case completely recovered from acute metabolic acidosis and altered mental status. Here we reported another one severe case presented with diffused brain injury noted on brain MRI. *Case Report:* A 73-year-old woman suffered from dizziness, nausea, vomiting and watery diarrhea 4 hours after eating 40 pieces of cooked yam bean seeds. She was referred to a local hospital where her arterial blood gas data showed severe acidosis with pH: 6.836, PaCO2: 62.4mmHg, PaO2:243.6mmHg, HCO3:10.6meq/L. SaO2:98.3%. Conscious change was also noted with only brain edema found on the brain computerized tomogram. She was referred to our hospital for possible antidote treatment due to persistent coma condition two weeks later. The MRI of brain showed diffuse irregular high signal intensity on T2WI and FLAIR without contrast enhancement over the periventricular white matter, corpus callosum, bilateral basal ganglia, thalamus and pons are noted. No significant cortex involvement can be noted. Hyperbaric oxygen therapy did not improve her condition. She was still on vegetative state and cared in a nursing home 7 months after poisoning. *Case Discussion:* The yam bean seed were noted to contain rotenone, the possible toxic principle. Rotenone works by interfering with the electron transport chain in mitochondria. Specifically, it inhibits the transfer of electrons from iron-sulfur centers in complex I to ubiquinone and leads to a condition of systemic energy failure. No effective therapy was suggested in literatures. Late oxygen therapy also couldn't change the prognosis. *Conclusion:* Public awareness of potential toxicity of yam bean seed must be announced.

33. Healthcare Facility Referral of Asymptomatic Pediatric Coin Ingestions

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Background: Pediatric coin ingestions are usually uneventful; however, serious complications (e.g. esophageal perforation) can occur. Up to 64% of patients with radiographic evidence of a coin in the esophagus are asymptomatic. Published recommendations vary regarding the need for healthcare facility (HCF) referral of asymptomatic children. We therefore surveyed North American Poison Control Centers (PCCs) regarding their referral guidelines for pediatric coin ingestion. *Methods:* We contacted one-third of American and Canadian PCCs by e-mail or telephone, sampling all PCCs affiliated with pediatric hospitals and additional PCCs to achieve balanced geographic distribution. Survey questions were: "What are your PCC guidelines for pediatric coin ingestion? If there are no formal guidelines, how would your poison specialists typically manage an asymptomatic child who has ingested a coin?" If the PCC referred all coin ingestions to a Telehealth service, this service was contacted. Responses were classified based on criteria for HCF referral. *Results:* 22 of 68 (32%) American and Canadian PCCs were surveyed and 16/22 (73%) responded. Two PCCs referred coin ingestions to a Telehealth service, one of which replied, leaving 15 respondents. Six of 15 (40%) respondents referred all patients to a HCF regardless of symptoms, 7/15 (47%) used age or coin size-specific criteria for referral of asymptomatic cases and 2/15 (13%) were unsure of management. Of PCCs using referral criteria, three used age as the only criterion (referral thresholds <2 yr, <2–3 yr, or <5 yr), two used coin size as the only criterion (referral thresholds > or ≥ penny) and two PCCs used both age and coin size. Only 5 of 15 (33%) respondents had formal coin ingestion guidelines. *Discussion:* The lack of consensus amongst surveyed PCCs regarding management of pediatric coin ingestion reflects the paucity of data and variability of published recommendations. Respondents who volunteered the rationale behind their guidelines cited anecdotal information such as a local fatality or the preferences of medical consultants. *Conclusion:* Survey results suggest the need for consensus guidelines for management of asymptomatic children who ingest coins, with subsequent validation by a prospective study.

34. The Puget Sound Call Center Coordination Project – Planning for a Public Health Emergency

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Background: Providing convenient, consistent, and helpful information to the public is challenging during a disaster. Poison centers provide such service and can provide expanded services during a disaster. The Washington Poison Center is working with Public Health - Seattle/King County to develop regional call center coordination and surge capacity, including health messaging and medical phone triage, in the event of a pandemic or disaster. *Methods:* Objectives for the plan include triaging callers with medical needs, directing them to available care, supporting care at home (to avoid overcrowding of hospitals and clinics, and reduce transmission of contagious diseases), and providing consistent, timely information to the public about health issues and interventions. Potential surge partners in a networked call center response include the poison center, nurse advice lines, crisis lines, regional 2–1–1 programs, emergency management agencies, non-profit organizations, and businesses with call center capabilities. A platform to connect multiple call centers and individuals working from home with a toll free hotline is being developed. This virtual technology, commonly used in business, will allow cost-effective rapid scalability when needed. Testing is set to begin this summer. *Results:* Various call center operations have been surveyed to assess capacity, staffing, and willingness to participate in an integrated response with Public Health. To date, over 15 agencies and organizations have agreed. *Discussion:* Integration of call centers, including the poison center, and development of increased surge capacity, has the potential to provide critical information to the public during a pandemic or disaster. Cross-agency collaboration is underway to develop triage guidelines, scripting, staffing, and training. The medical reserve corps may enhance surge capacity with work-at-home opportunities for phone triage. *Conclusion:* Integrating call center resources and networking them with novel technology in a disaster can enhance surge capacity and manage the information needs of the public. This should improve service and mitigate the overwhelming impact of potentially tens of thousands of phone calls on Public Health agencies.

35. Toxicosurveillance through a Regional Teleconference: The Washington and Oregon Colchicine Cases

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Background: The weekly regional telephone conference hosted by the Oregon and Washington Poison Centers has been previously described to offer multiple benefits, including networking enhancement, educational opportunities, and discussion of regional and national advances and trends in toxicology. Identification of unique clusters of poisoning during the conference and mitigation of public health risk has not been previously described. *Case Report:* During the weekly teleconference hosted by the Oregon and Washington Poison Centers, the on-call toxicologist from Washington presented an unusual case of fatal poisoning from intravenous administration of colchicine. Poison Center Staff from Oregon described a similar fatal case reported to their center the same week. Investigation of the cases by the poison centers identified a common source for the colchicine. The state and local departments of health were contacted and the source stopped administration of the colchicine. A third suspected case was identified, but never confirmed, in Portland. A drug concentration error by the supplying pharmacy in Texas was identified and a national recall of the colchicine product accomplished. No further cases were detected. *Case Discussion:* Toxicosurveillance commonly utilizes electronic data reporting and analysis to identify trends and unique clusters of cases. The use of a weekly teleconference has been described to have multiple benefits, including the ability to network with fellow professionals, discuss advances in poison identification and management, and provide opportunities for education. This report demonstrates the ability of the conference to identify a case cluster not detected by electronic methods, allowing expeditious investigation and rapid mitigation of public health risk at a regional and national level. *Conclusion:* A regional telephone conference discussing unique cases and case management can augment electronic toxicosurveillance to identify and mitigate potential public health risk from toxins.

36. Lethal Anaphylaxis to Snake Venom

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Background: Life-threatening IgE-mediated, Type I hypersensitivity (anaphylactic) reactions to arthropod venoms are well described. Less well described is their occurrence with snake venoms, even with first bites, among people incidentally exposed to snake antigens as researchers or hobbyists. Sensitization is postulated to occur via respiratory exposure to aerosolized antigens. We present a case of recurrent anaphylaxis to multiple species. *Case Report:* A 37 year old male presented to the ED via EMS, intubated, asystolic, and cyanotic, with CPR in progress. Thirty-four minutes prior to arrival, the patient called his wife stating that he was bitten on his right thumb by a captive *Crotalus horridus* (Canebrake rattlesnake, patient-identified) during routine husbandry. Fifteen minutes later, he was found unconscious and apneic. He was intubated, received CPR and regained cardiac activity in the ED after i.v. epinephrine and atropine. He developed elevated PT, INR, FDP and D-dimer, and thrombocytopenia. He was treated with epinephrine, H1/H2 blockers and steroids for anaphylaxis, and CroFab®, but remained deeply comatose and died upon withdrawal of support several days later. The patient had a history of hypersensitivity reactions to two prior snakebites. His first was by a *Crotalus lepidus* (Rock rattlesnake). He had respiratory difficulty followed by syncope 17 minutes after the bite. His second was by the African viper *Atheris ceratophorus* (Usambara bush viper). He had urticaria and near-syncope within 50 minutes of the bite. He was treated for anaphylaxis on both occasions. The patient also reported recurrent respiratory symptoms and facial angioedema when exposed to Crotalid musk. *Case Discussion:* Minor allergic respiratory symptoms around venoms or snake enclosures have been reported among venom researchers and herpetologists and anaphylaxis has been seen upon first envenomation. It is clear that potentially fatal anaphylaxis may occur among people exposed incidentally to snake antigens. *Conclusion:* Education and provision of injectable epinephrine should be considered for people at risk, even without prior envenomation or anaphylaxis.

37. Snake Envenomation in Pregnant Patients during the Fab Antibody Fragment Antivenom Era

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Background: In the United States, equine derived whole antibody antivenom, Antivenin Crotalidae Polyvalent (ACP), has been largely supplanted by a less immunogenic Fab antibody fragment antivenom, Crotalidae Polyvalent Immune Fab (FabAV). Although snakebite during pregnancy is uncommon, morbidity in the ACP era was surprisingly high, with fetal loss in the largest series reported as 43% and maternal death 10%. The purpose of this study was to investigate the outcome of envenomation in pregnant patients since the implementation of FabAV. *Methods:* After obtaining IRB approval, we searched the Texas Poison Center Network (TPCN) Database from January 2000 to December 2006 for all cases involving pregnant patients suffering from snake envenomation who were treated with FabAV. We correspondingly searched the National Poison Database System (NPDS) Database, using similar search criteria. Outcomes of interest included severity of snakebite, signs of fetal distress, maternal death and/or fetal demise. *Results:* There were four TPCN cases that met inclusion criteria for this study. The average age was 26.0 years (range 22–31 years) with an average estimated gestational age of 16.8 weeks (range 12–20 weeks). An average of 10.0 vials of FabAV (range 4–22 vials) was used per case. Average hospital stay was 4.75 days (range 3–8 days). There were no incidents of fetal distress, decreased movement or abruption in any case. There were no reported maternal deaths. Although few specifics could be obtained from NPDS data, an additional 5 cases, including 3 in the first trimester, were discovered, revealing similar outcomes with no maternal or fetal deaths. *Discussion:* None. *Conclusion:* Reporting of snake envenomation during pregnancy serious enough to require antivenom therapy is rare. Based on this small data set, fetal and maternal death rates among pregnant envenomation victims treated with FabAV appear to be substantially lower than previously reported when ACP was in use. More cases and long term follow-up will be necessary to accurately determine the long term safety of FabAV use during pregnancy.

38. Delayed Coagulopathy Secondary to Crotaline Envenomation Following Initial Control with Crotalidae Polyvalent Immune Fab: A Retrospective Case Series

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Background: Recurrent coagulopathy and thrombocytopenia after Crotaline envenomations has been previously described in patients initially controlled with Crotalidae polyvalent immune Fab antivenom(FabAV). The necessity of treatment of this recurrent coagulopathy is uncertain. We present 3cases of children 2–13 y/o with severe recurrent coagulopathy successfully treated with delayed administration of FabAV. *Case Report:* 1: 9yo M bitten on the left heel. His initial labs: INR1.56 fibrinogen(Fib)180mg/dL and platelets(PLT)177k/µL. He as treated with a total of 13vials FabAV over then next 20hrs and discharged 2days after the initial bite with normal coags. He returned on day7 with INR>7, low Fib and PLT80. He was treated twice with 1U FFP, each time with only transient improvement of his labs. After the administration of 4vials FabAV, his parameters permanently normalized. 2: 13yo F bitten on her right foot. Initial labs: INR1.2 Fib342 and PLT296. She received 16vials FabAV over 15hrs and was discharge 28hrs after her bite with normal lab parameters. She returned on day6 with INR>7, Fib35 and PLT238. She received an additional of 12 vials and was discharged on day7 with normal lab values. 3: 3yo M bitten multiple times in legs. He received 12vials FabAV prior to his first set of labs which revealed INR1.5, Fib116, and PLT194. He received an additional 10vials to stop the progression of swelling. He was discharge less then 48hrs after the bite, with INR1.5 and Fib<50. He presented to another facility on day5 with oozing form his IV site and gums. His INR was >12.0 Fib<40, PLT2, and Hgb4.9. Over the next 4days he received 30vials of FabAV, along with 6U PRBC, 3U PLT, 6U cryoprecipitate and 2U FFP. He was discharged 11days after his bite with an INR1.12 PLT78 and no further bleeding. *Case Discussion:* The 3 cases

presented reflect recurrent coagulopathy that can be seen in Crotaline bites treated with FabAV. All presented before 7days. Case 3 had life-threatening anemia from spontaneous bleeding that has not been reported. *Conclusion:* Each case was treated with additional FabAV, leading to resolution. Blood products alone may not be effective.

39. A Profile of Calls from Nursing Homes to a Poison Center

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Background: There are few data which describe the nature of poisoning exposures or calls to poison centers that involve the residents of nursing homes (NH). The objective of this study was to profile the most common exposures that occurred in NH residents so that appropriate interventions could be developed. *Methods:* A retrospective analysis of calls over an eight year period (2000–2007) from NH to a regional poison information center was conducted. The data were analyzed for age, gender, substance, reason, acuity, treatment, outcome and disposition. *Results:* Over the study period there were 1,738 (mean 217.25/year) calls from NH. Two-thirds were females (age: 81.7 ± 7.8; 60–99) and the remainder were males (age: 78.5 ± 8.3; 60–97). Unintentional exposures accounted for 86.5% of the calls. Referral to a health care facility was unnecessary in 97.7%. More than one-half of those who were referred were treated and released. No fatalities occurred. Therapeutic errors accounted for 8.6 % of the calls. The most common reasons were taking or being given someone else's medication (65.5%). *Discussion:* Most calls from NH were unintentional exposures. NH residents are vulnerable to unintentional poisoning or adverse medication reactions due to their innate frailty, co-morbidity factors, and being prescribed multiple medications. Males, although representing only a quarter of NH residents, accounted for one-third of exposed persons in nursing homes. Therapeutic errors were slightly higher in NH residents in comparison to the general population, but much lower than in geriatric non-NH residents. Given the large number of NH residents, it was surprising that the related call volume to the poison center was not larger. *Conclusion:* Understanding the circumstances, agents and the scenarios that are responsible for NH poisoning exposures will provide guidance to develop education and prevention programs that are evidence-based strategies to decrease the number of unintentional exposures and therapeutic errors. Furthermore, it appears that the poison center must make greater efforts in creating awareness of poison center services to nursing home personnel.

40. Lead Toxicity from an Ayurvedic Medication

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Background: Ayurveda ("knowledge of life") is an ancient approach to health that remains popular in parts of the Indian subcontinent; its practice includes the use of herbs and minerals for medicinal purposes. We report a case of lead toxicity in a man taking an "herbal" medicine compounded by an Ayuverdic physician in India. *Case Report:* A 29 year old man was referred to our Medical Toxicology clinic for a blood lead level (BLL) of 141 *u*g/dL. The patient reported a six year history of intermittent use of "mahavata," for leg cramps, with symptomatic relief. He stated that the medication was made by a physician living in his family's home town in central India. He had repeatedly purchased the medication and brought it back to the states, his last dose was approximately four weeks prior to our evaluation. Subsequent questioning of the Indian physician revealed that lead was being used for Ayuverdic purposes. We failed to identify any other potential lead exposure; his review of systems and physical examination were normal. Other lab tests: repeat BLL was 124 *u*g/dL, Hgb was 11.2 g/dL (MCV = 79 fL), creatinine was 0.7 mg/dL and erythrocyte protoporphyrin was > 250 *u*g/dL. He underwent 19 days of succimer therapy without side effects. Post-chelation BLL was 23 *u*g/dL, which increased to 35 *u*g/dL four days later. The patient received a second 19 day course of succimer; the second post-chelation BLL (three weeks later) was 39 *u*g/dL. Four weeks later BLL was 37 *u*g/dL weeks and Hgb was 15.2 g/dL. We decided not to chelate a third time, and his last lead level, one month later, was 33.1 *u*g/dL. *Case Discussion:* Although our patient presented with a BLL of 141 *u*g/dL he had minimal evidence of toxicity. We were unsuccessful in attempts to obtain a sample of the "mahavata" for testing. *Conclusion:* This is another example of a 'traditional" herbal medication causing lead toxicity. Blood lead concentrations do not correlate well with clinical effects.

41. Kratom: A Case of a Legal High

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Background: Kratom refers to the *Mitragyna speciosa Korth* tree native to Southeast Asia. Its leaves are chewed or dried and ground into a powder, smoked, brewed as a tea, or made into a resin extract for dose-related stimulant or sedative effects. Although it is unknown how long Kratom has been used, it is mentioned in 19th century literature as a substitute for opium as well as a cure for opium addiction. More than 25 alkaloids have been identified and recently 7-hydroxymitragynine, a minor alkaloid, has been found to be responsible for opioid agonist effects. Banned in some countries, Kratom is legal in the United States and Europe and readily obtained on the Internet. There are many reports of addiction to Kratom as well as a withdrawal syndrome. We report a case of Kratom abuse. *Case Report:* A 32 y/o male was found having seizure-like movements and foaming at the mouth. The movements persisted despite adequate Benzodiazepines and intubation. BP 99 systolic, HR 88, Temp 95° tympanic. Head CT and EEG WNL. Labs: WBC 12.5. Serum pH 7.42; electrolytes, renal function, cardiac enzymes WNL (CK 62). Serum and urine tox screens were negative. PMH: Crohn's Disease. Meds: Humira, 6-MP, Asacol and Prozac. Patient's spouse and a friend reported that patient had obtained a substance on the Internet that "is legal and can get you high." Spouse found information on *Mitragyna speciosa* on their home computer. Patient developed fever and evidence of aspiration pneumonia as well as an episode of hypotension (SBP 80s) responsive to IV fluids. After extubation about 24 hours following arrival in ED, patient admitted ingesting Kratom purchased on the Internet. *Case Discussion:* Although Kratom's availability and multiple first hand reports by users are readily available on the Internet, there are very few case reports by medical personnel or poison centers. There are no diagnostic tests available so diagnosis is made based on history and clinical presentation. *Conclusion:* This case illustrates that further study of the clinical effects and potential toxicity of Kratom is needed to better evaluate and treat these patients. Health professionals should be aware of the diverse symptomatology of these exposures.

42. Selenosis from Nutritional Supplement Formulation Error

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Background: The FDA recently issued a warning on a nutritional supplement containing excess selenium. We report 2 cases of alopecia and diarrhea with elevated selenium levels who presented prior to the FDA warning. *Case Report: Case A*. A 55 y/o female presented to toxicology clinic with a six week illness of diarrhea followed 2 weeks later with progressive hair loss. Hair loss began on the head and progressed to the axilla, genitalia, and extremities. Additional symptoms included muscle cramps, joint pain and fatigue. Evaluation revealed normal serum chemistries, hematology and no infectious etiologies. Prior to the illness she received a new shipment of a nutritional supplement. She brought this supplement with her and reported daily ingestion of 30 ml for the last 2 years. Exam revealed a healthy female with alopecia, minimal hair on her eyebrows but otherwise well appearing. Finger nails demonstrated discoloration and onycholysis. Serum selenium level was 534 mcg/L (normal 80–300 mcg/L) measured 14 days after last ingestion. *Case B*. A 57 y/o male, the husband of Case A, who also consumed 30 ml of the supplement daily. He also noted symptoms of diarrhea, fatigue, arthralgias, and hair loss. However, his symptoms were delayed and less severe than his wife's. Exam was normal except for pronounced hair loss on the scalp. A similar work-up was also normal. His serum selenium level was 300 mcg/L measured 16 days after last ingestion. Selenium testing on both patients' urine, hair, and the supplement are currently pending. *Case Discussion:* The FDA issued a warning about excess selenium in this supplement. Estimates range from 100–1000 fold increases of selenium, but this is still being investigated. These cases highlight communication between poison centers. Prior to FDA notification, a regional poison center notified our site of possible incorrect supplement formulation. This communication is another example of real time toxicosurveillance performed by poison centers. *Conclusion:* History of supplement usage, the FDA warning, and elevated blood selenium levels in these cases, makes the diagnosis of selenosis. This diagnosis was facilitated by inter-poison center communication and increased vigilance in toxicosurveillance.

43. Correlation of Altered Mental Status with Toxic Acetaminophen Exposure in Suicidal Patients Taking Acetaminophen with Hydrocodone

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Background: Surrogate markers are used in toxicology as means of estimating potential toxicity for a variety of exposures. Because hydrocodone may cause opioid toxicity, this study was undertaken to assess whether the classical signs of opioid toxicity, such as decreased mental status, correlate with combined acetaminophen (APAP)/hydrocodone exposures requiring treatment with *N*–acetylcysteine (NAC). *Methods:* We reviewed exposures to APAP/hydrocodone reported to a statewide poison control network from 2000 to 2007. Inclusion criteria were patients with a suspected attempted suicide managed at a healthcare facility. Co-exposure cases were excluded. The proportion of cases involving treatment with NAC (a surrogate measure of potential APAP toxicity) was calculated depending on whether drowsiness/lethargy, coma, miosis, or respiratory depression (markers or predictors of opioid toxicity) were reported. *Results:* Of 2,200 cases, 714 reported drowsiness/lethargy, 51 coma, 19 miosis, and 56 respiratory depression. NAC use was reported in 26.3% of cases with drowsiness/lethargy, 17.5% without drowsiness/lethargy, 52.9% with coma, 19.6% without coma, 52.6% with miosis, 20.1% without miosis, 55.4% with respiratory depression, and 19.4% without respiratory depression. Of the 765 cases in which any of the 4 clinical effects were reported, NAC was reported in 27.6%. Of the 237 cases where none of the 4 clinical effects were reported, NAC was reported in 16.5%. Sensitivities, specificities, and predictive values of the stated markers are reported. *Discussion:* In combined APAP/hydrocodone exposures, NAC treatment rates were higher among cases with reported drowsiness/lethargy, coma, miosis, or respiratory depression than in the absence of these clinical effects, although the rate was only slightly higher for drowsiness/lethargy. *Conclusion:* Reported drowsiness/lethargy, is a poor surrogate marker for APAP toxicity in patients with suspected suicidal intent who overdose on APAP/hydrocodone combination products. Coma may be a better marker.

44. Leaded and Unleaded: The Story of an Old Gunshot Wound

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Background: Establishing the diagnosis and etiology of adult lead (Pb) poisoning can be challenging. We present an adult with Pb poisoning who presented with Pb colic and an extremely high blood lead level (BLL) from a retained bullet. He required chelation therapy and surgical intervention. *Case Report:* A 44 year-old male presented with recurrent abdominal pain on five separate visits to the hospital over one month. Past history included hypertension and a gun shot wound (GSW) to the right thigh two years ago. Exam showed mild encephalopathy, diffuse abdominal tenderness, and swelling of the right thigh. Gastroesophagoduodenoscopy, abdominal computerized tomography (CT), and labs were unremarkable except for microcytic anemia. After basophilic stippling was noted on the blood smear, a BLL was sent and returned at 306 ug/dL [<10]. Chelation therapy was started with intramuscular BAL (Dimercaprol) and $CaNa_2$ EDTA infusion. Within 48 hours, his BLL decreased to 105 ug/dl. Femur X-ray showed an oval, radiodense area anterior and medial to the healed femur that contained the bullet with its separated jacketing. CT and ultrasound showed a nonvascular fluid collection within this area. The bullet and accompanying cyst were surgically removed. Cytology of the cyst showed birefringent, black crystals compatible with Pb salts. One week after completing the parenteral chelation course, BLL was 48 ug/dL. An oral chelation protocol with dimercaptosuccinic acid was started. BLL was 57 ug/dl one month later. *Case Discussion:* Retained bullets in joints or embedded in bone are rare causes of Pb poisoning. In this case, the Pb source was a bullet dissolving into a soft tissue

cyst. Important management decisions included pre-operative chelation to avoid Pb encephalopathy from Pb mobilization during surgical manipulation, post-operative chelation of Pb redistributing from bone and soft tissue compartments, accurate anatomic imaging to avoid potential intraoperative vascular complications, and timely operative removal of the Pb source. *Conclusion:* This case illustrates the potential for delayed Pb toxicity from retained bullets as well as the challenges of diagnosis and medical and surgical management decisions.

45. Whole Bowel Irrigation for Massive Jimson Weed Seed Ingestion

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Background: Jimson weed (*Datura stramonium*) is a causative agent of anticholinergic toxidrome. We report the use of WBI as a GI decontamination option for ingestion of Jimson weed seeds. Medline search yields no previous reports of WBI in this setting. *Case Report:* A 29 y.o. man arrived in the ED at 7 hrs post ingestion of Jimson weed seeds with extreme agitation and delirium. Haloperidol 5 mg was given but was discontinued based on concerns it could enhance anticholinergic symptoms. Multiple doses of lorazepam, 16 mg total, were given without resolution of agitation. Physostigmine was given at 12 hrs without response. Maximum heart rate was 105. Mydriasis and absent bowel sounds were noted; urinary retention required catheterization. UDS revealed THC only. Four point leather restraints were initiated. Sedation with propofol and lorazepam facilitated elective intubation and mechanical ventilation. Rhabdomyolysis (peak CK 1615, range 35–232 U/L) required IV fluids and alkalinization. Hyperthermia (101.8 F) was treated with ice packs and APAP. IV clindamycin and cefotaxime were administered for aspiration pneumonia. Coma, agitation, and reduced bowel sounds were cyclic, causing suspicion of unabsorbed seeds. Lavage, started at 28 hrs was continued for 32 hrs at 3 hr intervals with retrieval of a few seeds. At 60 hrs post ingestion, lavage was discontinued at PC urging in favor of WBI. Hypoactive bowel sounds were present and a cuffed ET tube was in place. WBI over 56 hrs retrieved up to 75+ seeds every 2 hrs in the rectal effluent. Pt had a full recovery by day 8. Physostigmine was not required beyond the initial dose. *Case Discussion:* Review of the 2004 Position Statement reveals no established indications for WBI though evidence exists for use in overdose of sustain release and enteric coated drugs. Jimson weed can cause sustained toxicity. Ingestion of large amounts of seeds may warrant GI decontamination at a point distant from time of ingestion. *Conclusion:* The contributory role of WBI requires further study. Evidence supporting the use of WBI for Jimson weed overdose is the large quantity of seeds retrieved.

46. Interstitial Nephritis Following an Acute Acetaminophen Overdose

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Background: Acute tubular necrosis (ATN) is the recognized injury responsible for renal dysfunction that may occur with an acetaminophen (APAP) overdose. We report a case in which acute interstitial nephritis (AIN) was responsible. *Case Report:* A 17-yr-old healthy female presented 2 days after ingesting nearly 15 grams of APAP, some in the formulation Tylenol PM (APAP/diphenhydramine). She initially had normal vitals and was tender to palpation in the RUQ. Initial lab testing: APAP 12.8 mcg/mL, AST 16023 U/L, INR 2.7, BUN 13 mg/dL, and Cr 0.7 mg/dL. Admission urinalysis (UA) revealed 27 RBCs/hpf, 20 WBCs/hpf, and no casts. IV N-acetylcysteine was begun and her liver dysfunction peaked the following day (AST 20921 U/L, INR 5.8) before progressive resolution. However, the patient developed a fever (without rash or eosinophilia), oliguric renal failure, and on the 2nd day of hospitalization hemodialysis (HD) was initiated (peak Cr 8.4 mg/dL prior to HD). A renal biopsy performed after 8 sessions of HD revealed AIN with tubular degeneration, interstitial edema, and mixed inflammatory cell infiltration with numerous eosinophils. Additional workup included a normal renal US, no growth of urine and blood cultures, a negative HIV test, and normal ANA. Steroid administration was begun and 3 weeks following the overdose, her renal function was normal. *Case Discussion:* Renal dysfunction in the setting of acute APAP poisoning has been well described as stemming from ATN. Occasionally, in the setting of hepatic failure, the hepatorenal syndrome may also occur, a diagnosis of exclusion characterized by a normal UA and biopsy. AIN may be associated with fever, rash, eosinophilia, and urine eosinophils, RBC's, WBC's, and WBC casts. AIN has only rarely been associated with APAP use, and to our knowledge never in the setting of acute overdose or in association with diphenhydramine. The identification of AIN in this case impacted management, as unlike ATN, AIN may benefit from steroid treatment. *Conclusion:* We report a case of AIN following an acute APAP overdose. Recognition that it was not ATN led to specific treatment with steroids.

47. Correlation of the Surrogate Markers of Anion Gap, Osmolar Gap, and Drowsiness to Outcome in a Large Case Series of Ethylene Glycol Exposures

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Background: It is well known that ethylene glycol (EG) contributes to the presence of both an anion and an osmolar gap. The current literature, however, does not describe the percentage of patients with EG exposures that actually have either an anion or osmolar gap or whether these clinical effects correlate with toxicity. Since drowsiness occurs in the setting of acute EG exposure, it has been suggested that its presence may also indicate patients at risk for toxic exposure. *Methods:* A review of EG exposures from a statewide poison control network from 2000 to 2007 was performed. Exposures with other substances or no final medical outcome were excluded. Cases were sorted by the reported presence or absence of one of the assumed surrogate markers of toxicity: anion gap, osmolar gap, or drowsiness. Exposures with a medical outcome of moderate or major effects or death were classified as serious outcomes. The distribution of serious outcomes by the surrogate markers was determined. *Results:* Of 726 total cases, the medical outcome was 386 no effect, 175 minor, 74 moderate, 84 major, and 7 death. Drowsiness was reported in 67 cases, an anion gap in 58, and an osmolar gap in 45. Serious outcomes occurred in 79.1% of cases with drowsiness, 17.0% without drowsiness, 96.6% with an anion gap, 16.3% without an anion gap, 97.8% with an osmolar gap, and 17.8% without an osmolar gap. Drowsiness or anion gap or osmolar gap was reported in 115 cases. Serious outcomes occurred in 85.2% of cases with any of the 3 markers and in 11.0% of cases without any of the markers. Of the 11 cases with all 3 markers, all had serious outcomes. The sensitivity, specificity, and positive predictive values were, respectively, 0.32, 0.98, and 0.79 for drowsiness, 0.34, 1.00, and 0.97 for anion gap, and 0.27, 1.00, and 0.98 for osmolar gap. *Discussion:* In this investigation of a large number of EG exposures, serious outcome rates were higher in EG exposures where drowsiness, an anion gap, or an osmolar gap were reported. *Conclusion:* Drowsiness, an anion gap, and an osmolar gap all may serve as useful surrogate markers or predictors of toxicity.

48. Agitation with Oral Baclofen Overdose

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Background: Baclofen is often prescribed for spasticity in multiple sclerosis, cerebral palsy, and spinal cord lesions. Baclofen overdose has been characterized as resulting in central nervous and respiratory system depression, hypotonia, hyporeflexia and coma. Agitation is typically associated with baclofen withdrawal. As a direct drug effect, agitation is reported in 1.3% of patients treated intrathecally, and less than 1% of patients treated orally. Agitation has been occasionally described in intrathecal overdose and only rarely in oral overdose. *Case Report:* This was a retrospective review of a single poison center's database between 1998 and 2007. Included were admitted, single-substance, acute, and acute-on-chronic, oral baclofen exposures. Overall, 33 cases met inclusion criteria. The mean age was 35 years (range: 4 months to 55 years) and 55% were female. Thirteen cases (39%) developed agitation as a clinical effect. The mean ingested dose was 261 mg. Those with agitation had a mean dose of 532 mg, and those without agitation averaged 103 mg (p=0.0997). There were no significant differences between those with and without agitation with regard to age, gender, percent receiving sedation, duration of effects, or outcomes. Some cases required parenteral sedation and/or intubation for control, and agitation persisted in some for greater than 48 hours. *Case Discussion:* Agitation following oral baclofen overdose in our series was a prominent feature, occasionally required sedation, and could be prolonged. As agitation has not been commonly described and because baclofen overdose is generally associated with CNS depression, it may not be suspected as an ingestant in patients presenting with agitation. *Conclusion:* In our case series, oral baclofen overdose was associated with agitation in 39% of patients. A larger, prospective study should be performed to confirm this finding.

49. Evaluation of Zolpidem Exposures in the Pediatric Population

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Background: Zolpidem (ZPM, Ambien®) is a nonbenzodiazepine sedative hypnotic. The purpose of this study was to evaluate pediatric, single-exposures of ZPM to describe potential adverse effects and a relationship between dose and severity of clinical outcome. *Methods:* Data from the AAPCC on ZPM exposures as reported to U.S. Poison Control Centers between Jan 1994 and Dec 2005 were retrospectively reviewed. Inclusion criteria were defined as age <18 yrs, oral single-drug ingestion of ZPM 5 mg or 10 mg tablet, known quantity ingested, documented weight and follow up to clinical outcome. Exclusion criteria were use of the controlled release formulation of ZPM and pregnancy. *Results:* A total of 1,343 exposures were reviewed and grouped based on age (< 2, 2–5, 6–12, and 13–17 yrs). The median amount of ZPM ingested was 0.49 mg/kg (range 0.40 to 22.7 mg/kg). Majority of cases were accidental 60% (n=808). Major, moderate, minor, and no effect were noted in 0.2%, 13.9%, 47.7% and 36.9% of exposures, respectively. Most cases (97%, n=1,301) involved home exposures. Clinically significant adverse effects included drowsiness (42%), ataxia (11%), vomiting (8%), dizziness (7.4%), and hallucinations (7.1%). 43% of exposures (n=582) were treated and released from a health care facility, 7.7% (n=104) were admitted to a non-critical care or psychiatric floor, 1.7% (n=23) were admitted to an intensive care unit and 4.2% (n=56) of patients refused referral or left against medical advice. No association was found between weight based dose and clinical outcome severity. *Discussion:* Pediatric toxicology of ZPM has not been well described in the literature. Extrapolation from adult data may not accurately describe overdose effects in children. Based on this evaluation, the most common adverse effects associated with ZPM ingestion in children were drowsiness, ataxia, vomiting, dizziness, and hallucinations. *Conclusion:* The majority of adverse effects from ZPM ingestion in children were considered minor and neurological in nature. A relationship regarding dose and outcome severity was not found.

50. Half-Life of Zonisamide in a Patient with an Intentional Overdose

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Background: Zonisamide, an antiepileptic sulfonamide derivative, is thought to prevent neuronal firing by blocking axonal calcium and sodium channels. It may also facilitate dopaminergic and serotonergic neurotransmission. Its half-life varies between 27 to 66 hours. *Case Report:* A 20 year-old female presented to the Emergency Department (ED) approximately 5 hours following a stated ingestion of 70×100 mg zonisamide capsules. She potentially ingested 8.7g by capsule count. The ingestion occurred at approximately 9:00am. She had one episode of emesis at 12 pm and "many" of the capsules were visualized. The patient had one additional episode of emesis. In the ED she complained of nausea, diffuse chest pain, blurred vision, dizziness, and a mild headache. Her vital signs and EKG were unremarkable. All laboratory tests were non-contributory except for a mild leukocytosis. The patient had a 5 minute episode of seizure-like activity which resolved without intervention. Activated charcoal and supportive therapy were recommended. An initial zonisamide level drawn 5 1/2 hours after ingestion was 110mg/L (therapeutic level 10–30mg/L). The patient was admitted and transferred to an inpatient psychiatric ward on hospital day 2 for further evaluation. An electroencephalogram showed no epileptiform discharges. A repeat zonisamide level 48 hours after ingestion was 38mg/L. The calculated zonisamide half-life was

30 hours. *Case Discussion:* Few cases of zonisamide overdose have been described. One case report details a patient who developed generalized seizures and cardiac arrest following an ingestion of 4.8 grams of zonisamide with a corresponding serum level of 44 mg/L. Death was secondary to anoxia and cerebral edema. In a second report, hypotension, coma and respiratory depression were noted following an ingestion of an unknown amount of zonisamide and clonazepam. The serum zonisamide level 31 hours post-ingestion was 100 mg/L. *Conclusion:* We present a patient who ingested zonisamide with resultant toxic levels. No sequelae were noted. Zonisamide's half life in this patient is within the range found in the literature. To our knowledge, this is the first time a half-life has been calculated following a zonisamide overdose.

51. Poisoning Hazards of Lamp Oils

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Background: A 1997 study demonstrated the potential for severe poisoning with decorative lamp oils: for a 20 month period ending in November 1996, 21 cases of unintentional pediatric exposures were reported. These results were reported to the US-CPSC and it was recommended that those interested in childhood injury prevention should increase public awareness of the dangers of these hydrocarbon products. The objective was to determine if lamp oil exposure epidemiology has changed in the last 10 years. *Methods:* All PCC cases involving ingestion of lamp oil from 1/1/2006 – 12/31/2007 were reviewed. *Results:* 71 cases were identified. Age: 53 patients were <6yr, 4 were 6 to 19yr, 12 were 19yr & above, 3 age unknown. Container: 12 original bottle, 17 lamp, 3 water bottle, 39 unknown. Reason: 67 unintentional general, 1 suicide, 3 occupational. Of the 14 cases with a documented chest xray, 8 had positive findings. Outcome: 39 no effect, 10 minor effect, 8 moderate effect, 2 major effect, no deaths, 11-lost to follow up (7 of which were symptomatic on initial call), 1 unrelated effect. Disposition: 44 managed on site, 1 unknown, 13 were treated and released from HCF, 8 were admitted, 5 admitted to ICU. 18 (33.9%) of patients < 6yrs were treated in HCF, 5 of which required an ICU admission (9.4%). 2 of those 5 experienced major effects: One child was intubated and developed pulmonary edema. The other developed necrotic pneumonitis, pneumothorax, and pneumomediastinitis requiring intubation with oscillation, chest tubes, and ECMO. This required a 10 week hospital admission with long term sequelae. *Discussion:* Approximately 10% of lamp oil ingestions in pediatric patients result in an ICU admission due to pulmonary sequelae. Many lamp oils are attractively colored and fragranced. Lamps and torches, which are not child resistant, may be placed in areas easily accessible to small children. *Conclusion:* Lamp oils have continued to pose a significant poisoning hazard for well over a decade. More emphasis should be directed at education regarding the dangers of these hydrocarbons and more effort should be put forth by manufacturers and government regulators to improve the safety of decorative glass candle lamps and torches.

52. Drugs Associated with Seizure in Patients Admitted to a Toxicology Treatment Center

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Background: Seizure is a serious consequence of many poisonings, and is often associated with additional complications including hyperthermia, acidosis, rhabdomyolysis, and aspiration pneumonitis. A 1993 study examined drug toxicities reported to a California poison center that were associated with seizure, and was updated in 2007. We investigated the drugs associated with seizure among patients admitted to a regional toxicology treatment center. *Methods:* We retrospectively studied all patients admitted to a toxicology treatment center over a three year period for whom seizure was noted as a complication. The majority of patients had taken an intentional overdose, though some were engaged in substance abuse or had sedative/alcohol withdawal. Through review of medical records, the medications involved, treatments provided, and secondary complications were determined. *Results:* Between 9/1/03 and 9/30/06 our toxicology service admitted or consulted on 2340 patients. Seizure was documented at presentation or during hospital stay for 121 patients. None died or had status epilepticus. In 22 cases, a seizure disorder or other underlying medical condition may have contributed to convulsive activity. Among the remaining patients, the drug most frequently associated with seizure was bupropion (19%), followed by cocaine (13%), ethanol or benzodiazepine withdrawal (11%), selective serotonin reuptake inhibitor (7%), diphenhydramine (7%), venlafaxine (6%), cyclic antidepressant (6%), and tramadol (3%). *Discussion:* Our results are similar to those published by Thundiyil (Journal of Medical Toxicology 2007; 3:15), in that bupropion was the drug most frequently associated with seizure. The Thundiyil study was based on call reports from the California Poison Center System. Our data was obtained from medical records of patients admitted to a single regional toxicology treatment center. *Conclusion:* Emergency providers, should be aware that seizures can complicate toxicity from these drugs, and that bupropion is the drug most commonly associated with seizure in poisoning or overdose.

53. Increased Poison Center Call Volume after Education to Elders

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Background: The poison center recognized a need for education outreach to people over 60 years of age (elders) after analysis of low call-volume counties showed populations of up to 31% elders. While the national average is 12% elders, several counties in the region exceeded the state average of 16% elders. An analysis of poison center data in 1999 showed 2048 exposure calls regarding elders. Age-specific penetrance (calls per 1000 population of people over age 60) for our region was 1.3. Prior to 1999, elders had not been a target for education outreach. *Methods:* Education to Elders Campaign began in 2000. Background research revealed that elders had been an underserved population for poison prevention despite their experiencing more clinical effects and hospitalizations after poisoning than other age groups. Several outreach tools and methods were developed over the past eight years. The poison center joined state and county injury prevention coalitions for elders. "*Medication and Poison Safety"* powerpoint presentation was created in conjunction with College of Nursing and coalition partners. Contact was made to Area Agencies on Aging districts and Senior Friends groups to offer presentations. Programs on various topics were taught at garden clubs, retiree civic clubs and congregate meal sites. Age-appropriate displays and promo items were used at local health fairs and large commercial events. Partner agencies such as Meals-on-Wheels and parish nurses distributed poison center materials. The poison center website added topics of interest to elders. *Results:* Each year, the Education to Elders outreach averages 30 presentations, 2000 elders reached in 12 counties, 3000 elder web-page views and 24,000 elder brochures distributed. In 2007, the call volume regarding elders rose to 3534. This resulted in an age-specific penetrance of 2.2, which reflects over a 90% increase in some counties. *Discussion:* Education for Elders has become a popular poison center outreach campaign encompassing medication safety, outdoor hazards for gardeners, poison safety for pets and herbal/medication interactions. *Conclusion:* Targeted education was successful in reaching a previously under-served population and increasing poison center call volume.

54. Survival of Verapamil-Poisoned Rats Treated with Triiodothyronine

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Background: The aim of this study was to evaluate the potential vasopressor effect of triiodothyronine(T3) in verapamil-poisoned rats. T3 mechanisms of action include: potentiation of endogenous catecholamines, improving aerobic metabolism and direct vasopressor activity. T3 has significantly decreased vasopressor requirements in critically-ill patients but has never been evaluated for verapamil toxicity. *Methods:* Based on a power calculation to demonstrate an increase of 10mmHg SBP, 2 groups of 5 Sprague Dawley rats were anesthetized, intubated and poisoned with an initial bolus and then continuous infusion of IV verapamil to maintain SBP of 55mmHg. The groups were randomized to then receive either IV NSS or T3 infusions over 60minutes. T3 dose, based on accepted resuscitation guidelines in critically-ill children, was 0.4 µg/kg bolus, followed by 1.6 µg/kg/24hr doubled every 2 minutes titrated to clinical effect. Outcome measures were SBP and survival. SBP and HR were continually recorded via arterial catheter and ECG leads. Normothermia was maintained. *Results:* All rats expired during the 60 minute period without any clinically significant difference between control and study groups. *Discussion:* This study was performed because 1) verapamil toxicity is highly lethal 2) no specific antidote for verapamil poisoning exists and 3) T3 has been reported to possess potent vasopressor effects in humans. However, despite rapidly escalating T3 doses, no significant increase in SBP was demonstrated compared with controls. The study had several limitations. The rats were significantly poisoned with verapamil using a continuous infusion throughout the study which ultimately led to death in all animals. Therefore, minute T3 effects may have been unrecognized. Also, T3 may have delayed vasopressor effects which may not have been adequately evaluated during the 60 minute period. It is also unknown whether T3 could act synergistically with other commonly used vasopressors. *Conclusion:* T3 monotherapy has no appreciable vasopressor effect in verapamil-poisoned rats.

55. Elevated Osmolal Gap after Mouthwash Ingestion

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Background: Elevated osmolal gap has been seldom reported with mouthwash toxicity. We report a case where mouthwash toxicity in a toddler resulted in a high osmolal gap along with a high anion gap. *Case Report:* A three-year-old male, with an unremarkable past medical history, was brought to our emergency department (ED) by his parents after they had noticed decreased responsiveness after he allegedly ingested 200–300 milliliters of Listerine Antiseptic Mouthwash™ (21.6% ethyl alcohol). By report, the mother had found the child next to the half-empty one liter bottle. Although the patient had vomited several times and became lethargic immediately after the ingestion, the family believed that the product was safe and that these symptoms were only transient. Approximately six to eight hours after the ingestion, the patient was found unresponsive in his crib and was immediately taken to our facility. In the ED, the bedside glucose was measured at 4 mg/dL and the nadir serum bicarbonate level was 7mEq/L. The recorded Glasgow Coma Scale was 8 and his vital signs were within normal limits. Initial osmolality was measured at 312 mosm/Kg. The initial anion gap and osmolal gap were 28 and 24, respectively. The patient's mental status and blood glucose, which rose to 285 mg/dL, rapidly improved after the hypoglycemia after treatment with dextrose. After 24 hours of hospital stay, patient's laboratory abnormalities resolved. *Case Discussion:* Ethanol is the major constituent of Listerine, making up 26.9 % of its content in a solution including water, sorbitol, caramel color, flavor additives, and other ingredients, phenolic compounds like thymol, eucalyptol and menthol. The latter are osmotically active compounds which, with large volume ingestions, could explain the elevated osmolal gap. Soo Hoo GW et al reported that large volume mouthwash ingestions cause elevated osmolal and anion gaps. In toddlers who present with high osmolal and anion gaps, the provider must consider mouthwash ingestion in the toxicologic differential diagnosis. *Conclusion:* Phenolic compounds in commercial Mouthwash may cause an elevated osmolal gap.

56. Dangers of Opioid-Containing Cough and Cold Drug Use in Children Less Than Six Years of Age

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Background: In March 2008, the FDA released a public health advisory warning against the use of Tussionex ER (hydrocodone/chlorpheniramine) in children <6 years of age due to susceptibility of life-threatening respiratory depression, a known opioid class effect. Data from a related project were used to evaluate the association between opioid-containing cough/cold

drugs and death as well as contributing factors. *Methods:* An independent expert panel reviewed available death reports of children <6 years of age with mention of cough/cold ingredient obtainable from 3 sources: English language medical literature (1949–2007), National Poison Data System (1983–2007) and manufacturer safety records (1980–2007). The panel assessed the association between death and each reported drug, estimated dose, intent of administration and potential contributing factors. *Results:* 12 (7%) of 177 fatalities reported an exposure to an opioid-containing cough/cold product (6 hydrocodone, 6 codeine), all of which the panel judged to be "related" to the medication exposure. Drug was administered with therapeutic intent in 7 (58%) cases, malicious intent in 1, self-administered in 1 and intent was unknown in 3. A supratherapeutic dose was reported in all cases where a dose could be estimated (58%). Contributing factors included the use of a product originally prescribed for an adult/older child and incorrect dose administered or prescribed. *Discussion:* Class effects of opioid-containing cough/cold medications are exacerbated by incorrect prescribing and dosing of these products. *Conclusion:* Inaccuracy in prescribing and dosing of opioid-containing cough/cold medications are contributing factors to death in children <6 years of age.

57. A Profile of Drug Identification Calls

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Background: According to the AAPCC NPDS, the number of drug identification (ID) calls to poison centers has increased dramatically. In 2002 there were 557,515 calls, compared to 948,055 in 2006; representing 16.0% and 24.4% of all calls to poison centers, respectively. The purpose of this investigation was to characterize the nature of the most common requests to a poison center for drug identification information. *Methods:* To profile the drug ID requests to a poison information center, the data from a 2003–2007 were analyzed to identify all requests for drug ID. The subset of drug ID data were extracted and analyzed to profile the requests by the specific drug, the origin of the call by county and caller type. Descriptive statistics were used to characterize the data. *Results:* Drug ID requests were responsible for 189,961 calls:12,401 (12.8% of all calls) in 2003, increasing to 58,967 (42.3% of all calls) in 2007. In 2003, there were inquiries about 1,261 different drugs and in 2007 that increased to 3,165. During all but two of the five years, substances with known psychoactive properties and abuse potential accounted for 24 of the 25 most common drug identification inquiries. Acetaminophen in combination with either hydrocodone or oxycodone dominated the requests. Oxycodone in combination with acetaminophen or alone ranked in the top three requests each year. With the exception of one year when cyclobenzaprine identification was the fifth most common request, clonazepam was always fourth and methadone was fifth. Seven counties in the metropolitan region of the poison center accounted for 82.4% of the inquiries. Rural counties more distant from the poison center urban center accounted for a lower percentage of calls relative to their population. The most common identification request each year was Mallinckrodt 512 (acetaminophen/oxycodone). *Discussion:* The most frequent requests for drug ID involved substances with abuse potential, primarily opioids, and were from the general public, not from law enforcement or health care providers. *Conclusion:* Awareness these data can provide important information to officials about substance abuse trends that may not otherwise be available.

58. Poison Control Centers' Role in the Glow Product-Related Outbreak Detection: Implications for Comprehensive Surveillance System

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Background: Development of syndromic surveillance systems to detect bioterrorist attacks as well as emerging infectious diseases has become an important and challenging goal to many governmental agencies and health care authorities. This paper utilized the sharp increase of "glow product"-related calls to demonstrate the utility of poison control data for early detection of potential outbreaks during Halloween Week of 2007. *Methods:* Electronic records of exposures reported to the New Jersey Poison Information and Education System (NJPIES) poison control hotline from 2002 through 2007 with generic code number 0201027 (glow products) set by the American Association of Poison Control Centers (AAPCC) were reviewed. Key information such as age, gender, time of the call, exposure reason, clinical effects, and medical outcomes along with telephone number, zip code, and county location were used in the analyses to determine the extent of the outbreak. *Results:* Analysis included a total of 139 glow product-related calls during Halloween week of 2007 with a single day high of 59 calls on Halloween Day. Over 90% of the glow product exposures were in children 1 to 10 years of age. The glow product-related calls on Halloween Day increased from 14 calls in 2002 to 59 calls in 2007, a 321% increase in a 6-year period. When Halloween Day occurred between Monday and Thursday, it was more likely to see a higher number of calls during the weekend prior to Halloween Day. On the other hand, when Halloween occurred during the weekend, there was less likely an increase during the week. Not surprisingly, July 4th Holiday produces the second largest increase of glow-product besides Halloween. *Discussion:* The dramatic increase of the glow-product provided an important implication in early detection of outbreak. *Conclusion:* Poison control centers in the United States are equipped with a unique and uniform input data collection system – the National Poison Data System – that provides an important data source in the development of a comprehensive surveillance system for early outbreak detection.

59. Interactive Voice Response (IVR) To Manage Drug Identification Calls

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Background: Drug identification requests (DIR) constituted 24.4% of all calls to poison centers according to the AAPCC NPDS 2006 report. DIR are documented with minimal information, but they still require an inordinate amount of work by specialists in poison information (SPI). An analysis was undertaken to identify options to reduce the impact of drug identification calls on both human and financial resources. *Methods:* All drug identification calls (2006–2007) to a poison information center were analyzed to determine call patterns and staffing impact. Inquiries were placed to other poison centers to determine how drug identification calls were managed. *Results:* DIR represented 42.3% of the poison center's 2007 call volume. The calls occurred in a pattern similar to poison exposure calls. Optimal staffing would require in excess of 4.0 full time equivalent SPI at an annual direct cost of $284,000. Utilization of an Interactive Voice Response (IVR) system, as used by another poison center, was investigated and it was determined that a one-time investment of $124,000 and annual maintenance expenses of $16,025 would be capable of responding to 50% of the drug identification calls (200 drugs accounted for 50% of the identification requests on 3,165 different drugs). *Discussion:* The IVR allows the diversion of up to 50% of the drug identification calls, enhancing surge capacity and allowing specialists to address the more emergent poison exposure calls. This technology is an entirely voice-activated response call management system that collects zip code, age, gender and drug data and stores all responses as csv. files for reporting purposes. The query bank includes the 200 most common drug identification requests and the system features text to voice synthesis that allows easy modification of the drug identification menu. Callers always have the option of engaging a SPI at any time during the IVR call flow. *Conclusion:* The IVR is an efficient and cost-effective alternative that creates better staff utilization.

60. Increasing Consultation by Specialists in Poison Information Using a Productivity Metric

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Background: The poison center functions under contract to the Department of Health. Deliverables include performing 750 critical cases with Medical or Clinical Toxicologist involvement. Average tenure of its SPIs is 11 years. Experienced Specialists in Poison Information are resistant to changing behavior. In January 2005, call regions in the state were reallocated resulting in a 19% reduction in population served. The number of critical cases fell below the deliverable. Verbal encouragement was insufficient to obtain sustained compliance. A productivity metric was developed to identify relative productivity by individual specialists focusing on contract deliverables. *Case Report:* The metric was composed of call productivity score rank, percent of call follow-up rank, percent of consultations requested rank and a single point for extra projects. Because not all SPIs are full-time, numbers were normalized to 1.0 FTE. Calculations produced an overall rank score. Scores were posted, minus name, to allow specialists to see how their productivity compared to other SPIs. Individual SPIs were provided their scores (each category and total) in a personal discussion. *Case Discussion:* Prior to institution of this metric, there was a change in management at the poison center. A need was identified to shift the work culture from the perception that SPIs should not "bother" the toxicologists to the need to keep the toxicologists informed. As could be expected, the productivity metric was poorly received by those specialists who scored poorly on it. Typical criticism was that there was no measure of "quality" included. However, follow-up calls and critical case consultation numbers did increase. The percentage of cases that received consultations approximately doubled. The increase was sustained as long as the numbers of critical case consultations were posted monthly. This metric, along with other interventions, has been successful in changing the working culture of the poison center. *Conclusion:* Use of objective measures to compare performance can result in sustained improvements in performance.

61. Impact of an Antidepressant Black Box Warning on Suspected Attempted Suicides Reported to Poison Control Centers

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Background: In October 2004, the FDA directed antidepressant manufacturers to include a black box warning about an increased risk of suicidality in children and adolescents. This study sought to determine if this black box warning affected suspected attempted suicides reported to poison control centers. *Methods:* Suspected attempted suicides with patients age 13 years or more reported to 6 poison control centers during 1998–2007 were extracted. The cases were divided into those with teens (13–19 years) and adults (20 years or more). The total number of suspected attempted suicides, those involving any antidepressant, and those involving any selective serotonin reuptake inhibitor (SSRI) in each age group were identified for each year and examined for annual trends by calculating the percent change in the number of cases from the preceding year. *Results:* For 1999–2004, the mean annual change from the previous year was +1.5% for total teen cases, +8.4% for total adult cases, +9.3% for teen antidepressant cases, +11.1% for adult antidepressant cases, +9.8% for teen SSRI cases, and +15.4% for adult SSRI cases. Compared to 2004, the number of cases in 2005 changed by −7.8% for total teen cases, −0.9% for total adult cases, −15.2% for teen antidepressant cases, −11.3% for adult antidepressant cases, −19.7% for teen SSRI cases, and −16.2% for adult SSRI cases. For 2006–2007, the mean annual change was +1.7% for total teen cases, +2.7% for total adult cases, −8.5% for teen antidepressant cases, +1.1% for adult antidepressant cases, −5.8% for teen SSRI cases, and +2.9% for adult SSRI cases. *Discussion:* The number of total suspected attempted suicides and those involving any antidepressant or SSRI increased for both teens and adults during 1998–2004. The number of cases for all of the groups declined in 2005. The number continued to decline for teen cases involving any antidepressant or SSRI in 2006 and 2007. *Conclusion:* The black box warning on antidepressants may have resulted in an overall decline in the number of suspected suicides reported to poison control centers, particularly those involving teens and antidepressants, especially SSRIs.

62. Acetaminophen Poisoning with a Difference

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Background: In Australia, patients presenting within 8 hours of acute acetaminophen (APAP) poisoning are usually managed with a 20 hour intravenous infusion of N-acetylcysteine (NAC). NAC is started if the time of ingestion is unknown or presentation is delayed more than 8 hours post-ingestion. The liver function and coagulation profile are repeated to determine if NAC should be continued to limit the degree of hepatic injury. We report a patient with altered APAP pharmacokinetics requiring a prolonged administration of NAC. *Case Report:* A

45 year old, 70 kg female with T4 paraplegia, ingested 100 g of immediate-release APAP, 10 mg alprazolam and 200 mg diazepam. The time of ingestion was unknown. The initial serum APAP level was 3716 micromol/l. She was commenced on a 20 hour intravenous NAC infusion (total dose 300 mg/kg). The acetaminophen level remained elevated for 62 hours post-admission and required prolonged treatment of N-acetylcysteine. She developed biochemical signs of hepatotoxicity 41 hr post presentation. INR peaked at 2.9, while her ALT peaked at 7211 IU/l and AST 5367 IU/l (see Table). Her admission was complicated by a transient thrombocytopenia and leukopenia. It was subsequently elicited that the time of ingestion was at least 12 hours prior to presentation.

Acetaminophen level and liver function since admission

Time post-admission	0	6	14	23	29	35	41
APAP (umol/l)	3716	2923	2550	3128	3249	1938	1288
ALT (IU/L)	37	52	61	94	108	167	245
AST (IU/L)	34	32	40	87	62	89	135
INR	1.2	1.6	1.7	1.9	1.9	2	2.1

Case Discussion: This patient exhibited delayed and prolonged APAP absorption after ingestion of >1g/kg which, we theorize, may have been due to due to gastroparesis or partial paralytic ileus. Her reduced gut motility may have played a role in redvtucing early peak serum APAP levels thus limiting the degree of hepatotoxicity. The development of hepatotoxicity most likely reflects her late presentation post-ingestion. Thrombocytopenia has been reported in patients with acute APAP poisoning. However, there are no reports of leukopenia developing post APAP poisoning. *Conclusion:* In conclusion, this is a massive acute APAP ingestion in a T4 paraplegic patient with a delayed absorption, requiring a 3 day intravenous infusion of N-acetylcysteine.

63. Surveillance of Maternal-Fetal Exposures in California

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Background: Animal studies function as a screen for human teratogenicity, however, interspecies differences and circumstances of exposure are not always consistent for accurate extrapolation to humans. Poison control centers offer unique opportunities to track human exposures during pregnancy. *Methods:* A retrospective review of 974 pregnancy-related cases in the California Poison Control System from the year 2006 was performed. *Results:* Pregnancy related calls accounted for 0.32% of all calls received by the California Poison Control System.When reported, 42% of those in the 13–19 year old age group were in the first trimester, 25% were in the second trimester, and 29% were in the third trimester. In comparison to the over 20 year old group of known gestation, 33% of those were in the first trimester, 36% were in the second trimester, and 30% were in the third trimester. In contrast, 52% in the younger age group required management in a health care facility, whereas 19% required this management in the 20 years and older group. Of total callers, 7.7% were exposed to more than one substance and 63.7% were via route of ingestion and 22% were exposed via inhalation. No protocol for follow-up to birth was recorded. Teratogen information calls accounted for 0.04% of total information calls in California. When compared to the California Teratogen Information Service records, no reported calls were recorded as referrals from the poison control center. *Discussion:* There is a vital need to partner with teratogen registries for exposures during pregnancy, in order to further follow up and accurately assess fetal implications, and risk from both maternal and gestational ages. *Conclusion:* Validated scientific data on exposures during pregnancy remains a significant public health need. The high call volume and types of exposures received by poison control centers provide a unique opportunity to assess risks to the maternal-fetal environment and establish community partnerships.

64. Severe Acetaminophen Poisoning with Therapeutic Dosing in a Child with an Undiagnosed Genetic Disorder

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Background: A case of severe acetaminophen poisoning in a child receiving therapeutic doses of acetaminphen over a 24 hrs. *Case Report:* 2yo male w/ hx hydrocephalus, V-P shunt, hypertonia, epilepsy, and motor delay, presented to his PMD w/ 1 day of low-grade fever and a self-limited, generalized convulsion. EMT transported him to the ED, where he had another generalized convulsion treated w/ 2 doses of lorazepam. He was admitted for Klebsiella UTI confirmed by lab studies. Head CT was negative. Admission labs: AST 24 U/L, ALT 25 U/L, and total bilirubin 0.4 mg/dL, with normal electrolytes and blood counts. He was started on cefotaxime for his UTI, and acetaminophen 10 mg/kg/dose po Q4 hours around-the-clock to prevent fever. After 24 h, he was lethergic w/ AST 36755 U/L, ALT 18705 U/L, total bili 1.1 mg/dL, NH3 122 µMol/L, and APAP 46 mg/L. APAP dosages were confirmed by nursing documentation, pharmacy records, and medicinal formulations with cumulative dose 60 mg/kg over 24 h. Serologies for hepatitis, EBV, CMV, varicella, and HIV were negative. Autoimmune etiologies were ruled out. Liver biopsy revealed centrilobular necrosis, consistent with APAP poisoning. Oral N-acetylcysteine was started 140 mg/kg, followed by 70 mg/kg Q4 hours. N-Ac was continued for 11 days. On day 11 AST was 62 U/L, ALT was 419 U/L, and total bilirubin was 0.7, with a peak of 2.6. Mental status improved to baseline. Genetics consultation revealed an undiagnosed LCHAD (Long-chain 3 hyroxyacyl CoA Dehydrogense) deficiency, an enzyme defect in the beta-oxidation cycle resulting in an inability of the liver to break down fatty acids into usable energy. *Case Discussion:* LCHAD deficiency can present with as hypoglycemia, lethargy, hepatic failure. Further genetic testing revealed his LCHAD deficiency was due to an autosomal recessive energy-compromising mitochondrial DNA defect, such that his liver was unable to tolerate the stress of repeated therapeutic dosing of acetaminophen, resulting in severe poisoning with therapeutic dosing. *Conclusion:* This child withstood severe liver toxicity from therapeutic doses of acetaminophen, secondary to an undiagnosed genetic defect.

65. Recovery of a Symptomatic Patient Abusing Zolazepam

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Background: Veterinary medicines are unfamiliar to many physicians and might not be suspected in an overdose. Accesses to veterinary drugs are readily accessible and may be abused. Zolazepam is a veterinary anesthetic for many species of animals. Human exposures to zolazepam are extremely rare and with only two known cases of a fatal zolazepam exposure in the literature. A 3rd case report describes a potential exposure, but no serum or urine levels were obtained. In one fatal case a postmortem serum level of 3.3 mcg/mL was documented and in the second fatal case a blood level of 1.71 mcg/mL and a urine level of 1.33 mcg/mL were reported. We describe the first known case of a symptomatic patient with quantitative serum and urine zolazepam levels who fully recovered. *Case Report:* A 29 year-old, 80 kg male veterinarian employee arrived to the ED following an acute injection of an unknown IV veterinary preparation which he had obtained from the animal clinic where he worked. The medication suspected initially to be involved was the tranquilizer named xylazine. The patient presented to the ED lethargic and in a fugue state. His vital signs were HR=81, BP=110/66, RR=18, T=97.1 F, and O2 sat 94% on room air. Urine immunoassay screening was negative for common drugs of abuse. The subsequent laboratory evaluation revealed serum and urine zolazepam levels of 0.12mcg/mL and 0.87mcg/mL, respectively. Xyalazine levels were undetectable. The patient fully recovered after appropriate supportive measures and was discharged one day later. *Case Discussion:* Zolazepam is used in veterinary medicine as an anesthetic agent and is structurally related to benzodiazepines. Zolazepam is usually administered in combination with other drugs such as xylazine an alpha-2 adrenergic receptor agonist. *Conclusion:* We report the first known case of human injection of zolazepam with quantitative serum and urine levels who was symptomatic but recovered with supportive management. Human poisoning with veterinary pharmaceuticals are rare, may present with unusual toxidromes, and may require comprehensive toxicological analyses of blood and urine specimens in order to confirm the exposure if warranted.

66. Puffer Fish (Tetrodotoxin) Poisoning in Chicago, IL

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Background: Tetrodotoxin (TTX) poisoning from eating puffer fish has rarely been reported in the continental United States. We present a case of such poisoning that occurred in Chicago, IL. *Case Report:* A 47-year-old woman with no significant past medical history, presented to the ED 6.5 hours after eating a soup that she prepared containing locally purchased puffer fish. The soup was prepared for her family, but she primarily consumed it. Within approximately 30 minutes of ingestion, she developed nausea and vomiting that was followed by lower extremity weakness and perioral and extremity numbness and tingling. The vital signs were unremarkable. The physical examination revealed generalized paresthesias, extremity weakness, and gross trunchal ataxia. The laboratory evaluation revealed no abnormalities. She was admitted to the hospital for close observation and supportive care. There was no progression of symptoms, and she did not require ventilatory support. The sensory deficits resolved within 24 hours. The motor deficits persisted and required inpatient rehabilitation. Testing of the soup, after the reporting to and involvement of local and federal agencies, revealed the presence of tetrodotoxin. The patient's husband, who ate a smaller portion of the soup than she did, developed similar but milder symptoms that lasted approximately one week. He did not require hospital admission. The patient's daughter, who ate a very small amount of the soup, remained asymptomatic. *Case Discussion:* Puffer fish is considered a delicacy but must be prepared properly to reduce the risk of TTX poisoning. TTX poisoning is well documented and accounts for the majority of food poisoning deaths in Japan. In the United States, only licensed establishments can serve puffer fish, and imported puffer fish must be certified as toxin-free. This report represents a case of tetrodotoxin poisoning in the continental United States despite such precautions. *Conclusion:* We report a case of puffer fish (tetrodotoxin) poisoning in the continental United States.

67. Beware the Pygmy Slow Loris?

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Background: Very few venomous or poisonous mammals are thought to exist. The slow (*Nycticebus coucang*, *N. bengalensis*) and pygmy slow (*N. pygmaeus*) lorises are nocturnal primates native to Southeast Asia. They are believed to produce a toxin from modified apocrine sweat glands located near their elbows. When startled, slow lorises lick their brachial glands and also apply the exudates to their heads. Medical literature reveals only 1 report of a human slow loris bite, which culminated in anaphylactic shock. We present the first case of a pygmy slow loris (PSL) bite. *Case Report:* A 34 year-old woman, 19 weeks pregnant, was evaluated in the emergency department (ED) after she was bitten on her left index finger by a PSL at the zoo where she works. She noted at least one hole in her glove and a small amount of bleeding from her finger. Immediately after the bite, she expressed blood from the wound and cleaned it with iodine. In the ED, she reported pain at the bite site and finger stiffness, but denied fever, rash, chest pain, dyspnea, or abdominal cramping. Exam revealed 3 small puncture wounds to her left index finger with mildly diminished sensation distal to the bite. Bleeding, drainage, and erythema were absent. Treatment included irrigation and a wound dressing. Bedside ultrasound confirmed normal fetal heart tones. After ED observation, the patient was discharged with clindamycin. Instructions were given to observe for an allergic reaction due to history of urticarial reactions to penicillin, sulfa, erythromycin, and anaphylaxis to tree nuts- for which she carried an epinephrine autoinjector. *Case Discussion:* The specific nature of the PSL's toxin remains unclear. Some suggest that the slow loris uses a lower jaw tooth comb to introduce its toxin, qualifying it as a venomous mammal. Research showing homology between the brachial gland secretions and domestic cat allergens may account for anaphylaxis in susceptible individuals. *Conclusion:* This is a unique case of a PSL bite, not previously reported in the medical literature. Despite our patient's history of severe atopic disease and prior exposure to PSLs, she did not experience anaphylaxis.

68. Delayed Pulmonary Edema from Oxycodone HCL in a 14 Month Old Child

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Background: Oxycodone HCL is an opiate analgesic indicated for the management of moderate-to-severe pain. We report an infant who developed delayed pulmonary edema (PE) following an unintentional ingestion of one 40 mg controlled release (CR) tablet. *Case Report:* A 14 month old boy presented to an ED after ingesting one of his mother's 40 mg oxycodone HCL CR tablets (Oxycontin CR®) 5 hours PTA. He was asymptomatic with BP 110/70, HR 120, respirations of 15/min, afebrile with an O2 sat of 99%. In the PICU at 5.5 hr PI, his respirations decreased to 5/min, became comatose with miotic pupils and his O2 sat decreased to 89%. Improvement in his consciousness and respirations occurred when 1 mg of IV naloxone was administered and repeated 20 min later. At 8.5 hr PI, improvement in his respiratory and mental status re-occurred following an another dose of naloxone. A CXR showed PE at this time. At 18 hr PI, IV epinephrine and albuterol was given to treat stridor and at 27 hr PI, IV methylprednisolone was given to treat his wheezing/rales. He gradually improved the following day and was discharged 3 days PI without sequelae. *Case Discussion:* This is a rare case of an infant who developed delayed respiratory depression leading to pulmonary edema following an unintentional ingestion of only 1 oxycodone HCL CR tablet. Although the peak blood concentration of CR oxycodone HCL in adults has been reported to range from 2.1–3.1 hrs, peak effects can last 24–36 hrs. The biological t 1/2 ranges from 4.5–8 hours. This case demonstrates that an ingestion of only one oxycodone HCL CR tablet can produce delayed pulmonary edema in a young child. Children who unintentionally ingest any amount of oxycodone HCL CR tablet should be monitored in a PICU and given smptomatic and supportive care including naloxone therapy. It is prudent to monitor asystomatic children for at least 24 hrs for this type of ingestion. *Conclusion:* We report a rare case of delayed pulmonary edema following an unintentional ingestion of only one oxycodone HCL CR tablet. Children who unintentionally ingest any amount of oxycodone HCL CR tablet should be observed in a PICU for at least 24 hours.

69. Pharmacists *Preventing* Opioid-Induced Adverse Drug Events: Case-Control Versus Voluntary ADE Reporting

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Background: Adverse drug events (ADEs) with opioid analgesics are not uncommon and can increase morbidity and mortality. Voluntary reporting has been shown to underestimate ADEs, and relying on this information can be dangerous. This study outlines one approach to this challenge that led to effectively lowering the incidence of opioid-induced adverse events. *Methods:* All cases for which naloxone was removed from the automatic dispensing cabinet over a three-month period were reviewed. ADE rates for each opioid were calculated using adjusted patient days. Promethazine was identified as a contributing factor and targeted for intervention.Opportunities for improvement were identified and implemented, and the review was repeated during the same three-month period the following year. *Results:* The number of cases of naloxone use was decreased from 1.08 events per 1000 patient days to 0.28 events per 1000 patient days ($p<0.0001$; OR 3.86; 2.55–5.85). Incidence rates of opioid-induced respiratory depression for individual agents were reduced from 0.07% to 0.03% with hydromorphone, from 0.06% to 0.01% with transdermal fentanyl, from 0.02% to 0.01% with morphine and from 0.14% to zero with meperidine. During the initial review, there were 3 cases of naloxone use voluntarily reported and 7 cases after intervention. *Discussion:* The increased focus on naloxone use led to a decrease in the use of the drug, and educating medical professionals on ADE reporting likely led to the increase in reporting. Even with this increase, voluntary reporting provided only a small fraction of the data required to make appropriate interventions. *Conclusion:* Examining all patients receiving a reversal agent can reveal specific issues not evident within the voluntary reporting system. The voluntary reporting system is subject to many issues of confounding and bias, which can result in inappropriate interventions.

70. The Use of "Clinical Effect-Other" in the Coding of Poison Center Cases

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Background: Poison control centers (PCCs) in the U.S. submit data on clinical effects experienced by patients to the National Poison Data System (NPDS) using definitions provided by NPDS. When a code is not available for a clinical effect, that clinical effect is coded as "other". This option provides no further explanation although the basis for this selection should be clear in the documentation of the written note. The coding section of each case is submitted electronically to NPDS, while the written note is not. We have summarized the most common uses of the code, "clinical effect-other" on 300 cases submitted by a single PCC over the course of a year. *Methods:* Twenty-five random cases from a regional PCC with "clinical effect-other" coded were selected for each month in 2007. A single reviewer recorded the possible clinical effects coded as "other" by comparing all clinical effects documented in the written note with those coded in the case. *Results:* Of the cases reviewed 69% used "clinical effect-other" incorrectly. The most frequently miscoded clinical effects were sick/not feeling well (13%), intoxicated(9%), and pain (6%). Out of the 31% coded correctly, patient was "dry" (13%), insomnia (10%), and skin discoloration (7%) accounted for the majority of the cases. *Discussion:* One issue identified was the use of "other" to code a cluster of clinical effects, rather than coding specific effects separately. For example "sick/not feeling well" should be coded as nausea, vomiting, etc. Another common mistake was coding "other" even though a code for the clinical effect was available. Explanations for these results include lack of clarification of clinical effects by PCC staff, ambiguity of clinical effect definitions in NPDS, or staff unaware that the clinical effect already exists in NPDS. *Conclusion:* The use of the code "other" does not add significant information for the purposes of surveillance or research. To minimize the use of "clinical effect-other", clinical effects need to coded individually when possible, NPDS definitions need to be clear and in some cases further defined, poison center staff need to be aware of the definitions, and adding new clinical effects to NPDS should be considered for effects commonly coded correctly as "other".

71. Beetlejuice Beetlejuice Beetlejuice!

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Background: Cantharidin, podophyllin, and salicylate are components used in topical wart treatment. Their dermatologic effects are well documented, but cases of ingestion are rare. We report a case of a 3 yo male who developed severe multi-system organ toxicity after ingestion of a wart remover. *Case Report:* A 3 yo previously healthy male presented to the ED shortly after ingesting no more than 5 mL of a wart remover containing cantharidin 1%, podophyllin 5% and salicylic acid 30%. Hematemesis developed, and concern for airway edema necessitated early intubation. Initial studies revealed WBC of 16,000/mm^3 and platelets 494,000/mm^3. O_2 saturation was 100%, T 36.1°C, HR 150, RR 20, and BP 98/53. Salicylate level 9.5 hours post ingestion was 5.8 mg/dL. Oropharyngeal and esophageal burns were noted on endoscopy. Hypotension and tachycardia required IV fluid and dopamine. An echocardiogram on day 4 revealed ventricular ejection fraction of 35%. He suffered transient renal insufficiency. WBC peaked at 52,800/mm^3, and platelets diminished to 40,000/mm^3 despite multiple transfusions. Liver transaminases elevated slightly. Acidemia persisted for 4 days. He suffered intermittent fevers with a T_{max} of 39°C. Hematologic, hepatic and renal parameters returned to normal by 2 weeks. However, delayed sensorimotor neuropathy, along with global encephalopathy were observed. At discharge, 78 days post ingestion, patient's cognitive function returned to baseline and sensorimotor neuropathy continued to improve slowly, although he continued to have residual deficits. *Case Discussion:* Cantharidin is a compound extracted from various beetles, which is thought to interfere with mitochondrial respiration or activate a latent cytosolic protease. Podophyllin is a mixture of resins which exhibits toxicity by arresting cell mitosis. A previous case report demonstrated an accidental ingestion of podophyllin in an 18-month-old who suffered severe, permanent developmental delay and incomplete gross motor skill improvement. This case demonstrates an exposure with complete return of cognitive function and continued improvement in sensorimotor neuropathy. *Conclusion:* Podophyllin and cantharidin, even in small amounts, can cause severe multi-organ toxicity with variable recovery from delayed sensorimotor neuropathy.

72. A Pilot Study Using a New Point of Care Test for Methanol

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Background: Serum methanol concentrations are available at few hospitals. Treatment decisions are made on a history alone or based on surrogate markers, which in themselves may not be available at many facilities. Additionally, surrogates may not be reliable in small or late ingestions. *Methods:* In a pilot study, to validate a novel point-of-care test (POCT) for methanol, we used the new POCT to determine qualitative methanol presence in sera from patients. Twelve samples with known methanol concentrations as determined by gas chromatography (GC) ranging from 0.8 mmol/L to 106 mmol/L from 2 different overdoses were tested. 5 samples from patients known to have negative methanol concentrations were also tested. Finally, an ethanol standard was used to determine cross reactivity. The testing technician was blinded to the GC results. A second study is underway using a convenience sample of consecutive emergency patients presenting with a decreased level of awareness comparing finger prick POCT results with serum methanol concentrations in the same patients. *Results:* Preliminary results from the pilot study show good correlation between the two methods. 9 of 11 patient samples, positive by POCT, were also positive by GC. Those 2 that were reported as negative by GC had detectable methanol but were below the reporting limit, suggesting increased sensitivity of the POCT method. There were no false positives or negatives. Spiked ethanol samples showed no cross reactivity. Emergency patient recruitment is ongoing. *Discussion:* In the real clinical setting, to have a reliable, reproducible point of care bedside test when serum methanol levels are unavailable, would obviate either empiric treatment with ethanol or fomepizole or expensive transfer of the patient to a facility where testing is available. *Conclusion:* A sensitive point of care bedside methanol test exists which can be used to determine the presence of significant methanol concentrations. Further evaluation of the POCT is needed to understand its place in the treatment of the methanol exposed patient.

73. Sotalol-Induced Tosades de Pointes Treated wtih Hemodialysis

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Background: Sotalol is a unique beta-adrenergic antagonist that blocks the delayed rectifier potassium current responsible for repolarization. It can prolong the QTc interval predisposing a patient to developing torsades de pointes (TDP). Hemodialysis (HD) is a seldomly reported therapy for sotalol-induced TDP. *Case Report:* A 77-year-old man with a history of history of prostate cancer and end-stage renal disease was admitted to the hospital due to osteomyelitis and an epidural collection in the lumbar spine region. He was started on daily sotalol 40 mg orally for atrial fibrillation 2 days prior to transfer to a tertiary care facility. During hospitalization his telemetry showed TDP which was treated with defibrillation to normal sinus rhythm. A12-lead electrocardiogram showed a QTc interval of 717ms and QRS interval of 104ms. The patient was intubated, given norepinephrine for hypotension, and amiodarone and lidocaine for recurrent TDP. Labs included potassium 5.1 mEq/L, magnesium 3.3 mg/dL, calcium 9.1 mg/dL, BUN 114 mg/dL, creatinine 10.4 mg/dL. He continued to have multiple episodes of TDP with persistently prolonged QTc interval. The regional poison control center was contacted. Two grams of intravenous magnesium sulfate was recommended as well as HD. After HD, the patient had no further episodes of TDP. QTc shortened to 558ms following one 4-hour dialysis session, and subsequently to 398ms after a second 4-hour session. The patient became hemodynamically stable and vasopressors were no longer required. *Case Discussion:* Sotalol-induced TDP may be difficult to treat. The serum half-life of sotalol in a patient with normal renal function is 7 to 18 hours and may increase to 40 to 110 hours with renal failure. Sotalol is unique compared to other beta-adrenergic antagonists because it has a low volume of distribution (1 L/kg) and low protein binding making it amenable to HD. *Conclusion:* It appears that HD may be considered in the treatment of sotalol-induced TDP refractory to standard therapies. Further work is necessary to determine the utility of HD for sotalol toxicity.

74. Falsely Elevated Lactate Measurement after Ethylene Glycol Ingestion

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Background: Obtaining a bedside lactate on patient while performing an arterial blood gas analysis is becoming a more common practice. We report a case of a patient who had a false positive lactate assay after ethylene glycol ingestion. *Case Report:* A 27 year old male presented approximately 7 hours after reportedly ingesting 20 ounces of antifreeze along with an unknown quantity of alprazolam and escitalopram. The patient was confused with slurred speech and generalized weakness. A point of care lactate was run from an arterial sample on a Radiometer ABL725 analyzer (Radiometer America; Westlake, OH) and a value of 27 mmol/L was obtained. A lactate value of 1.48 mmol/L was confirmed using a lactate oxidase enzymatic methodology. After dialysis another arterial sample was run on the Radiometer 725 and lactate was measured at 2.4 mmol/L. The patient's initial ethylene glycol level was measured at 1559.9 mg/L. *Case Discussion:* Lactate sensors in certain point of care blood gas analyzers are sensitive to glycolic acid and glyoxylic acid, therefore these tests can falsely report ethylene glycol metabolites as lactate causing a false positive reading. In addition, many hospitals lack access to gas chromatography methods for evaluating ethylene glycol levels. Most hospital toxicology laboratories do not measure both ethylene glycol and its major metabolite, glycolic acid. This can result in misdiagnosis of ethylene glycol exposure in patients presenting late after exposure. For these reasons a positive point of care lactate test could serve as an early clue to ethylene glycol exposure in an unknown ingestion and be the only evidence of a late presenting ethylene glycol ingestion. *Conclusion:* We report a case of a falsely elevated lactate reading after ethylene glycol ingestion.

75. Black Widow Envenomation Presenting as Possible Barbiturate Withdrawal

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Background: Urine drug screens (UDS) are often performed in the treatment of patients with symptoms of unknown origin which might be related to a toxic exposure. While the UDS may have some utility in specific cases, it is unusual for a positive screen to have a significant impact on patient outcome. *Case Report:* A 14 year old male presented to the emergency department following a 24 hour illness which was worsening. Symptoms on presentation included diaphoresis, irritability, tachypnea, abdominal cramping, and tremor. Among other labs, a UDS was performed and was positive for barbiturates. Though the patient denied any drug use and was not on any medications therapeutically, the physician made a presumptive diagnosis of barbiturate withdrawal. Lorazepam was administered, and the patient was transferred to a tertiary care facility. Symptoms had worsened, and now included severe abdominal pain, respiratory distress, and paresthesias in the lower extremities. After consultation with the poison center, questions about other potential exposures and symptoms were asked. The patient described an unknown insect or spider bite on his leg the previous day while hunting, and a family member described urinary retention the previous evening. A black widow bite was suggested as a possible alternative explanation. Intravenous morphine and benzodiazepines were initiated, with mixed results. Administration of black widow antivenin was suggested; after one dose all symptoms rapidly and markedly improved. The rest of his hospital stay was uneventful and he was discharged 2 days after antivenin administration. Further testing revealed that no barbiturates were present in the original urine sample. *Case Discussion:* Additional information obtained in the more detailed history was crucial to the correct diagnosis of this patient. Because of this, definitive therapy was able to be provided. *Conclusion:* The clinician should be aware that screening for drugs of abuse may lead to misdiagnosis. Treatment of the poisoned patient should focus on good symptomatic and supportive care, and specific antidotal therapy when warranted. Additionally, a careful history should be elicited to aid in diagnosis.

76. Therapeutic Misadventure of High Dose Insulin without Adverse Effects

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Background: High dose insulin (HDI) is used to treat beta blocker (BB) and calcium channel blocker (CCB) overdoses. We report a therapeutic misadventure utilizing HDI therapy for a multiple drug ingestion without adverse effects. *Case Report:* A 32 year old (150kg) female ingested 100 tablets of clonazepam 0.5mg in a suicide attempt. She vomited and then ingested an unknown amount of Trichlor, Toprol, and Norvasc. Initial HR was 130/min and BP was 94/49mm Hg. She was lethargic and had slurred speech, PE was otherwise negative.Tox screen, APAP, salicylate, and blood alcohol levels were negative. Basic chemistry revealed an elevated blood glucose of 182mg/dl. Despite receiving 2 grams of calcium chloride and 2 liters of saline over 45 minutes the patient's HR and BP dropped to 64/min and 73/36mm Hg, and MAP to 45/min. HDI was recommended at 1unit/kg bolus followed by an infusion of 1 unit/kg/hr, and to increase the infusion as needed up to 10 units/kg/hr to maintain a MAP>65. An infusion of D10 was begun. Confusion regarding the maximum insulin dosing occurred and over the next 10.5 hours, the insulin infusion was increased incrementally to a dose of 2500 units/hr. The patient was sustained at this dose for approximately 3.5 hours. Blood glucose was measured every 10–15 minutes, and only one hypoglycemic event of 57mg/dl occurred while the patient was on the initial HDI infusion rate of 160 units/hr. Hypoglycemic symptoms did not occur. This was corrected to a level of 162mg/dl with 50 ml of D50. Potassium ranged between 3.2 to 4.6 mmol/L. The HDI infusion was stopped without taper after 10.5 hours. BP maintained without further pressor support. Supplemental dextrose was required for 24 hours after discontinuation of the insulin infusion. *Case Discussion:* This is the highest reported dose of insulin given to a patient therapeutically for treatment of drug overdose. Although given in error, the patient did not experience adverse complications or require excessive glucose or potassium supplementation. *Conclusion:* This experience suggests that the therapeutic upper limit of insulin dosing is unknown. Glucose and potassium transport mechanisms in HDI may be a saturable process limiting supplementation requirements.

77. Buprenorphine-Induced Respiratory Depression Reversed by Naloxone in a 2-Year-Old

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Background: Uncertainty exists whether respiratory depression caused by buprenorphine is responsive to naloxone. We present a pediatric case of buprenorphine-induced respiratory depression successfully reversed by naloxone. *Case Report:* A 2-year-old girl was brought to the emergency department (ED) a few hours after ingesting buprenorphine 8mg/naloxone 2mg (Suboxone (R)). The uncle reported the child to be "sleepy and gasping." On arrival to the ED, she was lethargic, with 2 mm pupils and a respiratory rate (RR) of 20 breaths per minute (BPM). Bedside glucose was 101 mg/dL. Laboratory tests were significant for serum CO2 of 18 mmol/L, anion gap of 22, and urine drug screen (UDS) negative for opiates and other drugs of abuse. One hour later, her RR decreased to 16 BPM. Naloxone 1mg IV was administered in three successive doses spaced one minute apart. The child became awake and alert with a RR of 20–26 BPM after the last dose. She was started on a naloxone infusion at 2 mg/hour and transferred to a tertiary care facility. The naloxone infusion was discontinued 15 hours post-exposure, and the patient remained awake and alert without further respiratory depression. Repeat UDS was negative and her anion gap normalized to 14. She was discharged home after 24 hours of observation. *Case Discussion:* This case demonstrates buprenorphine's ability to produce clinically significant respiratory depression in a child. This potentially life-threatening adverse effect was successfully reversed with a high weight-based dose of naloxone. A continuous infusion of naloxone appeared to prevent recurrent respiratory depression in this child. Previous pharmacokinetic studies evaluating the relationship of buprenorphine and naloxone for the mu receptor support the effectiveness of this regimen. *Conclusion:* While buprenorphine is thought to demonstrate slow dissociation from the mu receptor, naloxone was shown to be effective in reversing the respiratory depression in this patient. Future studies are necessary to determine consistency of response to buprenorhpine-induced respiratory depression by naloxone and proper dosing.

78. Anuric Renal Failure, Pancreatitis, and Acute Respiratory Distress Syndrome in *Bothrops venezuelensis* Envenomation

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Background: Bothrops envenomations cause significant morbidity and mortality resulting in more fatalities in the Americas than snakes of all other genera. Envenomation by the Venezuelan Lancehead, *Bothrops venezuelensis*, has rarely been reported, and this case is the first documented case in the US. *Case Report:* A 56 year-old male amateur herpetologist was bitten on the 3rd digit of his right hand by *Bothrops venezuelensis.* His history included 26 prior envenomations by various species of North, Central, and South American Crotalids and Colubrids, African vipers, and Asian pit vipers. Within minutes he injected 1 mL of polyvalent antivenom (Instituto Clodomiro Picado-Polyspecific, Costa Rica) at the bite site. Eight hours later he had nausea, vomiting, abdominal pain and oliguria. At 24 hrs he presented to the ED, was afebrile, mildly hypertensive, and in no acute distress. The bite site was oozing serous fluid, with swelling and erythema extending to the elbow. Initial labs included creatinine 4.8 mg/dL, INR 3.26, D-dimer 6860 ng/mL, fibrinogen 122 mg/dL, PTT >150 sec, and platelets 69k/cu mm. CT showed evidence of acute pancreatitis. Initial ED treatment involved aggressive fluid resuscitation, cryoprecipitate, and administration of 5 vials of antivenom (Antivipmyn Polyvalent, Bioclon, Mexico). The patient was admitted to the ICU, the coagulopathy stabilized; however he was anuric with rising creatinine. On hospital day 2, he was intubated for acute respiratory distress syndrome, and remained intubated for 10 days. Pancreatitis resolved. The bite site was debrided of local necrotic tissue. Hyperkalemia prompted dialysis, but renal function did not recover. At discharge he was dialysis dependent. *Case Discussion:* Acute renal failure without hypoperfusion and without return of normal renal function suggests a direct nephrotoxic effect of *Bothrops venezuelensis* venom. *Conclusion:* This patient displayed complications of *Bothrops venezuelensis* envenomation including anuric renal failure, pancreatitis, thrombocytopenia, coagulopathy and ARDS.

79. Severe Myoclonus from Pregabalin (Lyrica) Due to Chronic Renal Insufficiency

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Background: Pregabalin (PGB) is an analogue of GABA with an unknown mechanism of action. PGB was recently approved by the FDA for treatment of fibromyalgia and is used for seizure disorders, post-herpetic neuralgia, and neuropathic pain. Generally, PGB is a well tolerated drug. However, since it undergoes mostly renal elimination, significant side effects may occur in the context of renal insufficiency. We report a case of rapid onset PGB toxicity requiring hospitalization in a patient with chronic renal insufficiency. *Case Report:* 67 year old female with diabetic nephropathy presented to the ED with a one day history of multiple neurological complaints: dizziness, twitching of all limbs, diplopia, confusion, and ataxia. One month prior to admission, she underwent L4-L5 laminectomy for spinal stenosis. Due to ongoing radicular leg pain, she received a sample of Lyrica from her orthopedic surgeon. The maximum dose as per package insert instructions (600 mg/day divided tid) was taken in hope of rapid pain relief. Within hours, the patient began to experience adverse effects. Within 24 hours, the symptoms became intolerable. Physical exam revealed orthostatic hypotension, diffuse and continuous myoclonus of all four limbs, nystagmus, and ataxia. Bloodwork was significant only for a creatinine of 1.78 mg/dL or 158 umol/L (baseline 1.66 or 147), corresponding to a creatinine clearance of 30 mL/minute. She was admitted for delirium and inability to ambulate. Pregabalin was discontinued and symptoms resolved within 48 hours. *Case Discussion:* Pregabalin is considered a relatively safe medication and will likely be prescribed much more frequently due to its recent FDA approval for treatment of fibromyalgia. It has no pharmacokinetic drug interactions, which is ideal for patients on multiple medications. However, it is almost completely renally eliminated. As a result, patients with decreased creatinine clearance are susceptible to toxicity. Although not life-threatening, severe myoclonus and other neurologic symptoms can occur in a dose-dependent manner. *Conclusion:* Although not life-threatening, PGB toxicity may result in hospital admission due to myoclonus and delirium. Clinicians must be aware of possible toxicity in patients with renal insufficiency.

80. A Two-Year Review of Pediatric Liquid Hand Sanitizer Ingestions

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Background: Liquid hand sanitizers (LHS) can contain up to 62% ethanol. Pediatric ingestions are becoming more common, especially when used to keep the hands of young children clean. A case report of a 3 year old ingesting a "small amount" of a LHS resulting in intoxication and an elevated blood alcohol level has generated interest in these products. *Methods:* A retrospective case review of pediatric LHS ingestions reported to the California Poison Control System for the years 2006–2007 was undertaken. Inclusion data: cases with children 6 yrs and younger, LHS as the only ingestant, symptoms, treatment and a known outcome. IRB approval was obtained. *Results:* A total of 412 cases were collected. Of the patients, 216 (52.4%) were male and 196 (47.6%) were female. Ages included 53 (12.9%) under age 1 yr, 199 (48.3%) 1 yr, 110 (26.7%) 2 yrs, 32 (7.8%) 3 yrs, 10 (2.4%) 4 yrs, 6 (1.4%) 5 yrs, 2 (0.5%) 6 yrs. Home was the management site for 398 patients (96.6%), 13 (3.2%) were treated at an ED, 1 was referred in but did not show. Outcomes included no effect in 355 (86.2%), minor effects in 30 (7.3%) including 20 with vomiting, 9 with gagging/choking and 1 child reported by the parents to be drowsy. Unrelated effects were reported in 27 (6.5%) including late onset vomiting, diarrhea, fever or asthma. *Discussion:* Children often taste the LHS frequently found in homes and schools to keep hands clean. Children aged 1 to 2 yrs are responsible for 75% of the LHS ingestions. In this study, 86.2% of children had no effects from thier exposure. Even though the LHS contain 62% ethanol, symptoms beyond gagging or vomiting were not seen. Symptoms usually occurred shortly after ingestion and did not last longer than 1 hour. Intoxication was not reported in any of the children. *Conclusion:* While a majority of pediatric LHS ingestions did not result in any symptoms, it is still prudent to supervise the use of LHS in small children, especially 1 and 2 year olds, to avoid possible ingestion. Referral to a health care facility is not necessary and these ingestions can be safely observed at home.

81. Phenibut Withdrawal – A Novel "Nutritional Supplement"

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Background: Phenibut (β-phenyl-γ-amino butyric acid) was first introduced into clinical practice in Russia in the 1960s, soon after it was discovered. It has anxiolytic and nootropic effects. It acts as a GABA agonist, primarily at $GABA_B$ receptors, and stimulates dopamine release. Phenibut is structurally and mechanistically similar to baclofen, but has not been approved by the FDA for use in the US. *Case Report:* A 40-year-old man reported using phenibut for its psychoactive properties for months prior to his presentation with agitation, psychosis, hallucinations and a complaint of insomnia. He purchased the drug via the Internet, and used 250 mg 3–4 times a day. He denied the use of any other medications or supplements. Three days prior to his hospital visit, he discontinued phenibut because cyclic use is recommended to decrease tolerance. Other than a heart rate of 110 bpm, his vital signs were normal. He required intubated and sedation with benzodiazepines (lorazepam) for behavioral control. He was extubated on day 4 with a normal mental status and his psychosis had resolved. He never developed seizures. *Case Discussion:* Phenibut is used widely in Russia as an anxiolytic and a sedative. It can be obtained via the Internet as a nutritional supplement that "induces relaxation, improves mental function and athletic performance". In humans, the plasma half-life after a 250 mg oral dose of phenibut is 5.3 hrs, and most of the administered drug is excreted unchanged. Users develop tolerance and require escalating doses to obtain the same effect. Withdrawal from phenibut is expected to present like baclofen withdrawal. A search of the literature did not reveal any reported cases of withdrawal, but there are numerous reports of withdrawal symptoms on Internet blogs. Withdrawal from baclofen and other $GABA_B$ agonists have successfully been managed with benzodiazepines and supportive care. *Conclusion:* Phenibut is available in the US via the Internet, and withdrawal symptoms in our patient were successfully managed with benzodiazepines and supportive care.

82. The Use of "Therapy-Other" in the Coding of Poison Center Cases

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Background: Poison control centers (PCCs) in the U.S. submit data on the therapies recommended and provided to patients to the National Poison Data System (NPDS) via coding. When a code is not available for a therapy, that therapy is coded as "other". This option provides no further explanation although the basis for this selection should be clear in the documentation of the written note. The coding section of each case is submitted electronically to NPDS, while the written note is not. We have summarized the most common uses of the code, "therapy-other" on 300 cases submitted by a single PCC over the course of a year. *Methods:* Twenty-five random cases from a regional PCC with "therapy-other" coded were selected for each month in 2007. A single reviewer recorded the possible therapies coded as "other" by comparing all therapies documented in the written note with those coded in the case. *Results:* The most common uses of the code "therapy-other" were for analgesics (12%), potassium (11%), lotion/aloe (11%), eye drops/ointment (10%) and oral replacement of fluids (10%). In addition, approximately 25% of the time "other" was used incorrectly (i.e. "comfort care/supportive care" or therapies given for underlying conditions unrelated to the exposure). *Discussion:* The use of the code "therapy-other" provides little value for review, research or surveillance. For our center if coding options were expanded to include the most common uses listed above, utilization of "therapy-other" would decrease by over 50%. The use of "therapy-other" in our PCC may not accurately reflect use for all PCCs due to documentation styles unique to our poison center or variety in the interpretation of available codes for therapies. In cases where the code was used incorrectly, staff education is needed to review the correct use. *Conclusion:* In cases where the code "therapy-other" is being used frequently, consideration should be given to adding that therapy to the list of coding options to improve the quality of data being submitted to NPDS. This should be evaluated at a national level. In cases where the code is being used incorrectly, focused staff education can be utilized to improve coding accuracy on an individual PCC basis.

83. Metformin Overdose in an Adolescent with Severe Metabolic Acidosis & Hyperlacticacidemia Treated with Bicarbonate-Buffer Hemodialysis

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Background: Metformin (MTF) is a biguanide oral hypoglycemic used for Type 2 diabetes. Over-ingestion of MTF rarely causes lactic acidosis. In one series of 4072 adults, the incidence of acidosis was 1.6%. In 2 case series of pediatric patients, none had acidosis. *Case Report:* A 15-year-old girl ingested MTF (~ 800 mg/kg) in a suicide attempt and presented to the ED with headache, abdominal pain, diarrhea, and vomiting. Initial pH was 7.39, but 4 hrs post ingestion fell to 6.98 despite aggressive IV $NaHCO_3$. Serum creatinine was 2.1, lactic acid 25.4 mmol/L. Hypotension (80 mm Hg sys) was resuscitated with fluids and dopamine. Heart rate was labile with bradycardia (40 bpm) to tachycardia (170 bpm). Both hyperglycemia to 364 mg/dL and hypoglycemia to 52 mg/dL occurred. Serum MTF level 15 hrs post ingestion was 110 mcg/mL (therapeutic 1–2) Hemodialysis (HD) was initiated with an F8 dialyzer using an initial blood flow of 300 ml/min; dialysate flow of 500 ml/min. After 3 hrs, blood flow was increased to 400 ml/min, and dialysate flow to 800 ml/min. MTF level was 44 mcg/ml after 3.5 hrs of HD; 26 mcg/ml after 5 hrs, and 15 mcg/ml after 12 hrs. Lactic acid dropped from 25 mmol/L pre HD to 7.5 mmol/L after 12 hrs of HD. Continuous venovenous hemodiafiltration (CVVH) was then begun. After 12 hrs of CVVH, the MTF level was 10 mcg/ml. On day 4, the level was 1.8 mcg/ml. The patient suffered no neurological or other organ system sequelae. *Case Discussion:* MTF does not usually result in metabolic acidosis but in massive overdose as in this case the peripheral utilization of glucose was likely altered along with development of hyperlacticacidemia and hypoglycemia. Bicarbonate administration, supportive care and HD or CVVH were required to improve acidosis. *Conclusion:* Massive MTF overdose may be associated with severe lactic acidosis, hemodynamic instability, disturbed glucose homeostasis, and renal dysfunction. Severe acidosis may be refractory to IV bicarbonate therapy and require aggressive renal replacement. We believe this is the largest MTF overdose reported in the pediatric literature.

84. A Retrospective Study of Fluoxetine Unintentional Ingestions: Establishing a Toxic Dose in the Pediatric Population

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Background: Little published data exists on the effects of pediatric fluoxetine unintentional exposures. Case-based dose recommendations (mg/kg) or clinical effect probabilities to aid poison center decision making options are lacking. We used National Poison Data System (NPDS) case data to study this problem. *Methods:* Unintentional pediatric (age ≤ 6 yr) fluoxetine single ingestion cases reported to NPDS from 2002–2006 were reviewed. Medical outcome (MO) versus dose history (mg/kg) was examined using ordinal logistic regression (SAS JMP 6.0). "Taste or lick" exposures were assigned a dose history of 1/10 of the dosage form involved. Weight for cases that did not report a weight was calculated based on a quadratic estimate of weight for age from cases with a weight. Results were considered statistically significant if $p < 0.05$. *Results:* The search query retrieved 4975 cases. Dose history, age, and follow-up to a known medical outcome were available for 2015. MO for the 2015 was: No Effect in 90.67%, Minor in 8.59%, Moderate in 0.74%, and no Major or Death. The mean [min, max] age was 26 [0.33, 72] months and 52% were male. The mean historical dose was 42 [0.2, 2500] mg or 3.1 [0.02, 172] mg/kg. Clinical effects were absent in 1827 of 2015 (91%) of the cases. Clinical effects in all 4975 cases included: nausea/vomiting (144), drowsiness/lethargy (130), agitation/irritable (65), cardiovascular (21), mydriasis (7), seizure/s (4), and diaphoresis (1). The table shows representative ordinal logistic regression results (p= 0.0402).

Ordinal logistic regression

Dose history	Prob [No Effect]	Prob [Minor Effect]	Prob [Moderate Effect]
10 mcg/kg	95.00%	4.62%	0.38%
1 mg/kg	91.17%	8.13%	0.70%
100 mg/kg	84.86%	13.86%	1.28%

Discussion: There were no deaths or major outcomes in 4975 exposures. Of the 2015 cases with dose histories, only 188 cases resulted in any adverse outcome. *Conclusion:* MO was related to historical dose. The probability of No Effect ranged from 95% (at 10 mcg/kg) to 85% (at 100mg/kg). Pediatric single substance fluoxetine ingestions are unlikely to produce symptoms.

85. Lack of Conversion to Inorganic Arsenic after Ingestion of a Monosodium Acid Methanearsonate Herbicide

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Background: Monosodium acid methanearsonate (MSMA) is a commonly used herbicide. Reports of human ingestion of organic arsenic (As) compounds have been rare and have not included urine arsenic speciation. *Case Report:* A 60 year old landscaper was using a commercial MSMA herbicide and mistakenly drank water from a cup used to mix the product. The patient developed nausea, vomiting, abdominal pain, and green diarrhea within 30 minutes and went to the emergency department. After poison control center consultation, the patient was transferred to a tertiary care facility with a toxicology service. Upon arrival to the tertiary facility the patient was stable and chelation with succimer was recommended. Spot urine was obtained before chelation and was found to have an extremely elevated total urine As level of 29,290 ug/L. Speciation showed this was 91% MMA, 7% DMA, 0.3% AS (V), and 1.7% AS(III). Two urine samples obtained after initiation of chelation therapy showed no significant increase in the percentage inorganic As excreted, but did show conversion of MMA to DMA. The patient remained asymptomatic after his initial presentation and was discharged on hospital

day 4 to continue 2 weeks of succimer. He remained asymptomatic at 5 months on phone follow up. *Case Discussion:* Organic As is less toxic than its inorganic forms but few human ingestions have been fully described. Our patient had an extremely elevated total urine arsenic level which was predominantly MMA, and had a very benign clinical course. *Conclusion:* Arsenic metabolism in humans is still being defined. Inorganic and organic As ingestions are often treated similarly with chelation. Our case shows a benign course after MSMA ingestion and no evidence of conversion to inorganic As.

86. Application of Lean Theory to Poison Center Quality Management Processes

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Background: Lean theory uses the "less is more" concept - a systemic approach to identifying and eliminating waste (non-value-added activities) through continuous quality improvement (CQI). This approach describes the current state of a process, maps the value stream, and applies the 5 S Principles (sort, set in order, shine, standardize, sustain). We applied lean thinking to a poison center (PC) charting process. *Case Report:* Documentation required a 10-step process: recording full product name in case notes, choosing the name in the computer pick-list (current state), and CQI review. Value stream mapping revealed that although this process was designed to ensure accuracy, inconsistencies still resulted. Lean thinking (future state) resulted in a 5-step process that eliminated duplication, sped charting, and reduced CQI review time. After lean implementation (recording the product in the product name field only), CQI performed initial and follow-up 30-day case studies comparing the product selected to the quality control audiotape. Initial study revealed an accuaracy rate of 92.9% (131/141), and follow-up, 12 months after process change showed an accuracy rate of 92.9% (143/154). *Case Discussion:* Initial and repeat metrics showed that product identification accuracy remained over 90% before and after the lean process. In addition, daily CQI review time was decreased by 50%. Three of the 5S Principles were used in this process change: sort, standardize, sustain. Sorting identified actions that either created no value or were duplicative. Standardization sped up documentation. The process is sustained by repeating CQI review at yearly intervals or sooner if it is determined that a problem exists. *Conclusion:* Using lean thinking sped chart completion, maintained product identification accuracy, reduced need for paper review (decreasing paper use and and CQI staff time to print charts), and cut CQI review time. Future CQI follow-up studies will monitor the process to ensure accuracy is maintianed over 90% (no process decay). Lean theory may have application to many other PC processes.

87. Mistaken Oral Ingestion of Inhalational Medications for Chronic Obstructive Pulmonary Disease (COPD)

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Background: Foradil® (formoterol fumarate) and Spiriva® (tiotropium bromide) are COPD medication capsules designed for insertion into inhalers. In April 2005 the FDA issued a post-marketing alert on mistaken oral ingestion (MOI) of Foradil (30 cases) and Spiriva (2 cases). Poison center empiric observation indicated a larger case count. We sought to describe this phenomenon using National Poison Data System (NPDS). *Methods:* NPDS 2000–2007 was queried for Foradil and Spiriva cases: unintentional misuse or therapeutic error, ≥ 6 years of age, route of administration, and outcome. *Results:* A total of 3,919 Foradil and 18,096 Spiriva cases met the criteria. Of these 3,755 (95.8%) Foradil and 17,574 (97.1%) were MOI. Both drugs showed a 6-fold increase: Foradil 104 to 671; Spiriva 1146 to 7169. The mean age for Spiriva was 65.5 [min 6, max 95]; Foradil 63.3 [min 6, max 96]. The majority of Foradil outcomes were no effect, not followed, unrelated or nonexposures (99.1%) with only 0.9% minor or moderate outcomes. Results were similar for Spiriva: 97.8% and 2.2%, respectively. Neither drug had a death or major outcome.

Mistaken oral ingestions

Agent	2001	2002	2003	2004	2005	2006	2007
Foradil†	104	403	509	417	648	696	671
Spiriva	*	*	*	1146	3915	5344	7169

*Not yet on market; †2000 cases = 0.

Discussion: Although the FDA identified this issue, the full scope was not known. NPDS data indicate a larger case number than reported to the FDA. Foradil MOI exposure reports appear to have plateaued while Spiriva continue to increase. MOI may result in reduced efficacy, increased expense, and clinical risk. Even though outcomes were generally benign, MOI of Foradil and Spiriva may disrupt a COPD patient's delicate airway balance. *Conclusion:* Oral ingestion of capsule-shaped medications formulated for inhaler use occurs more commonly than in published reports. NPDS data analysis provides a real-time mechanism to assess the effect of packaging or formulation changes on mistaken oral ingestion.

88. Life Threatening Anemia from Chronic Aluminum Ingestion Via Fabric Softener Sheets

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Background: Pica is a well described syndrome consisting of abnormal cravings for non-nutritive substances. We report a case of a patient with pica for fabric softener dryer sheets resulting in significant anemia. Interestingly, the Material Safety Data Sheet(MSDS) for this product does not mention the offending agent: aluminum. Incomplete diagnoses may be entertained if further investigation is not made beyond the information provided from such MSDS. *Case Report:* A 28 year old female presented with complaints of fatigue, headache, and lightheadedness. She reported a four year history of chewing and sucking on Arm & Hammer Fresh N'Soft Wild Flowers Brand Fabric Softener Dryer Sheets, utilizing at least ten sheets a day. VS: pulse-91; B.P.-117/65; resp-18; temp-37.1°C. Hb - 4.9g/dl; MCV - 54.4fl; MCH - 15.8pg; Fe - 13mcg/dl; Al - 28ng/ml; Pb < 1µg/ml. Bone marow biopsy showed no iron stores. She had no evidence of blood loss. She was treated with: tranfusion of PRBC; supplemental folic acid; I.V. iron; erythropoietin; and psychiatric consultation. She recovered from her severe anemia; however, follow-up six months later found her to be again chewing on the dryer sheets, though only at a rate of two per day. *Case Discussion:* Aluminum has a direct effect on hematopoiesis, decreasing globulin synthesis and increasing hemolysis. It also inhibits iron absorption from the gastrointestinal tract. Most notable in this case is that the MSDS of the product makes no notation of aluminum as a toxic component. Though "surfactants" are listed as components, it is dependent on the chemistry background of the reader to realize that the general category of "surfactants" include substances such as: aluminum palmitate; aluminum stearate; aluminum silicates, and aluminum oleate. These contributed to the chronic oral ingestion of aluminum, and the resultant life-threatening anemia, in this patient. *Conclusion:* Careful interogation of the patient helps to elicit many chronic toxic exposures. The clinician must investigate beyond the generic information of a product's composition that is reported in the MSDS, or risk misdiagnosis. A systematic review of MSDS should be performed to further delineate product composition.

89. Massive Ethylene Glycol Ingestion Treated with Fomepizole Alone

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Background: Fomepizole is used to treat and prevent toxicity from ethylene glycol (EG) toxic metabolites. Treatment with fomepizole without hemodialysis in massive EG ingestion has been reported in the literature; however, some literature recommends starting dialysis for EG levels > 50 mg/dl. We present a case of a massive EG ingestion treated solely with fomepizole. *Case Report:* A 48 year-old male presented to the emergency department after reportedly ingesting > 1 L of antifreeze in a self-harm attempt. Time of ingestion was unknown. Upon presentation, he was conscious, clinically intoxicated and reported one episode of vomiting. Initial vital signs were: HR 70, BP 168/90, RR 27, T 37°C, and O_2 saturation 94% on 2 L O_2. Presenting serum EG level was 700 mg/dl, ethanol < 10 mg/dl, Na 135 mmol/L, K 3.7 mmol/L, Cl 101 mmol/L, CO_2 18 mmol/L, AG 20 mmol/L, Cr 0.9 mg/dl, and BUN 13 mg/dl. One hour after presentation he was started on IV fomepizole 15 mg/kg loading dose, then 10 mg/kg every 12 hours for 3 doses and finally 15 mg/kg every 12 hours for 5 doses. Treatment continued until the patient's EG level was 16 mg/dl, 72 hours after the initial level without adverse effects from the fomepizole. The patient was discharged to the psychiatric ward on day 4 with BUN 8 and Cr 0.8 without sequelae. The elimination half-life of EG was 21 hours and followed first order kinetics during therapy. *Case Discussion:* Literature suggests hemodialysis should be initiated with an EG level > 50 mg/dl. This recommendation is anecdotally based rather than evidence based. With the potential risks inherent in hemodialysis, especially in suicidal patients, our case provides additional evidence that treatment with fomepizole alone may be a viable option in the appropriate population. *Conclusion:* This case suggests that patients who present after a large EG ingestion with normal renal function and without significant acidosis can be treated with fomepizole alone in the absence of hemodialysis.

90. Acute Respiratory Failure and Death Associated with Acrolein Exposure during Routine Application

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Background: Acrolein is a volatile, bitterly pungent liquid used as a pesticide for weeds, bacteria or algae. As a metabolite of cyclophosphamide, acrolein causes hemorrhagic cystitis due to high reactivity with sulfhydryl groups present in proteins. We present a rare case of fatal pulmonary edema associated with liquid acrolein exposure. *Case Report:* A healthy 50-year-old man applying acrolein algicide was sprayed in the face when a connection failed in his high-pressure application system. He presented with anxiety, copious respiratory secretions, coughing, dyspnea, chest pain, dermal and eye irritation and redness. Initial vital signs were BP 147/73 mm Hg, pulse 103 beats/min, respirations 28 breaths/min, temperature 97.6°F, O_2 saturation 85% on room air with an unremarkable chest x-ray. At 4 hours, chest x-ray revealed bilateral pulmonary edema. To facilitate transport to a larger hospital, the patient was intubated. Within approximately 15 hours of exposure, the patient became hypotensive, hyperkalemic (K 6.2 mg/dL) and acidotic (pH 7.1). During his clinical course, the patient experienced massive capillary leak and hemoconcentration (Hgb 21.8 g/dL), thrombocytopenia (PLT 15 x10^9/L), renal failure (Cr 3.9 mg/dL, BUN 48 mg/dL), and rhabdomyolysis (CK 573,680 U/L). There was significant difficulty maintaining oxygenation (ventilated, PEEP up to 17 cm H2O) and hemodynamic status (BP 80/50 mm Hg on pressors). The patient succumbed on day 8 to hypoxia and bradycardia and arrested on maximum medical therapy. *Case Discussion:* Acrolein is a limited use pesticide restricted by EPA because of its toxicity. *Conclusion:* Accidental occupational acrolein exposure can result in pulmonary edema and death.

91. Flower Power Gone Bad

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Background: We are presenting a case report of suicide by self-injection, into a central line, of a fresh flower powder preservative. After extensive product search, we found most fresh flower powder preservatives contained either citric acid, alum, or a combination of the two. *Case Report:* A 28 year old, 135 pound female with a long documented history of Munchausen's Syndrome amd Bi-polar Disorder was seen in a local emergency room after dissolving an unknown brand of fresh flower powder preservative in water. She then injected an unknown

volume of solution into her central line. Family found her lying on the floor at home. Upon arrival to the emergency room she was awake, oriented and gave a statement about what she had done. Vital signs were BP=100/60mmhg, HR=110/min (st), RR=24/min, T=98. Blood gas was PH=7.43, PA02=78, PC02=14, HC03=11, Anion gap=15. Blood and urine drug screens were negative. Tylenol and aspirin levels where negative. Over the next 4 hours her condition deteriorated requiring intubation and infusions of sodium bicarbonate, vasopressin and levophed. In spite of efforts to resuscitate her, she was pronounced dead 10 hours after admission to the emergency room. *Case Discussion:* The Autopsy concluded cause of death to be complications of lactic acid acidosis and diffuse intravascular coagulopathy from intravenous injection of fresh flower powder preservative. *Conclusion:* This appears to be a novel form of suicide by injecting fresh flower powder preservative into a central line.

92. Falsely Elevated Lactate Level in Ethylene Glycol Poisoning: A Case for Better Understanding the Limitations of Our Laboratory Equipment

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Background: The anion gap metabolic acidosis caused by ethylene glycol (EG) is due to elevated levels of glycolic and oxalic acid. Lactate is a minor contributor to the profound acidosis seen in EG poisoning. We report on a patient with EG toxicity who presented with a significant lactic acidosis on laboratory analysis. *Case Report:* A middle aged man was brought to the Emergency Department after being found unresponsive by the side of the road. There was no evidence of trauma. The initial vital signs were heart rate of 100/min, BP 250/120 mmHg, and RR 26/min. The patient had a profound metabolic acidosis (pH= 7.17) and acute renal failure. The lactate level was >11.1 mmol/L as measured by a Beckman Coulter LX20. The osmolal gap was 62 mOsm/kg. Urinalysis revealed significant crystalluria, so the patient was treated with a standard course of fomepizole. A repeat lactate level 8 hours after the first sample remained greater than 11.1 mmol/L. Following hemodialysis, the lactate level was 1.6 mmol/L. The next day, serum EG level returned at 1096 mg/L. After a prolonged hospital course, the patient was discharged with minimal long-term sequelae. *Case Discussion:* Our patient's "elevated lactate" most likely represented a very high level of glycolic acid, a metabolite of EG which is structurally similar to lactic acid. The extent of glycolic acid interference in the measurement of lactic acid depends on the device and technique used. This has been reported previously with whole blood analyzers that are routinely used as point-of-care devices. This case is unique in that the falsely elevated lactate level was measured by a plasma analyzer (Beckman Coulter LX20), previously considered reliable for measuring lactate concentrations. *Conclusion:* In the setting of unexplained severe lactic acidosis, clinicians need to maintain a high index of suspicion for ethylene glycol ingestion. Toxicologists should be familiar with the limitations of laboratory equipment used in the evaluation of patients with metabolic acidosis.

93. Iatrogenic Ethanol Intoxication

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Background: Ethanol has been successfully used as a sclerosing agent. While generally tolerated, there are many possible complications. Here we report a case of acute ethanol intoxication as a complication of CT-guided cyst drainage. *Case Report:* A 47 year old hypertensive asthmatic female presented to Interventional Radiology for CT-guided splenic cyst drainage under conscious sedation. During the procedure, 800ml of thick brown material was aspirated via a posterior approach, and 400ml of 95% ethanol was injected to sclerose the cyst. After completing the injection, she became unresponsive and hypotensive requiring intubation. An attempt at ethanol aspiration removed 100–150ml. She was given flumazenil and naloxone for possible midazolam and fentanyl overdose, without improvement. Intravenous fluids and dopamine were started. An abdominal CT scan showed a left pleural effusion and retroperitoneal fluid felt to be ethanol. In the ICU, she remained unresponsive, hypotensive, and bradycardic with an initial blood ethanol level of 433mg/dL (1 hour post injection). She was emergently dialyzed and radiology was consulted for pleural effusion drainage. However, size precluded safe chest tube placement and the possible amount of ethanol to be removed was not felt to be significant. After an initially increased ethanol level, her clinical status stabilized with one round of hemodialysis. She was extubated and discharged 4 days later. *Case Discussion:* Hemodialysis effectively removes ethanol. While most ethanol intoxicated patients do not need aggressive support, our patient is unique. She was exposed to 400mL of 95% ethanol which could have produced a blood level of 737.3 mg/dL. She occasionally drinks ethanol, but was relatively naïve to this level of intoxication. She rapidly developed altered mental status and lost airway protective reflexes requiring emergent intubation and blood pressure support. The injection of ethanol into her spleen, a highly vascular organ, may have contributed to her rapid absorption and clinical compromise. *Conclusion:* Ethanol sclerotherapy has been used to successfully treat many conditions, but practitioners need to be aware of the possible complications. This will allow for prompt therapy, potentially avoiding long term sequelae.

94. Severe Health Impairment of a 6-Week-Old Infant Related to the Ingestion of Boiled Poppy Seeds

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Background: Severe health impairment in a 6-week-old female infant who had suffered from respiratory depression culminating in respiratory arrest. The infant had been given 75 ml of strained milk of poppy seeds by her mother, who had intended to help her sleep through the night following an old German receipt. *Case Report:* Manifestations / Course: On admission, the infant's general condition was critical. Her consciousness was clouded and she hardly responded to pain stimulus. Findings included an inspiratory stridor, her contracted pupils did not react to light and her skin was of a pale, grey, cyanotic and marbled appearance. Increasing respiratory insufficiency was observed associated with a repeated dropping of oxygen saturation to a level of 67 % in the absence of oxygen supply. Due to imminent respiratory arrest, artificial respiration was performed using an oxygen mask. Very early an aspiration could be excluded. Since opiate poisoning was suspected, an i.v. antidote treatment with naloxone was performed by administration with a total of six single doses, which resulted in a persistent effect, i.e. sufficient spontaneous respiration. *Case Discussion:* The suspected poisoning was confirmed on the same day by urine analysis revealing a morphine level of 18.2 µg/L and a codeine level of 317 µg/L. On the following day, the morphine level in the serum was 4.3 µg/L. The level of morphine in the urine had dropped to 627 µg/L and that of codeine to less than 5 µg/L. After 10 days, the child could be discharged in a good general condition and referred to outpatient care. *Conclusion:* Given the fact that in the above case, the morphine level detected in the poppy seeds was as high as 0.1 %, the superior government authorities of the German Länder were requested to consider appropriate monitoring measures. A rapid communication was circulated among the responsible ministries and led to regulatory effects.

95. Massive Ibuprofen Ingestion Resulting in Coagulopathy, Hypotension, and Coma without Significant Renal Failure

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Background: Serious toxicity from ibuprofen ingestion includes coma, metabolic acidosis, GI bleeding, shock, and death. Renal failure is common. Cases of isolated massive ingestion are rare. Review of the literature reveals the highest reported ingestion was 100 grams. We report an isolated massive ibuprofen overdose of 100 grams with coagulopathy, hypotension and coma without renal failure. *Case Report:* An 18 yo previously healthy male was found down with a suicide note and an empty bottle of ibuprofen that contained five hundred 200mg tablets. The patient later admitted to making a slurry and consuming the entire bottle. On arrival to the ED, the patient had a GCS of 4 with no gag reflex and was intubated. He was hypotensive and required norepinephrine and dopamine. He had a negative comprehensive urine drug screen for drugs of abuse and other medications. He also had negative carbon monoxide, acetaminophen, salicylate, ethanol, ethylene glycol, and methanol levels. A serum ibuprofen level drawn immediately in the ED was 262 mcg/ml (normal range 10–50 mcg/ml). Time of ingestion was unknown, but was at most 6 hours prior to arrival. Despite vomiting at the scene and receiving activated charcoal, an ibuprofen level 24 hours after admission was 514 mcg/ml. Admission labs included an INR of 2.9 that peaked at 8.4 two days later, a PTT that was >150, and a pH of 7.17 with an anion gap of 15 that peaked 6 hours later at 22. Renal function was normal throughout his stay. The patient was extubated on day 2, pressors were weaned by day 3, and he was discharged on day 8 to a psychiatric facility with no significant sequelae. *Case Discussion:* In the previous case of 100 gram ingestion, the admission level was 720 mcg/ml and 16 hours later was 16 mcg/ml. Our case resembles the previous case of a 100 gram overdose in that both patients developed an anion gap acidosis with no significant renal failure, but differs in that our patient became coagulopathic, hypotensive and had toxic levels which persisted beyond those previously reported. *Conclusion:* The effects and toxicokinetics of massive ibuprofen overdose are variable, and renal injury is not inevitable.

96. Deafness and Hepatotoxicity after an Acute Intentional Ingestion of Monosodium Methanearsenate

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Background: Poisoning from methylated forms of arsenic is less well described in the literature compared to inorganic arsenic species. Monosodium methanersenate is available as an herbicide. *Case Report:* A 46 year old male with a history of hepatitis C intentionally ingested 8 ounces of an herbicide that contains 22.1% monosodium methanearsenate. He developed severe nausea, vomiting and diarrhea within hours of ingestion and presented to an ED. No cardiac dysrhythmias were described. Dimercaprol (BAL) IM was initiated at 5 mg/kg every 6 hours and was switched to every 12 hour dosing at 48 hours of treatment. By hospital day (HD) #2, he had severe hearing loss and within 2 days was clinically deaf. He developed a worsening transaminitis and hyperbilirubinemia that peaked in the first week of treatment. (Table) The creatinine peaked on HD#4. He developed leukopenia on HD#9 at 4800/µL that improved and declined again to 2100/µL on HD#28. Oral succimer was started on HD#8 when he was able to take orals and continued until discharge on HD #59. Upon discharge, he remained deaf with a 24 hour urine arsenic of 63 mcg/L. His ALT had returned to baseline of 98 U/L and total bilirubin of 1.8 mg/dL. At follow up 67 days after ingestion, his urine arsenic level was below limits of detection. His auditory toxicity had not improved.

Table: Laboratory course over first 10 days

Hospital day	24 hour urine arsenic (mcg/L)	Creatinine (mg/dL)	Total bili (mg/dL)	ALT (U/L)	Chelation
Admission/#1		1.2	1.5	162	BAL IM q 6hrs
#2			4.3	131	"
#3			6.9	172	BAL IM q 12 hrs
#4	8605	2.1	7.9	289	"
#5	3037		11.6	369	"
#6	7818		17.8	350	"
#7			20	251	"
#8	6589		22.1	198	Succimer po
#9			18.7	154	"
#10			17.1	136	"

Case Discussion: Ototoxicity is not well described after acute arsenic poisoning. Auditory neurotoxicity and hepatotoxicity has been described in one case report after a poisoning with methanearsenate. Our case also had early onset of deafness, hepatotoxicity, and marked hyperbilirubinemia. BAL is not known for causing ototoxicity. *Conclusion:* We report auditory neurotoxicityand hepatotoxicity associated with an acute ingestion of monosodium methanearsenate.

97. Continuous Pralidoxime Infusion in Organophosphate Toxicity: A Case Report

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Background: Organophosphate toxicity due to pesticide exposure is well recognized. Cholinergic symptoms result due to the inhibition of acetylcholinesterase. Treatment typically involves regeneration of the acetylcholinesterase prior to organophosphate associated aging with medication such as pralidoxime and symptomatic support with medications such as atropine. *Case Report:* This case describes a 51 year old landscaper who overdosed on a moderate amount (200mg/kg) of chloropyrifos in a suicide attempt. The patient initially exhibited mild symptoms of cholinergic poisoning, and was transferred to a toxicology center after only being treated with odansetron and atropine. The erythrocyte cholinesterase level on admission was 3.2 U/mL (reference range 5.7–9 U/mL). Sixteen hours after ingestion, the patient began to exhibit symptoms of severe toxicity and required initiation of a pralidoxime infusion, which was weaned after a day. Days after discontinuation, the patient again began experiencing symptoms cholinergic toxicity. The pralidoxime infusion was restarted and continued for a week. Three days after discontinuation of pralidoxime infusion, his erythrocyte cholinesterase level was 3.0U/mL. Despite the decreased level of acetylcholinesterase the patient exhibited increased muscle strength. *Case Discussion:* It was commonly understood that treatment with oximes for toxicity was ineffective after the enzyme is aged. This case demonstrates that pralidoxime infusion can be beneficial even weeks after ingestion. Another consideration, however, is that chlorpyrifos is very lipophilic, and may be taken into, and then released from, fat depots over a period of many days. Due to this property, a recurrence of clinical effects requiring continued acute treatment after an initial period of apparent recovery is possible. Our patient had longstanding exposure to chloropyrifos due to his landscaping work, which may have increased the total toxic exposure. *Conclusion:* This case demonstrates that pralidoxime infusion can be beneficial days to weeks after ingestion.

98. Content Analysis of YouTube as Source of Toxicologic Information

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Background: YouTube is a popular video-sharing website where users select and view content on a range of topics. Many people use video-sharing websites, such as YouTube, for self-education. Unfortunately, there is currently no regulation of information content for veracity. We conducted this study to analyze the content on YouTube as it relates to medical toxicology. *Methods:* We conducted a search on YouTube using the keywords *poison* and *toxicity* and *poison control center*. Inclusion criteria included: English language and a claim about a potentially toxic material. We viewed all videos in their entirety and data were collected including a summary of content, source, type of video, length, view counts, and viewer-based review ratings. *Results:* The keyword search identified 321 videos. Of these, 45 met our inclusion criteria, of which 95.5% reported on a single poison or toxin. Videos included information on the following: PVC, mercury, aspartame, fluoride, lithium, benzene, chlorine, pesticides, cane toad, 1080, vaccines, carbon monoxide, riboflavin, citric acid, methyliodide, phosphorous, lead, aluminum, and paraquat. 27% of videos contained validated information, 73% were controversial. No videos on this search were created nor supported by poison control centers. *Discussion:* No videos were submitted or endorsed by poison control centers. Also, 73% contained controversial information. Of specific concern was that many videos include specific regimens for self-detoxification, with potential for serious harm. As YouTube becomes increasingly popular, the distribution of content related to poisons and toxins will continue to grow. Along with that comes the potential for misinterpretation and dangerous recommendations. *Conclusion:* Poison control centers currently have no videos posted on YouTube. Ignoring it will simply facilitate domination by information not supported by evidence-based medical opinion. Further studies should identify how to increase public education on topics related to toxicology through video-sharing websites.

99. Ethylene Glycol Poisoning with Biphasic, Rapid Elimination

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Background: An increasing number of ethylene glycol (EG) poisonings are managed with fomepizole without hemodialysis. However, alcohol dehydrogenase enzyme inhibition by fomepizole prolongs EG elimination; thereby potentially limiting fomepizole monotherapy to cases with mildly elevated EG levels. We describe EG kinetics in a pediatric patient with the highest reported EG level that was treated with fomepizole alone. *Case Report:* A healthy 17 year old, 60 kg male sought health care three hours after intentionally ingesting antifreeze containing ethylene glycol. Vital signs and examination were normal except for mild inebriation. Serum bicarbonate, lactate, pH, electrolytes, glucose, and renal function were normal. Serum ethanol was undetectable. Empiric fomepizole therapy was started pending EG level. Initial EG level was 600 mg/dl (96.7 mmol/L), three hours post-ingestion (PI). Subsequent levels are in table one. He received five doses of iv fomepizole. Additional therapy included iv crystalloid at two times maintenance and one dose each of thiamine and pyridoxine. Hemodialysis was not performed. Urine output averaged two ml/kg/hr. Acid-base parameters, renal function, and neurologic examination remained normal during a three day hospital stay.

EG levels vs. time

Time PI (hr)	EG level (mg/dl)	EG level (mmol/L)
3	600	96.7
9.8	326	52.5
17.7	181	29.2
23.6	158	25.5
31.5	115	18.5
48.3	44	7.1
62.8	19	3.1

Case Discussion: EG elimination half-life during fomepizole therapy was determined using semi-logarithmic analysis with least square fit methodology. Elimination was first order and biphasic. During the first 12 hr of therapy, the EG half-life was 8.5 hr (r^2=0.9969) and, during the subsequent 48 hr, was 12.0 hr (r^2=0.9999). In a previous series of fomepizole therapy with and without hemodialysis, Brent (NEJM 1999;340;832–8) found a mean EG half-life of 19.7 ± 1.3 hr. *Conclusion:* This case illustrates that: 1) EG elimination appears first order and biphasic with terminal elimination 50% longer than the initial phase. 2) EG elimination during fomepizole therapy may be more rapid than previously reported. 3) Patients with extremely high EG levels and no acidemia or end-organ dysfunction can be successfully managed in a timely manner with fomepizole alone.

100. Are We Ready for Prime Time? Prenatal Lead Screening

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Background: Prenatal blood lead screening is becoming more common and has been formalized in NY for high risk mothers identified by questionnaire. However, there are no clear guidelines for the management of elevated blood lead levels (BLL) once discovered. We present two cases referred to our Poison Control Center. *Case Report:* Case 1: A 23 yo Mexican woman at 36 wks gestation had a BLL of 58mcg/dL. No treatment was offered. A 3kg normal female was delivered at term. The infant's BLL on day of life (DOL) 2 was 73 mcg/dL with a hemoglobin of 17 g/dL. A double volume exchange transfusion was performed on DOL 4, reducing the BLL to 11.4 mcg/dL. Additional chelation included BAL, CaNa2EDTA and oral succimer. BLL on DOL 25 was 15 mcg/dL, and the infant was referred to a high-risk development program. Case 2: A 24 yo woman at 33 weeks had a BLL of 24 mcg/dL. Subsequent levels were 35 mcg/dL at 35 weeks, and 28 at 36 weeks. Induction was recommended at this time without further treatment for the BLL. A normal female infant was delivered, BLL was 30 mcg/dL at birth. The mother received succimer chelation; the BLL one week post partum was 11 mcg/dL. The infant was not treated, and breastfeeding was discouraged; BLL on DOL 6 was 32, DOL 12 was 31. *Case Discussion:* Recent guidelines suggest screening all pregnant women considered high-risk for lead exposure. This involves many patients because the questionnaire identifies all foreign-born women as high risk. While there are some suggestions for intervention in these women based on BLL, there is no data or formal guideline for management such as termination, induction or chelation in these patients. These issues are complicated further by concerns of teratogenicity of chelation. *Conclusion:* While screening for prenatal and neonatal lead poisoning is a worthwhile goal, further study and universal guidelines are necessary to manage the mothers and newborns identified. Until these guidelines are developed, efforts should be directed at education and prevention in these high risk populations to decrease lead exposure for themselves and their newborns.

101. Lithium Toxicity Reported to a Statewide Poison Control System

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Background: Our aim was to describe the clinical course of lithium toxicity reported to the California Poison Control System (CPCS). In particular we were interested in the prevalence of cardiac dysrhythmia (CD), frequency of hemodialysis (HD), duration of poison center follow-up, and patient outcomes. *Methods:* This is a retrospective cohort study of lithium toxicity reported to CPCS in 2005 to 2007 followed to a known outcome. We searched the CPCS database for lithium exposures. Those with concurrent exposures were excluded. Records were reviewed for demographic data, exposure details, levels, pertinent labs, and outcomes. *Results:* 406 cases were included. The mean peak lithium level was 2.63 (CI 2.18, 3.08) in acute, 2.81 (CI 2.43, 3.19) in acute on chronic (AC), and 2.72 (CI 2.18, 3.08) in chronic toxicity. ALOC was the most commonly reported symptom, occurring in 253 cases (62.3%). CD was reported in 17 cases (4.2%). These consisted of bradycardia (15) and/or AV blocks (4) and wide QRS in 1 case. Hypotension was reported in 1 of these. 2 patients (0.49%) received cardiac pacing. 47 patients (11.5%) received HD. HD was performed in 7 (12.5%) acute, 9 (9.8%) AC, and 27 (13.0%) chronic cases. Peak lithium levels were higher in patients receiving HD (3.9, CI 3.6, 4.2 vs. 2.6 CI 2.5, 2.7). Hours followed by CPCS was 105.4 (CI 86.3, 124.5) in cases with HD versus 54 (CI 47.8, 60.2) without. In 5 cases, CPCS recommended HD but it wasn't performed. None of these patients died. Residual symptoms were recorded in 9 cases (2.2%). There were 2 deaths (0.5%) in cases of chronic toxicity. Neither received HD. In each case, death was delayed and preceded by pneumonia. *Discussion:* This is the largest cohort of lithium toxic patients to date. While neurological symptoms are commonly reported, significant CD is unusual. Most patients are managed without HD. Deaths were related to respiratory complications. *Conclusion:* In this cohort of lithium toxic patients, CD, disability, and deaths were unusual. The majority of patients recover without HD.

102. Symptomatic Pediatric Zolpidem Exposures with Elevated Serum Concentration

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Background: Zolpidem toxicity is not well described in children. We report two unique cases: (1) the first symptomatic pediatric zolpidem exposure with a documented elevated serum zolpidem concentration; (2) the youngest reported zolpidem exposure. *Case Report: Case 1:* A 3-year-old male and 2-month-old sister were found with 4 tablets missing from a bottle of 10 mg zolpidem tablets. No other medications were missing. In the emergency department 1.5 hours later, the 3-year-old child was agitated with visual hallucinations, sinus tachycardia (HR 122/min) and BP 128/80 mmHg. The agitation required treatment with lorazepam. The urine drugs of abuse screen was negative. The serum zolpidem concentration was >200 ng/mL (therapeutic level 4 ng/mL) and the comprehensive urine drug screen was negative for other drugs. The symptoms resolved after 31 hours. *Case 2:* The 2-month-old female was reportedly

fed 1 zolpidem tablet by her 3-year-old brother. The mother reports a whitish paste in the infant's mouth. The infant was agitated and difficult to console with sinus tachycardia (HR 180/min) and BP 121/80. The urine drugs of abuse screen was negative and the comprehensive urine drug screen demonstrated an unknown alkaline substance. A sufficient blood sample was not available for serum zolpidem determination. The symptoms resolved after 36 hours. *Case Discussion:* Previously published cases of unintentional pediatric zolpidem exposures report symptoms lasting up to 4 hours, with no serum zolpidem concentrations reported. In contrast, we confirmed exposure with an elevated serum zolpidem concentration, and document altered mental status with abnormal vital signs lasting 31–36 hours. Also, the 3-year-old showed paradoxical agitation which required medical intervention. *Conclusion:* We report two pediatric zolpidem exposures with prolonged symptoms. An elevated serum zolpidem concentration was documented in one case. The 2-month-old infant is the youngest zolpidem exposure reported.

103. Unique Management of Isolated Yew Berry Toxicity

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Background: Taxus species are known to be toxic through a variety of mechanisms. Treatment of taxus induced cardiac dysrhythmias is based largely on case reports. We describe a case of a 24 year old male with yew berry toxicity initially treated with amiodarone, and subsequently managed with a sodium bicarbonate continuous infusion. *Case Report:* The patient was found at home by his parents with witnessed "seizure-like" activity 2 hours after eating "168" yew seeds. The initial pre-hospital rhythm strip demonstrated VT and was unsuccessfully cardioverted. Vital signs on arrival to the ED were: T 97.1; P 120; BP 61/32; Pox 87% RA; and RR 20. The toxicology service was consulted for management of the presumed yew berry ingestion, complicated by cardiac dysrhythmias. Amiodarone 300mg IV push and diazepam 5mg IV were given. Further cardioversion was attempted four times. Post cardioversion electrocardiogram revealed wide complex tachycardia at a rate of 166. An amiodarone drip at 1 mg/min was initiated. On arrival to the toxicology center the patient was alert and verbally appropriate without complaints. Initial vital signs: BP 104/54; P 76 and regular; R 14; and T 36.1. EKG showed SVT at a rate of 121 with PVC's, QRS 162, QT/QTc 404/573. Given the EKG findings, 100mEq of $NaHCO_3$ was given intravenously followed by sodium bicarbonate drip. The amiodarone drip was discontinued. Subsequent EKGs revealed a prolonged, but steadily narrowing QRS complex. Ultimately, the QRS complex closed to 92 ms, with a rate of 94, PR 154 and a QT/QTc of 390/487. *Case Discussion:* In this case presentation, successful treatment of the patient included initial stabilization with amiodarone followed by sodium bicarbonate bolus and infusion. Sodium bicarbonate improved his EKG, metabolic derangement and this patient's clinical status. It is difficult to determine if correction of the cardiac dysrhythmias was solely due to the sodium bicarbonate, or the synergism of sodium bicarbonate and amiodarone, or possibly spontaneous improvement due to taxine clearance. *Conclusion:* We would suggest initial treatment of associated ventricular dysrhythmias, then stabilization with sodium bicarbonate.

104. Muscular Spasm with Therapeutic Doses of Cang Er Zi

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Background: Cang Er Zi is a Chinese herbal preparation including *Xanthium sibiricum*, a member of the cocklebur family. It is prescribed for allergies and upper respiratory problems. We report the first case of adverse reaction due to therapeutic dosing of Cang Er Zi. *Case Report:* A 17 yo female with a history of seasonal allergies presented to the ED complaining of 2 hours of whole body "twitching" primarily in her left arm and face. Symptoms began several hours after taking a 2nd dose of Cang Er Zi. She was prescribed 10 pills of Cang Er Zi BID by her acupuncturist for allergies. The tablets contain Xanthium sibiricum(100mg/tab) and small amounts of angelica and magnolia. In the ED, her vitals were normal(36.9°C, BP 116/72, HR 87bpm, RR 22/minute, 99%RA). She was awake, alert, oriented, and in no acute cardiopulmonary distress. She diffusely increased muscular tone and bilateral muscle spasm every 30 seconds, not consistent with seizure activity. EKG showed sinus rhythm with a rate of 85 bpm without ectopy. Labs were significant for a slightly elevated WBC of 11.8, CPK of 171 IU/L, and a negative UDS. She was treated with 2 (1mg) doses of lorazepam which improved her symptoms. She was observed over 6 hours and discharged. She was seen the next day by her pediatrician and was noted to have visible spasm of her bilateral upper arms, shoulders and face every 30 seconds, alleviated with movement. She was prescribed lorazepam and an appointment with a neurologist. On day 3, the patient reported she was having difficulty talking due to facial muscle spasm, and was only able to complete only 2–3 word sentences. The twitching was worse with talking. She was not taking her lorazepam. By day 4 she was asymptomatic and declined workup by a neurologist. On 7 month follow up, she remains asymptomatic. *Case Discussion:* There are no reported cases of adverse reactions to Cang Er Zi. There are reports of muscular spasms and death in livestock due to exposure to Xanthium species. In humans, 10 cases of toxicity due to various Xanthium species have been reported resulting in hepatic and renal failure, seizures, and death. No isolated muscular symptoms have been reported. *Conclusion:* We report an adverse reaction to a commonly used herbal medication at therapeutic doses.

105. Delayed Recrudescence of ASA to Toxic Levels after Cessation of Bicarbonate Therapy

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Background: Aspirin (ASA) exposures were reported to Poison Centers 10,091 times in 2006. After the salicylate level decrease to therapeutic, levels are typically no longer checked. We report a case where toxic serum salicylate levels declined to subtherapeutic levels and subsequently returned to toxic levels after bicarbonate therapy was terminated. *Case Report:* A 31 year-old male was found down after a suicidal ingestion of aspirin the night prior to his presentation. On arrival to the ED, he was noted to have a BP of 162/92 mmHg, pulse 100 bpm, respiratory rate 14 and oxygen saturation of 98% on room air, GCS of 14. UDS detected benzodiazepines and THC only. Initial ASA level was 29.2 mg/dL, APAP level <10 mg/dL, potassium was 4.1 mEq/dL, EKG showed rate 93bpm, QRS 102 msec, QT 350 msec. ABG showed a pH of 7.34, pCO2 of 46, and pO2 of 80. He was intubated for respiratory failure, treated with activated charcoal and admitted to the ICU, where IV $NaHCO_3$ was administered.The patient's salicylate level peaked at 55 mg/dL 8 hours after admission, and steadily decreased to a sub-therapeutic level of 5.6 mg/dL 36 hours p admission. The $NaHCO_3$ drip was turned off. The ASA level reached 41.4 mg/dL 61 hours after admission(K was 3.6). At this time he complained of tinnitus and nausea. A sodium bicarbonate drip and MDAC were restarted. ASA levels rose to 61.6 mg/dL 64 hours after admission(K was 3.4). After this peak, the level returned to the normal range with a final measurement of 11.5 at 93 hours after admission. While the ASA level rose, no salicylates were administered. The patient was under observation by a sitter and his room was searched without evidence of aspirin. *Case Discussion:* Delayed ASA toxicity and non-linear ASA elimination are well reported phenomena in the literature; however, return to a toxic level requiring reinstitution of therapy has never been reported previously. Levels typically decline in a predictable fashion and once they have decreased to non-toxic levels, they do not rebound. Possible mechanisms include delayed gastric emptying or bezoar formation. *Conclusion:* We report an unusual case of ASA ingestion with resolution of symptoms and ASA levels to non-toxic values, with a subsequent unexpected recrudescence to toxic levels.

106. Ethanol-Induced Transient Myocardial Dysfunction in a Three Year Old

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Background: The toxic effects of ethanol ingestion have been described for many years, but no cases of transient myocardial dysfunction have been reported in pediatric population. We report a case of transient myocardial dysfunction due to acute ethanol intoxication in a child. *Case Report:* A 3-year-old male was found at home unresponsive with strong odor of alcohol. Blood glucose in the field was 25 mg/dL. In the ED, the child was obtunded and had cool, pale extremities without palpable radial pulses and weak, central pulses. Initial vital signs: BP:104/58 mmHg; HR:103 bpm; RR:31–35 bpm; rectal temp:93.3 ºF; O_2 saturation:93% on bag-valve-mask ventilation. The child's oxygen saturation decreased to 68% and he was intubated. ABG (100% O_2 on mechanical ventilation): pH, 7.00; pCO_2, 44 mmHg; pO_2, 71 mmHg; bicarbonate, 11 mEq/L. Laboratory analysis was significant for: serum bicarbonate, 13 mEq/L; lactate, 7.9 mEq/L; negative for acetone; ethanol level 247 mg/dL. Glucose of 48 mg/dL was treated with dextrose. Initial chest x-ray revealed bilateral pulmonary edema. Echocardiogram showed an ejection fraction of 47% with mild left ventricular systolic dysfunction. Dopamine and norepinephrine were started for pressure support. Subsequent chest x-rays over six hours showed worsening pulmonary edema. Milrinone later replaced dopamine. By hospital day 3, the pulmonary edema had completely resolved. The child was discharged home on hospital day 9 with an ejection fraction of 77% and normal left ventricular systolic function. *Case Discussion:* Cases of severe hypoglycemia, coma, seizures, metabolic acidosis and fatalities have all been reported in children with similar ethanol levels. Cardiomyopathy has been identified in chronic alcoholics. We believe this to be the first reported case of transient myocardial dysfunction due to acute ethanol intoxication in a child. *Conclusion:* We report a rare case of acute cardiomyopathy as a result of ethanol ingestion in a child. Toxicologists must remain vigilant for this rare but serious effect of a commonly encountered poison.

107. Clinical Effects of Epinephrine Auto Injector Exposures

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Background: Exposures to epinephrine auto-injectors, whether intentional or unintentional, are a commonly reported occurrence. A primary clinical concern has been tissue necrosis from digital exposures. Systemic effects have generally been considered to be minimal. The objective was to review the Toxic Exposure Surveillance System (TESS) records of epinephrine auto-injector exposures to determine their clinical effects. *Methods:* The TESS data for epinephrine auto-injector exposures from 2003 & 2004 was obtained. Distribution of clinical effects, as well as duration and outcome fro adult and pediatric patients were reviewed and abstracted by the primary author. *Results:* A total of 3,901 exposures were recorded over the 2 year period. 1, 673 (42.8%) were pediatric (age < 19) and 2,228 (57.2%) were adults. No deaths were recorded. Outcomes were recorded as no effects (n=202, 5%), minor effects (n=1583, 40.5%), moderate effects (n=434, 11%), and major effects (n=2, .005%), with remainder coded as nontoxic. The most common systemic effects were tachycardia (n= 98, 2.5%), agitation (n=43, 1.1%), vertigo/dizziness (n=27, 0.6%), and hypertension (n=13, 0.3%). The most common local effects were puncture wound (n=1514, 38.8%), irritation/pain (n=972, 24.9%), pallor (n=797, 20.4%), edema (n=266, 6.8%), and erythema (n=168, 4%). There were 6 reported cases of tissue necrosis (0.1%). Chest pain, and dysrhythmias, were rare (n=22, 0.6%), and there were no reports of seizures or stroke. The duration of clinical effects were < 8 hours in the majority of cases for which the duration was reported (n=1385, 86%). *Discussion:* Epinephrine auto-injector exposures, while frequenly reported to PCC's, have good outcomes overall. In the majority of reported cases, there are minimal effects, both systemically and locally. Further delineation of persons who may be at increased risk of adverse effects from epinephrine auto-injector exposures may aid in further refining treatment guidelines. *Conclusion:* Significant clinical effects from epinephrine auto-injector exposures were infrequent. Systemic toxicity appears to be limited, and serious local effects (necrosis) were rarely reported.

108. Duplication/Ultrarapid Metabolism of Cytochrome P450 2D6 (CYP2D6) as Possible Cause for Dextromethorphan (DM)/Dextrorphan (DX) Overdose in a Child

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Background: In 2006, over 49,000 exposures to DM were reported to US Poison Centers with over 2700 moderate or major outcomes and 5 deaths. Usually, the treatment of exposures is guided by the amount of DM ingested. We present a case where the symptoms in a child were most likely caused by DX, the active metabolite of DM. *Case Report:* A 4 yo male presented

to Urgent Care with altered mental status, disorientation, slurred speech, and nystagmus. By history, the night prior his mother gave him a teaspoon of Tussin DM®. The morning of presentation she gave him one tablet of Alka Seltzer Plus® and 2 teaspoons Delsym®. Total DM in 12 hours was 4.5 mg/kg. Toxicity is unlikely to occur at doses < 7.5 mg/kg. UDS was positive only for drugs expected. Symptoms in this patient resolved 5 hrs after last exposure. Urinary concentrations of DM and its metabolite DX were determined via HPLC with fluorescence detection. Data were normalized to an internal standard (levallorphan tartrate) and molar amounts determined using a seven-point standard curve. CYP2D6 activity was estimated by the ratio of DM/DX. The *CYP2D6* genotype was determined using a combination of long-range PCR and PCR-RFLP methods. The following allelic variants were tested: *CYP2D6*2, *3, *4, *5, *6, *7, *9, *10, *17, *29, *41* and gene duplication events. *Case Discussion:* The subject's urinary DM/DX ratio was 0.0009, a value consistent with the phenotype of an extensive or ultrarapid CYP2D6 metabolizer. The subject's genotype was determined as *CYP2D6*1/*2xN* (i.e. carrying at least 3 fully functional genes), which is in accordance with an ultra-rapid metabolizer phenotype. While unable to ascertain exact number of copies, more than 2 copies of CYP2D6 are present in this child. Although sedation is common with DM, PCP-like effects due to noncompetitive antagonism at the NMDA receptor may be attributed to excessive DX, especially under conditions of relatively large DM doses and extensive conversion to DX. *Conclusion:* DX may be responsible for the symptoms seen in DM overdoses and may be more common in high doses and/or in extensive metabolizers.

109. Inocybe Mushroom Poisoning: A Case Series with Exact Species' Identification

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Background: Many species of genus Inocybe (higher Basidiomycetes) are muscarine-containing mycorrhizal mushrooms, ubiquitous around the world, including Israel. In Israel genus *Inocybe* contains 31 species, 11 of them are poisonous. The few published reports on the poisonous Inocybe mushrooms are often limited because of inadequate identification of the species. The clinical course of patients with typical muscarinic manifestations, forwhom *Inocybe* spp. was unequivocally identified, is reported. *Case Report:* Between November 2006 and January 2008, 14 cases of typical muscarinic syndrome after mushroom ingestion were recorded at the Poison Center. The clinical manifestations included combinations of nausea, vomiting, abdominal pain, hypersalivation, diaphoresis, bradycardia, hypotension, lacrimation, blurred vision, miosis, tremor, restlessness, and syncope. Time to onset of symptoms ranged between 15 minutes to 2 hours after consumption, 5 hours in one patient. Treatment was supportive (IV fluids, antiemetics and atropine). Full recovery ensued within 12 hours. In all cases, an expert mycologist unequivocally identified the mushrooms as *Inocybe fastigiata, I. geophylla* and *I. patouillardii*. *Case Discussion:* We report a series with muscarinic poisoning in Israel due to consumption of *Inocybe* spp. Muscarine is a heat stable toxin capable of activating muscarinic acetylcholine receptors in the parasympathetic autonomic and central nervous systems. It does not cross the blood brain barrier due to its positively charged quaternary ammonium structure. However, in our series some patients had neurological signs. Although the muscarinic content of *Inocybe* spp is well known, there is only a limited number of case reports with mushroom identification and one small series with only presumptive identification. *Conclusion:* To the best of our knowledge, this is the largest reported case series of muscarinic poisoning due to documented consumption of *I. fastigiata, I geophylla,* and *I. patouillardii*.

110. Effects of Adenosine Receptor Antagonists on Survival in Amitriptyline-Poisoned Mice

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Background: We had demonstrated that adenosine receptor antagonists improved hypotension and shortened QRS duration in rodent models of amitriptyline toxicity in our previous studies. This study was to investigate the effects of adenosine receptor antagonists on survival rates in a mouse model of amitriptyline poisoning. *Methods:* In the preliminary study, amitriptyline was given 75, 100 and 125 mg/kg to mice intraperitoneally (i.p, n=20 for each group) to determine the LD_{50}. Different doses (1, 3 and 5 mg/kg) of DPCPX, a selective adenosine A_1 antagonist, or CSC, a selective adenosine A_{2a} antagonist were given i.p to find the safe dose of DPCPX or CSC (n=30 for each antagonist). After administration of confirmed LD_{50} dose of amitriptyline(125mg/kg), mice were randomized to treatment with DPCPX (3mg/kg) or CSC (3mg/kg) or saline or DMSO, a solvent for adenosine antagonists (n=25 for each group). Outcome parameter was 24 hours survival after amitriptyline administration. *Results:* In the saline group, 12 of the 25 mice receiving amitriptyline+saline died. Kaplan-Meier estimates of the 24 hour survival rate was 52% (13/25) for saline and 68% (17/25), 52% (13/25) and 40% (10/25) for DPCPX, CSC and DMSO groups, respectively. Median survival times were 1440, 1440, 1440 and 44 minutes for saline, DPCPX, CSC and DMSO groups, respectively. There was no statistically significant difference in survival rates for amitriptyline poisoning between control and adenosine receptor antagonist treatment groups (p>0.05). Power analysis demonstrated a 42 % likelihood of finding a 20 % difference (S1=50 %, S2=70 %, Beta error 58 %, alpha 5 %). *Discussion:* Adenosine antagonists, DPCPX or CSC, failed to increase survival rates of amitriptyline poisoning in mice. This finding might be results from small sample size of experimental groups with high beta error. *Conclusion:* It is difficult to extrapolate the negative results of the study in a small sample size mouse model to humans. Future studies are needed with repeated doses of adenosine antagonists in amitriptyline poisoning with a higher statistical power.

111. Unusual Manifestations after Inadvertant Pediatric Ingestion of Pyridostigmine

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Background: Pyridostigmine is a reversible cholinesterase inhibitor widely used to increased strength of muscular contractions in persons suffering from myasthenia gravis. We report a case of an 11 year-old boy that developed bradycardia and mydriasis, in addition to the more commonly reported adverse effects, after an inadvertent ingestion of 300mg of pyridostigmine. *Case Report:* At 1915, a previously healthy 11 year-old boy inadvertently took five tablets from an ibuprofen bottle in which his mother stored her 60mg pyridostigmine used for treatment of her myasthenia gravis. Shortly after ingestion, his mother observed abnormally large pupils and facial twitching in the child. He was brought to a local emergency department for evaluation. Upon arrival at 2145, the patient complained of nausea, dry mouth, and the urge to have a bowel movement. His vital signs were as follows: HR 59 bpm, BP 126/80, RR 18 bpm, T 36.8, SpO2 97% on RA. Physical exam revealed resolving mydriasis and no facial fasciculations, but noticeable leg fasciculations and tremors were present when ambulating. The patient was observed for 2 hours in the emergency room setting and discharged after resolution of all previously reported adverse signs and symptoms. *Conclusion:* Though the CNS, muscarinic, and nicotinic effects of pyridostigmine are well understood in acute overdose, bradycardia is rarely observed in doses described here. Furthermore, it is well established in the medical literature that miosis is the more common finding after acute overdose; here we report an infrequent occurrence of mydriasis after such an ingestion.

112. Regional and Temporal Variation in Methamphetamine-Related Incidents: Applications of Geographic Information Systems and Spatial Scan Statistics

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Background: Methamphetamine abuse is a widespread public health problem. This investigation utilized geographic information systems, spatial scan statistics, and multiple data sets to assess spatial clustering of methamphetamine-related incidents. The temporal effects of regulatory interventions to reduce access to precursor chemicals (pseudoephedrine) were also explored. *Methods:* Four statewide data sets were utilized including poison center statistics, fatality incidents, methamphetamine laboratory seizures, and hazardous substance releases involving methamphetamine laboratories. Spatial clustering of methamphetamine incidents was assessed using SatScan™. SatScan™ was also utilized to assess for temporal clustering of methamphetamine laboratory incidents, in relation to the enactment of regulations to reduce access to pseudoephedrine. For statistical inference 9999 Monte Carlo replications were conducted in these analyses, and a p-value less than 0.05 was considered statistically significant. *Results:* Five counties (2 urban, 3 rural) with a significantly higher relative risk of methamphetamine-related incidents were identified. The most likely cluster was in a rural location, and had a significantly elevated relative risk of methamphetamine laboratories (RR=11.5), hazardous substance releases (RR=8.3), and fatalities relating to methamphetamine (RR=1.4). A temporal clustering of methamphetamine lab incidents was observed during the time period prior to regulations enacted in 2004 and 2005, which restricted consumer access to pseudoephedrine. *Discussion:* Three of the five counties identified in this study as having significant clusters of methamphetamine-related incidents are classified as High Intensity Drug Trafficking Areas. The results of the current study support a need to target preventive interventions towards methamphetamine production and abuse in urban and rural communities. *Conclusion:* Spatial scan statistics and GIS can be effectively applied to Poison Control Center and other data sources to assess regional variation in methamphetamine-related incidents, and assess the impact of preventive interventions.

113. Validation of Putative Substances in Poisonings Involved in Fatal Poisonings

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Background: Each year, a proportion of patients who receive medical care for overdoses with poison center consultation expire despite such consultation. When such cases are investigated by the medical examiner the post-mortem toxicology results periodically do not match to the data collected during the initial call to the poison control center. This lack of knowledge of the actual substance implicated in an overdose might represent an impediment to appropriate care. This initial study was designed to determine the frequency of discordance in the initial toxic substances reported to the New Jersey Poison Information and Education System (NJPIES) and post-mortem toxicology results. *Methods:* We conducted a retrospective study of the poison center records of all cases in which the outcome was a fatality between the years 1986 and 2006. Substances reported as putative agents during the initial call were compared to the post mortem toxicology results obtained by the medical examiner. The frequencies and characteristics surrounding discordance were examined. *Results:* Between 1986 and 2006, there were 708 fatal cases. Of these cases, only 207 (29.2%) had complete post-mortem toxicological evaluations and thus were included. We determined that 44 (21.3%) cases showed discordance. We did not attempt to determine if knowing the identification of the substance found at post mortem would have altered treatment or outcome. *Discussion:* This study showed that a substantial number of fatalities were related to exposures to substances not mentioned by the initial treating professionals. The reasons for this are not yet known, but may include a lack of thorough history taking on behalf of the healthcare practitioner or poison information specialist. It remains to be shown if the outcome in cases of discordance would have been any different with concordance. *Conclusion:* There exists an appreciable percentage of cases in which there is a major difference between the substance thought to be responsible for a patients clinical course as reported to a poison center and that found on postmortem evaluation. Future studies will be designed to determine the implication of such discordance.

114. NPDS Data: Situational Awareness of an Emerging Poisoning Epidemic

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Background: According to the CDC, poisoning is the second leading cause of injury-related death: deaths have increased from 12,186 in 1999 to 23,618 in 2005. From a public health perspective, death is a small percentage of the total injuries; CDC published statistics also lag by 2 years and do not provide real-time awareness. It is postulated that NPDS data can provide up-to-date data on this emerging epidemic of severe poisoning. *Methods:* An 8 year review (1/1/2000–12/31/2007) of NPDS data was undertaken. The data was examined for management site, referral pattern and summary data by generic code. Generic codes reviewed included all medications/drug classes. *Results:* There were 456,669 patients treated in a HCF in 2000 and

583,091 patients treated in a HCF in 2007: an increase of 28%. A 38% increase in patients admitted to a critical care unit (64,027 in 2000 and 88,283 in 2007) and a 44% increase in patients admitted to non-critical care unit (34,012 in 200 and 49,079 in 2007) was also observed. The 5 drug classes associated with the highest increase in HCF dispositions are described in the table below.

Table 1

	Analgesic with opiate	Antipsychotics	Sedative/ hypnotic	Cardiovascular Meds	Anticonvulsants
2000	18,602	13,029	36,723	14,908	14,014
2007	39,372	31,401	65,650	26,207	22,920
% Increase	112%	141%	78%	76%	64%

Discussion: Poisoning deaths tracked by the CDC are a fraction of the injuries that occur from poisoning. A larger number of injuries can be tracked using NPDS data by measuring trends of patients admitted to a HCF and survive and an even larger number are those who seek care but do not need hospitalization. The NPDS database can provide up-to-date situational awareness of this emerging public health threat. *Conclusion:* Total PCC exposures have increased by 384,264 in the past 8 years, but cases managed in a HCF (increase of 126,422) account for 1/3 of the total increase. Opiate analgesics, antipsychotics, sedative/ hypnotics, cardiovascular medications and anticonvulsants are major contributors to the acute poisoning injury epidemic.

115. Use of Antivenin for Snake Bites Reported to US Poison Centers (PC)

Spiller HA,[1] Bosse GM,[1] Ryan ML.[2] *[1]Kentucky Regional Poison Center, Louisville, KY, USA; [2]Louisiana Poison Center, Shreveport, LA, USA.*

Background: In 2001 a new antivenin [crotalidae polyvalent immune fab (ovine)(Crofab®)] was introduced to the US and became widely available in the snakebite season of 2002. We investigated what impact this may have had on snakebite treatment and medical outcome. *Methods:* 8 year retrospective review of all snake bites to humans reported to the national Poison Center Database System (NPDS) from 2000 to 2007. *Results:* During the 8 years there were 37,760 snakebites, with a mean of 4720 bites per year. While there was a 27% increase in bites reported to a PC over the 8 year period, there was a 118% increase in the use of antivenin. The two categories primarily responsible for the increased use of antivenin were Copperhead and Crotaline-unknown. (Table 1) Rattlesnake bites remained the category most frequently treated with antivenin with a mean 52.5% treatment rate and no change over the 8 years. There was no change in the percentage or number of patients with a major outcome (mean 3.8%) or death (mean 0.5%). There was a decrease in patients with a minor outcome from 36.4% to 31.7% and an increase in patients with a moderate outcome from 29.2% to 37.7%.

	2000	2001	2003	2005	2007
Number (%) of Copperhead treated	69 (9.8)	119 (15.6)	261 (26.23)	320 (30.53)	410 (35.8)
Number (%) of Crotaline-Unknown treated	51 (18.6)	56 (19.24)	121 (30.6)	129 (31.2)	195 (40.5)
Number (%) Rattlesnake treated	491 (48.7)	618 (54.6)	628 (50)	638 (50.8)	736 (55.3)
Number (%) of total snakebites treated	743 (19)	936 (22.6)	1257 (25.5)	1378 (27.2)	1617 (32.5)

Discussion: The new antivenin is reported to have a reduced potential for adverse reactions. This may have had a role in the decision of which snakebite victims received treatment with antivenin. *Conclusion:* With the introduction of a new antivenin, there has been a dramatic increase in the number of snakebite patients treated with antivenin. This has been most noticeable in snake bite categories that were less frequently treated with antivenin in the past. There was no change in the rate of death or severe outcomes.

116. Who Are We Serving with Pill ID Requests?

Spiller HA,[1] Griffith JRK.[2] *[1]Kentucky Regional Poison Center, Louisville, KY, USA; [2]Central Ohio Poison Center, Columbus, OH, USA.*

Background: Information calls and specifically pill identification (PID) have been increasing at poison centers. *Methods:* This was a retrospective review of information calls reported to the NPDS for 2002–2006. *Results:* The total number information calls increased by 34% to 1.5 million/yr, while calls related to human exposures increased 1%. The sub-category PID was exclusively responsible for the increase in information calls with an increase of >70%. PID requests from the public, police and HCF changed by +98%, +112% and −13%, respectively. PID requests originating from the public, police and HCF were: 78%, 12%, and 10%, respectively. Other information sub-category calls showed a decrease or no change and these included calls for poison information (−20%), medical information (−1%) and drug information (non-PID) (<1%). 25% of all calls to US poison centers are now to identify a pill unrelated to an exposure. 62% of all identified pills were drugs with abuse potential (DAP). *Discussion:* DAP are <4% of pharmaceutical sales, yet > 60% of all PID requests involved DAP. This strongly suggests PID is not a random event but strongly driven by interest in DAP. Resources to fund poison centers are limited. Increasing services must come with a dedicated source of increased funding and it is unlikely that there are significant new resources dedicated to fund PID of DAP. Not all poison centers identify pills or report PID requests. The actual number of PID requests, while large, may be under reported. *Conclusion:* PID are increasing dramatically and taxing already limited PC resources. Continuing to provide PID for the public may not be in the best interests of the US poison Center system.

117. High Pressure Injection of Pepper Spray

Cooper SJ,[1] Hurley WT,[1,2] Amott SJ.[2] *[1]Harborview Medical Center, Seattle, WA, USA; [2]Washington Poison Center, Seattle, WA, USA.*

Background: Pepper spray use is increasing as a non-lethal weapon. Capsaicin, the active ingredient, produces incapacitation through ocular pain, tearing, and visual disturbance. Superficial injury to the eye has been reported from pepper spray canisters, but high pressure injection has not been previously described. *Case Report:* A 35 year old male inmate presented to the Emergency Department (ED) after suffering a pepper spray injection into his left palm. He had become combative and confrontational due to psychiatric illness. During attempts to control his behavior, the patient grabbed a canister and pepper spray was discharged into his left palm. Examination of the hand 90 minutes after the injury revealed diffuse swelling and erythema from the wrist to the fingertips. It was swollen to twice the size of the right. The palm bore a 1-cm puncture wound. The dorsum revealed ecchymosis 3 cm in diameter, indicating deep penetration of the injection. Digits were swollen and flexion limited to 30 degrees by pain. The patient was taken to the Operating Room by the Orthopedic Hand service. Operative exploration confirmed high pressure injection injury. Decompression of the left hand flexor and extensor compartments, interosseous compartments, and carpal tunnel was performed. Wounds were irrigated and left open. Wound healing was complicated by psychosis, which rendered the patient unable to cooperate with wound care. Repeat hospitalizations were required for debridement, treatment of cellulitis, and management of psychosis. *Case Discussion:* This is the first reported case of pressure injection of pepper spray. High pressure injections are insidious, producing little initial injury, but delayed incapacitating complications in the hand. They require surgical management by skilled providers. The patient experienced pain and immobility from the puncture wound, chemical irritation, and evolving compartment syndromes. Psychosis complicated post-operative wound healing, making it impossible to determine the damaging or protective effects of pepper spray in the tissues. *Conclusion:* Providers should be aware of the complications of pepper spray use, including high-pressure injection injury.

118. Using a Media Buyer To Promote Poison Center

Booth KM, Hurley WT. *Washington Poison Center, Seattle, WA, USA.*

Background: The Washington Poison Center held its first Poison Prevention Week Mr. Yuk poster contest for 3–5th graders. To increase participation and awareness of the Poison Center, the prize included featuring the winning poster on billboards throughout the state. Grant funds to purchase billboard space were very limited. *Case Report:* Due to the complexity of the task, the Poison Center contracted with a local media buyer to negotiate the best billboard rates, ensure optimal billboard placement, and act as an intermediary between the center and billboard owners. *Case Discussion:* The media buyer was able to purchase 36 billboards in 4 major market areas. Because of the center's nonprofit status and the buyer's experience, she secured over half, 53% (19), of the billboard spaces as donations. The media buyer obtained $44,289 worth of billboard advertising, using only $16,714 of grant funds. She allowed the center to purchase more than twice the planned number of billboards for the budgeted funds. The final cost was $464.28 per billboard. The billboards were viewed an estimated 489,573 times per day for a total of 13,708,044 "impressions" over the 28 day period they were contracted. Several of the billboards remained up past the contracted time, producing an even higher impression count. The Washington Poison Center received many positive comments from the general public about the billboards. *Conclusion:* Using a media buyer to secure billboard space for promoting the Poison Center resulted in a higher than expected impact on the community. Other Poison Centers should consider the use of a media buyer when purchasing advertising to provide the best use of limited funds.

119. Toxicity from Duloxetine Ingestion

Griffith JRK,[1] Spiller HA,[2] Weber JA,[3] Lintner CP,[4] Casavant MJ,[1] Baker SD.[1] *[1]Central Ohio Poison Center, Columbus, OH, USA; [2]Kentucky Regional Poison Center, Louisville, KY, USA; [3]Missouri Regional Poison Center, St Louis, MO, USA; [4]Hennepin Regional Poison Center, Minneapolis, MN, USA.*

Background: Duloxetine (Cymbalta®) is a serotonin and norepinephrine reuptake inhibitor and a less potent inhibitor of dopamine reuptake. A Pubmed search up to September 2007 revealed no literature describing the toxicology of duloxetine. *Methods:* A retrospective chart review of all duloxetine ingestions for 2000–2006 from 4 regional poison centers. Exclusion criteria were lack of follow up or multiple drug ingestion. *Results:* Of 238 patients, 152 (64%) were female. In adults (>19 yr) there was a predominant gender shift with 78% female. 105 patients (44%) were <6 yrs, with 22 older children and 110 adults. 146 (61%) were seen in a HCF, of which 34 (14%) were hospitalized and 85 (36%) were observed at home. Symptoms occurred in 81 patients and included lethargy (n=44), tachycardia (n=15), vomiting (n=15), hypertension (n=12), agitation (n=9), headache (n=9). Serious medical outcome included 19 moderate effects and one death. One third of moderate effects were adverse drug reactions. The single fatality was an adverse reaction to duloxetine resulting in hepatic failure after an increase in dose from 30 to 60 mg daily. Reason for exposure included: unintentional 143, intentional 76 (suicide = 69), adverse reaction 16, withdrawal 2 and unknown reason 1. Dose was known in 50 of 56 children less than 6 years old. Mean dose by outcome in children was no effect 3.4 mg/kg, minor 5.0 mg/kg and moderate 26.5 mg/kg, respectively. *Discussion:* The gender shift in adults may reflect prescription patterns and availability. Fatality from duloxetine use is previously unreported. Overdose of duloxetine in children or adults did not produce life threatening effects in this case series. *Conclusion:* Overdose of duloxetine in children or adults did not produce life threatening effects in this case series. Duloxetine appears to be associated with high acuity adverse effects. One third of moderate effects and the only fatality in this study are related to therapeutic use. We report the first fatality related to duloxetine ingestion.

120. Mechanisms of Adverse Reactions to Intravenous Acetylcysteine in Acetaminophen Overdose

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Background: Mechanisms involved in adverse reactions (ADRs) to IV acetylcysteine (NAC) are poorly understood. In volunteers changes in clotting factors [Knudsen et al 2005] are reported that relate to ADR severity. We have reported increases in serum histamine related to ADRs from NAC in acetaminophen (AP) overdose (EAPCCT Congress, Seville), and now report endothelial and hemostatic data in this group. *Methods:* An IR approved prospective study of 22 patients receiving IV NAC for AP overdose was conducted. Concentrations of AP, NAC, tryptase, IL6, CRP, tPA, wWf, and clotting factors were determined pre-NAC and at intervals during treatment. ADRs were pre-categorized as minimal (no or mild GI); moderate (GI requiring anti-emetic and/or mild anaphylactoid features); severe (anaphylactoid features requiring cessation NAC). *Results:* ADR occurence and severity (10 cases minimal, 5 moderate, 7 severe) was unrelated to any measure, despite differential changes in histamine. Factors II, VII, IX, X were significantly reduced by NAC but these changes were not related to ADR severity or AP concentration. NAC concentrations were similar in all three groups but AP levels were lower ($p<0.05$) in severe reactors. *Discussion:* ADRs to NAC in patients with AP poisoning involve increase in histamine, without other changes in endothelial markers or clotting factors. ADRs to NAC are unrelated to NAC concentration, but AP concentrations inhibit severe reactions. Undetermined patient factors appear important in their aetiology. *Conclusion:* Histamine release causes anaphylactoid responses to IV NAC in AP overdose. Mechanisms by which severe ADRs are inhibited by AP require further study.

121. Differential Toxicological Diagnoses Using a Computerized Knowledge-Based Model

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Background: Utilizing poison center data, a prototype knowledge-based system for developing a differential diagnosis list for toxic exposures was created. The goal of the system is to generate differential diagnoses for unknown exposure cases based on the clinical effects observed in patients. Serving as a medical decision support system, the system seeks to provide pertinent case-based summary data that is normally unavailable to medical practitioners. *Methods:* The computerized application was automatically generated by applying data mining techniques to a database supplied by the Florida Poison Information Center Network. For diagnosis, the system makes use of pre-test probabilities and likelihood ratios. To overcome the limitations of traditional likelihood ratios, the equation employed by the system is adjusted to account for every possible outcome. Using adjusted likelihood ratios facilitates system stability while closely modeling the calculations of traditional likelihood ratios. Accuracies are calculated as the percentage of correct diagnoses in the top 10% of all possible diagnoses. *Results:* Trained and tested on single exposure data from 2002–2005, the system achieved accuracies as high as 81.0% on cases involving at least three clinical effects. Adding exposure data from 2006, the system was trained on a combination of single exposures as well as the primary contributors in multiple exposure cases. With this training combination, the system achieved accuracies as high as 86.9% when diagnosing other primary contributors in multiple exposure cases. *Discussion:* The results of this research are modest, yet promising. The current system design assumes no prior knowledge in the field of toxicology. System performance should improve by the addition of certain knowledge, such as removing the "unknown toxin" diagnosis, combining various formulations of the same generic substance, and grouping substances by intelligently based on similar clinical effects. *Conclusion:* Many improvements to increase system utility and accuracy are readily apparent. With time, it is hoped that these studies will yield an effective consultant for the diagnosis of primary contributors in toxic exposure cases.

122. Demographics of Toxic Exposures Presenting to Three Public Hospital Emergency Departments in Singapore 2001 – 2003

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Background: The objective of this study is to establish the demographic profile of toxic exposures that presented to 3 Emergency Departments (ED) in Singapore. *Methods:* Toxic exposures that presented to the EDs of three public hospitals from 2001 to 2003 were identified through a search of the ICD code. Data for age, gender, race, type and quantity of toxic exposure, treatment and disposition of the patients were collected on a standard survey form and analyzed using the SPSS software. *Results:* The total number of toxic exposure cases for the 3 years was 9212 (0.94% of the total ED attendance). Accidental exposures made up 39.6% (industrial accident:8.1%, bites and stings:15.4%, others:16.1%). Non-accidental exposures constituted the other 60.4% (deliberate self-harm:20.9%, abuse and misuse of drugs:39.5%). 63.3% of the patients were male with a racial distribution of: Chinese 57.9%, Malay 15.7%, Indians 15.7% and Others 10.7%. The median age was 29 years (range 0.1 to 101). Most of cases involved one toxic agent (87.7%) and oral ingestion constituted 60.4% of cases. 39.2% of cases occurred at home and only 16.4% of the patients presented within 2hrs of exposure. The top 5 toxic exposures were: alcohol 26%, bites and stings 13.4%, analgesics 12.3% (82% of which involve acetaminophen), industrial chemicals 9.7% and sedatives 7.9%. 153 patients needed airway management. Decontamination procedures included activated charcoal (11.1%) and gastric lavage (3.7%). Antidotes administered included N-acetylcysteine (584 cases), flumazenil (69 cases) and naloxone (39 cases). 36.1% of the patients were admitted of which 70.6% stayed for >24hrs and 4.7% needed intensive monitoring. 39.4% of patients were discharged without follow up while the remainder of the patients were managed as outpatients or were transferred to other hospitals. There were altogether 7 deaths (0.08%). *Discussion:* This is the most extensive demographic study of toxic exposures in Singapore, covering 3 out of 6 public hospitals. The results were comparable to those in other developed countries. *Conclusion:* Developing a viable clinical toxicology service could improve patient outcome.

123. Drug Combinations Associated with Serotonin Syndrome in Patients Admitted to a Toxicology Treatment Center

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Background: Serotonin syndrome, a state of excess CNS serotonin activity, is typically associated with combinations of drugs that enhance serotonin release, block its metabolism, inhibit its reuptake, or act as direct receptor agonists. The condition can also occur after overdose of a single drug. Some agents originally linked with serotonin syndrome are now unavailable or less widely used. *Methods:* We reviewed the records of all patients admitted to a regional toxicology treatment center with the diagosis of serotonin syndrome to determine the drugs, or drug combinations, most frequently associated with the condition. All inpatients assigned a diagnosis of serotonin syndome from July 2003 through December 2006 were reviewed, and drug associations determined. Only those meeting the Hunter Serotonin Toxicity Criteria were included in the final analysis. *Results:* We reviewed records of 231 patients, 107 of whom met the Hunter Criteria. Twenty (19.6%) had taken an overdose of a single agent. Life-threatening toxicity occurred only in patients exposed to multiple drugs affecting serotonin activity by different mechanisms. Among the 87 patients with serotonin toxicity in the setting of multiple drug exposures, the most common combinations were a serotonin reuptake inhibitor (SRI) with either cocaine (28.7%), bupropion (11.5%), fentanyl (8%), amphetamine (7%), lithium (7%), dextromethorphan (7%), or tramadol (5.7%). *Discussion:* In 1991 most reported serotonin syndrome cases were exposed to drug combinations that included a monoamine oxidase inhibitor (MAOI) (84%) or tryptophan (55%). Today serotonin syndrome is more likely to be associated with the combination of an SRI antidepressant and cocaine, serotonergic analgesics, amphetamines, or lithium. *Conclusion:* These agents should be used cautiously in the setting of chronic SRI use. The diagnosis of serotonin syndrome should be considered in patients with delirium who are exposed to any of these drug combinations.

124. Reversible Bilateral Hearing Loss after Heroin Overdose

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Background: Transient sensorineural hearing loss has been associated with heroin overdose, however, the incidence of this phenomenon is not known. *Case Report:* A 22 year-old female with a history of recent abstention from intravenous (IV) heroin use presented to the emergency department (ED) obtunded and cyanotic. The patient and a friend each injected a "bag of heroin" nine hours prior to arrival. Within an hour the patient became difficult to arouse. In the ED, the patient was successfully treated with 2 mg of intramuscular naloxone and supplemental oxygen. Upon awakening, the patient reported bilateral hearing loss but denied tinnitus and vertigo. Weber-Rinne testing did not lateralize and her cranial nerve exam was normal save for subjective hearing loss. Within 12 hours after presentation the patient's hearing had grossly recovered. The patient's friend, by contrast, reported no changes in her own hearing. Outpatient audiometric testing was requested but the patient did not attend the appointment. The patient's friend reported that temporary hearing loss after heroin overdose was common knowledge in her local IV heroin using community. *Case Discussion:* Five cases of heroin-associated acute hearing loss are reported in the medical literature. Three of the cases are well described, and feature abrupt bilateral hearing loss after a heroin overdose. Two additional cases are briefly discussed in abstracts. A comparison of available details suggests that a period of opiate abstinence followed by a potentially life threatening overdose immediately precedes the hearing loss. The deafness was of variable duration, lasting 3 days in two cases, 3 weeks in one case, and was permanent in two. Vertigo and tinnitus were not universal. Audiometric data, available in 3 cases, revealed high-frequency hearing loss, and suggested cochlear injury. Propoxyphene and hydrocodone induced hearing loss have also been described. Permanent high-frequency hearing loss was a common finding in these cases, which outnumber the heroin cases. *Conclusion:* Transient hearing loss is a rarely reported sequela of heroin overdose. Similar features among heroin, propoxyphene, and hydrocodone associated hearing loss cases suggest a common pathophysiology.

125. Acetone Clearance Improved with Hemodialysis

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Background: Severe life threatening acetone intoxication is infrequently reported in the literature. A case of severe acetone toxicity in which hemodialysis was used to expedite clearance is reported. *Case Report:* A 49 year-old woman was found in the bathtub with an altered level of consciousness and an empty bottle of nail polish remover. She presented to the emergency department obtunded with vomiting and diarrhea. Vital signs included: temperature 34.7ºC, pulse 114 bpm, respirations 34 bpm, blood pressure 118/74 mmHg and SaO_2 100% on 15L face mask. Physical exam revealed: GCS 4, markedly dry mucous membranes, perioral vomitus and copious diarrhea. Abnormal initial lab values included: BUN 25 mg/dL, creatinine 1.7 mg/dL, glucose 351 mg/dL, CPK 12,549 IU/L and acetone 190 mg/dL. Both toxic alcohol and urine drug screens were unremarkable. Acetaminophen, salicylate and ethanol levels were undetectable. She was endotracheally intubated and received IV fluid resuscitation. Hemodialysis was initiated on hospital day 2 due to a persistent coma and an estimated acetone elimination of 5 mg/dL/hr. After 5 hrs of dialysis, her coma resolved, measured acetone level was 0 mg/dL and mechanical ventilation was discontinued. *Case Discussion:* Acetone toxicity induces vomiting, diarrhea, coma, hyperglycemia and falsely elevated creatinine. After IV fluid administration but before dialysis, the patient's creatinine normalized. Use of hemodialysis to rapidly clear acetone, however, is unreported in the English literature. Hemodialysis led to rapid improvement in this patient's coma and provided an acetone clearance of 212 ml/min at a dialysis flow rate of 250 ml/min. This suggests a more rapid recovery from the effects of acetone toxicity. *Conclusion:* Hemodialysis hastens acetone clearance and may decrease duration of mechanical ventilation which could ultimately reduce the morbidity of prolonged ICU stays. Additional research is required to determine if this treatment would reduce cost and hospital complications after acetone poisoning.

126. Trends in Hypoglycemic Drug Exposures Reported to Six Poison Control Centers

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Background: Diabetes rates and hypoglycemic drug use have increased in recent years in the United States. However, there is little information on trends in hypoglycemic drug exposures reported to poison control centers. *Methods:* Exposures to hypoglycemic drugs, excluding insulin, reported to six regional poison control centers during 1998–2007 were extracted and analyzed. The distribution of cases with respect to drug category and exact drug was determined for each year and examined for annual trends. *Results:* There were a total of 6800 hypoglycemic drug exposures reported to the centers during this time, increasing from 392 in 1998 to 836 in 2007. Between 1998 and 2007, the proportion of total exposures involving biguanides increased from 27.6% to 60.6% and sulfonylureas proportions declined from 69.1% to 42.9%. Thiazolidinediones proportions increased from 7.9% to 19.0%. The number of exposures involving more than one hypoglycemic category was 1228 or 18.1%. This percentage increased from 6.6% in 1998 to 23.3% in 2007. The most frequent combinations were biguanide/sulfonylurea exposures (14.5%), biguanide/thiazolidinedione (2.6%) and sulfonylurea/thiazolidinedione (1.6%). When examining the individual drugs, the most common exposures involved metformin (48.4%), glyburide (24.2%), glipizide (18.6%), and pioglitazone (8.2%). The most common combinations of specific drugs were metformin/glyburide (8.21%) and metformin/glipizide (2.6%). *Discussion:* The number of hypoglycemic drug exposures reported to six regional poison control centers increased over a recent ten-year period. This increase was observed across the three major drug categories, and an increasing proportion of the exposures involved multiple drugs. *Conclusion:* Poison centers will need to increase education and preventions efforts targeted at hypoglycemic drugs. With the increasing number of exposures to multiple drug classes, there is a rising need for new guidelines dealing with multiple drug exposures.

127. Gamma Hydroxybutyrate (GHB) Abuse Trends: Impact of U.S. Regulatory Controls

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Background: In 2000, GHB was regulated as a Schedule I agent in the US due to rising abuse and, since 2002, as a Schedule III prescription drug limited to narcolepsy treatment. Stricter controls were contemporaneous with declining US GHB abuse reports. This has not been paralleled by international use trends, a divergence we wished to investigate. *Methods:* Over a 4.5-month period (Oct 30, 2007 to Mar 15, 2008), we recruited subjects via the Internet for a brief, self-completed survey on GHB use. We targeted "social networking Internet sites" (eg FaceBook, DontStayIn) likely to be visited by GHB-knowledgeable persons. Individuals (n=314) or groups (n=66) were approached for participation based on testimonial or video indications of their GHB use. Notices were also posted on selected websites visited by GHB users internationally (eg Project GHB). Key data points collected included: respondent location (US city or country level), GHB use status (current v. former user) and the main reason for GHB cessation (former users). *Results:* We recruited 155 GHB current or former users. US respondents (53 of 70; 76%) were almost 4 times more likely to report cessation of GHB use compared to those residing outside of the US (38 of 85; 45%) (Odds Ratio [OR] 3.9; 95% CI 1.9 – 7.7; p<0.001). Of the 91 who ceased GHB use (excluding 11 who declined to state a reason), 36 (45%) cited legal risk, price, or access; 44 (55%) cited health or safety concerns. US respondents more frequently invoked legal risk, price or access as reasons for cessation vs. non-US respondents (OR 2.5; 95% CI 0.99–6.3; p=0.05). *Discussion:* In the US, where GHB has stricter legal restrictions and penalties for possession, GHB cessation is significantly more likely, with a trend toward non-health concerns more commonly invoked as the reason for such cessation. *Conclusion:* Utilizing an innovative survey strategy, these findings support the temporal association between declining US GHB overdoses and national legal restrictions in force since 2000.

128. Coma Following Toxic Topiramate Ingestion

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Background: Topiramate, a sulfamate-substituted monosaccharide anticonvulsant, is being used with increasing frequency for a variety of neurologic and psychiatric disease due to its benign safety profile. Data regarding the toxicity and toxicokinetics of topiramate in acute overdose is limited. A case of massive, acute ingestion resulting in the highest reported topiramate level is presented. *Case Report:* A 37 yo woman presented with normal vital signs and coma unresponsive to naloxone. Family found bottles of topiramate, ibuprofen, and hydrocodone/acetaminophen. She was intubated for airway protection, given 3.5mg lorazepam IV for facial and neck muscle twitching, and transferred to a tertiary care facility. No additional sedation was required for 24 hours on the ventilator. The patient was extubated on day 2, but confusion, dysarthria, and imbalance continued until day 3. Serial serum topiramate levels were 356.6 mcg/ml(5–20), 173.6, 61.2, and 44 at 1615 day 1, 0955 day 2, and 0841, 1555 day 3, respectively. Serum half-life was 15.79h overall, and 17.01, 15.025, and 15.188h for each measurement. She presented with a nonanion gap metabolic acidosis (pH 7.31, HCO_3 16 mEq/L) which persisted throughout her hospitalization. Urine pH was 9.0. Serum ibuprofen level drawn upon presentation was 12 mcg/ml(5–50). Urine GC/MS revealed only topiramate, ibuprofen, and caffeine. Acetaminophen and salicylate levels were undetectable. *Case Discussion:* Massive topiramate ingestion led to prolonged coma with normal vital signs and a nonanion gap acidosis. This is consistent with topiramate's mechanism of action: GABA agonism, kainate/AMPA antagonism and carbonic anhydrase inhibition. The highest previously reported level was 170mcg/ml which resulted in death. Coma of the severity reported in the above patient has not been previously reported. Toxicokinetic evaluation revealed preserved first order kinetics with a serum $t_{1/2}$ of 15.79h. Despite the large ingestion and significant presenting symptoms, the patient recovered fully with supportive intensive care alone. *Conclusion:* Massive acute topiramate ingestion may lead to prolonged coma which resolves with supportive care.

129. Clinical Features of Montelukast Ingestion Reported to a National Poisons Service

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Background: Montelukast (Singulair®) is a leukotriene antagonist used in the treatment of asthma. The present study sought to examine the clinical characteristics and toxicological features associated with montelukast ingestion. *Case Report: Methods:* TOXBASE® is a standard web-based resource in the United Kingdom for clinical advice regarding poisoning, and is freely accessible to healthcare staff. All TOXBASE accesses regarding montelukast ingestion between January 2000 and March 2008 directed users to an electronic data collection sheet. If the enquiry related to a clinical case, then healthcare staff were asked to provide clinical details: patient age and gender, the quantity ingested, co-ingested drugs or ethanol, symptoms, and clinical outcome measures. *Results:* Study questionnaires were completed in respect of 47 separate exposures. These involved 26 male patients (56.5%) and 20 female (43.5%) patients, and median age was 4 y (range 1 to 37 y). The median dose ingested was 16 mg (range 4 mg to 560 mg), and an additional drug was co-ingested in 2 patients (4.3%). Reported symptoms were: none in 35 (76.1%), excessive thirst in 4 (8.5%), abdominal pain in 2 (4.3%), nausea and vomiting in 2 (4.3%), wheeze in 2 (4.3%), drowsiness in 1 (2.1%), headache in 1 (2.1%), malaise in 1 (2.1%), pallor in 1 (2.1%), restlessness in 1 (2.1%). No specific treatment was required in any patient. *Case Discussion:* A high proportion of clinical TOXBASE enquiries regarding montelukast involved exposures in a paediatric population. The majority of patients had either no symptoms or only mild symptoms that resolved without specific therapy, as reported elsewhere[1]. *Conclusion:* These data support the view that Montelukast ingestion is associated with low toxicity. Reference: 1. Forrester MB. Pediatric montelukast ingestions reported to Texas poison control centers, 2000–2005. J Toxicol Environ Health. 2007;70:1792–7.

130. Survival after Massive Diphenhydramine Ingestion Requiring Hemodialysis in a Toddler

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Background: Antihistamine exposures account for 3% of pediatric (<5 yo) cases reported to poison centers in 2006. Mortality arises from tachydysrhythmias and status epilepticus. We report a case of diphenhydramine ingestion requiring hemodialysis for wide-complex tachycardia and persistent seizures. *Case Report:* A 13-month-old male was found with an empty bottle of 50 mg Unisom gel caps. His mother reported that 20 gelcaps were missing. The child had four seizures prior to his arrival in the Emergency Department. On arrival, he was still seizing. Vital signs revealed a temperature 37.6°C, BP 99/56 mmHg, HR 188 bpm, RR 30/min oxygen saturations by oximetry 100% on blow-by oxygen. His ECG revealed a sinus tachycardia with a QRS of 68 msec, and QTc of 407 msec. An interosseous line was established. He was given midazolam and lorazepam which terminated the seizures. 3.5 hours post-ingestion he developed a wide-complex tachycardia and went into status epilepticus. He was intubated, loaded with fosphenytoin, and started on pressor support for hypotension. Despite multiple boluses of sodium bicarbonate, he had an intermittent wide complex tachycardia with a QRS of 120 msec. An echocardiogram revealed global hypokinesis. Approximately 11 hours post-ingestion, his vital signs were a temperature of 38.6°C, heart rate 188 bpm, and a blood pressure of 65/26 mmHg. At that time, he was started on hemodialysis. An intra-dialysis diphenhydramine concentration was 3900 ng/mL (reference range 100–1000 ng/mL). No further seizure activity or wide-complex tachycardia was noted. 48 hours post-ingestion he was extubated and all pressors discontinued. *Case Discussion:* Despite diphenhydramine having a large volume of distribution (3–4 L/kg) and protein binding (98%), several previous case reports have reported survival with dialysis in adults. We believe this may be the first case report of hemodialysis in a toddler for diphenhydramine overdose. *Conclusion:* We report a case of diphenhydramine ingestion in a toddler who presented with tachydysrhythmias and status epilepticus with a significantly elevated diphenhydramine level. Hemodialysis should be considered in cases that do not respond to conventional supportive care.

131. Inappropriate Use of Physostigmine in TCA Toxicity: An Online Medical Reference May Be Paritally Responsible

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Background: Physostigmine was used in the 1970's to reverse the effects of anticholingeric agents. Following several deaths, it was no longer recommended in the treatment of TCA toxicity. We report a case of cardiac arrest resulting from administration of physostigmine in a TCA overdose. Physostigmine was administered in part based on information published on an online medical database. *Case Report:* The poison center was contacted regarding a 67 year-old female who ingested more than 30 amitriptyline tablets. At initial presentation, she was agitated with vital signs of: BP 134/37 mmHg, RR 24 bpm, and an ECG showing sinus rhythm of 125 bpm with a QRS of 126 msec. There was no significant T40-ms. Two doses of physostigmine 2 mg were administered before the initial call to the poison center. Immediately thereafter, the patient developed ventricular tachycardia and arrested, but was successfully resuscitated. With advice from the poison center, sodium bicarbonate therapy was started. No further dysrhythmias were reported and the patient eventually did well. *Case Discussion:* This patient presented with classic signs of TCA toxicity: agitation, tachycardia, and a wide QRS=126msec. Physostigmine administration resulted in a wide complex tachycardia with a QRS of 202 msec and subsequent cardiac arrest. The healthcare providers were unaware of the contraindication of administering physostigmine with TCA toxicity. Their initial source for toxicology management, UpTo-Date.com, an online database, recommended using physostigmine as an antidote for amitriptyline poisoning. We contacted the editors of this reference who agreed to change the monographs involved and send a "Dear Doctor" letter to their subscribers. *Conclusion:* We report a case where use of physostigmine in TCA overdose was temporally associated with an adverse cardiac effect. We determined that the medical error was at least in part due to incorrect information published online. We caution that information available to healthcare professionals may contain spurious treatment recommendations and the primary source for advice should always be the regional poison control center and/or medical toxicologist.

132. Highest Reported Serum Topiramate Level with Survival

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Background: Acute topiramate (TPM) toxicity is characterized by altered mental status, dysarthria, and ataxia. Carbonic anhydrase inhibition produces hyperchloremic acidosis. We present a case of brief neurologic signs followed by persistent acidosis in a patient with the highest reported serum TPM level associated with survival. *Case Report:* A 28 y/o female presented to the ED 2 h after ingesting 47 100 mg TPM tabs and 60 tabs of 500 mg/25 mg acetaminophen/diphenhydramine (APAP/DPH). She was obtunded but protecting her airway. Labs were: Na^+ 141 mEq/L, K^+ 2.5 mEq/L, Cl^- 112 mEq/L, and HCO_3^- 12 mEq/L. 4-hr APAP level was 428 mg/L warranting initiation of IV NAC. ECG showed HR 118, QRS 111 ms and QTc 388 ms. In the ICU vital signs were: BP 114/73 mmHg, HR 92 bpm, RR 19/min, SaO_2 100% (RA), and T 97.2°F. The patient was somnolent but responsive to verbal stimuli. Speech was slightly garbled. Neurological exam revealed horizontal nystagmus and clonus. The remainder of her exam, including pupils, was unremarkable. Repeat labs revealed a persistent hyperchloremic acidosis (Na^+143, K^+ 3.5, Cl^- 119, and HCO_3^- 15). ABG showed pH 7.32, pCO_2 24, pO_2 114, HCO_3^- 12, and base deficit of 12.7. Urine GC/MS found APAP, DPH, and TPM. Initial serum TPM level was 63.1 mg/L (2 – 25 mg/L) and DPH level was 676 mcg/L (30 – 50 mcg/L). Heart rate, QRS prolongation, and neurologic exam normalized 3 h after arrival. Acidosis worsened (Na^+ 143, K^+ 3.1, Cl^- 128, HCO_3^- 11) requiring 3 d of therapy with a HCO_3^- drip and K^+ and Mg^{2+} supplementation. NAC was continued for 21 h. On hospital day 4 the serum $Cl^-$and HCO_3^- normalized. *Case Discussion:* Our patient demonstrated CNS depression, dysarthria, and nystagmus, which are consistent with both TPM and DPH. The patient displayed mild anticholinergic signs that resolved early in her clinical course. This along with the persistent hyperchloremic acidosis suggests the TPM played a greater role in this patient's clinical presentation than DPH, which is consistent with TPM's longer elimination half-life. *Conclusion:* A MEDLINE search from 1996 – 2008 suggests this is the highest reported serum TPM level in an overdose survivor. Physicians caring for TPM ingestions should be aware that metabolic abnormalities may persist after neurotoxicity has resolved.

133. Outcomes Following Accidental Pediatric Ingestions of (Dextro-) Amphetamine and Methylphenidate

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Background: Prescription amphetamines (pAM), dextro-amphetamine (Adderall) and methylphenidate (Ritalin) stimulates the cerebral and subcortical structures by inhibiting the reuptake of dopaminergic neurons. Clinical effects can manifest via CNS stimulation or depression. Limited data have been published concerning accidental pAM exposures. We performed a chart review to evaluate outcomes following accidental pAM ingestions in children <7 years old. *Case Report:* Crystal reports ™ search engine was run on all PCC charts from 1/2003 to 12/2007 for entries of pAM (>500,000 charts). All reviewers underwent standard training for manual, systematic chart review. Patient age, clinical effects and outcome were recorded. All patients were followed for at least 24 hours (if asymptomatic) or until cessation of symptoms. Results: A total of 118 accidental pAM charts were identified; mean age was 3.1 yrs (8m - 7y). 28/118 (24%) of pts took a "double-dose." Of these, 25 (89%) were observed at home and developed no or minimal symptoms; 3 (11%) were referred to an ED for headache or mild agitation but were subsequently discharged. 90/118 (76%) were naïve to the medication and accidentally ingested a sibling's pAM. Of these, 76 (84%) developed symptoms and were evaluated at a HCF. 15 (17%) received benzodiazepines for agitation and 16 (18%) were observed for > 12 hours, there were no deaths. OR for hospital referral was 45.2 [12–170] if the patient was naive to the medication. *Case Discussion:* Supratherapeutic ingestions of prescription amphetamines can result in transient tachycardia or CNS disturbances. *Conclusion:* These symptoms are more likely in naïve patients.

134. Occupational Acute Pulmonary Edema Following Refrigeration Coil Deicing

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Background: When exposed to intense heat halocarbon refrigerants decompose into phosgene and/or carbonyl fluoride (P&CF), both potent respiratory irritants. Relative water insolubility results in delayed but sometimes severe acute lung injury (ALI). We report a case of suspected P&CF exposure in a worker who developed ALI after using an oxy-acetylene torch to melt ice on refrigeration coils charged with MP39. *Case Report:* A 48 yo male nonsmoker in excellent health was working without respiratory protection in an enclosed walk-in cooler using an oxy-acetylene torch to melt an ice on the coils of a cooling unit for approximately 2 – 3 hours. He did not experience an odor or irritant symptoms. Though he began to feel mildly lightheaded, he completed the task and left work. Within the hour he developed acute dyspnea with increased lightheadedness. On arrival in the ED his vital signs were: HR 156 bpm, BP 131/92, RR 36/min and labored. O_2 sat was 90%. The exam revealed bilateral wheezing and rhonchi. Chest radiography revealed acute non-cardiogenic pulmonary edema. Bacteriology and serologic studies were negative. Endotracheal intubation and mechanical ventilation was required for 3 days. No treatment was required after discharge on day 8. CXR, oximetry, and spirometry were normal at 2 weeks. Methacholine challenge was negative at 10 weeks. *Case Discussion:* The clinical course in this case strongly suggests an occult exposure to P&CF, generated by applying a torch to refrigeration coils containing halocarbons in a closed-space environment. The development of pulmonary edema without ocular and upper airway irritancy implicates exposure to a potent water insoluble irritant such as P&CF, neither of which may be perceptible by vision or odor at concentrations that exceed the TLV of 0.1 ppm and 2.0 ppm. No other substances were identified capable of producing the clinical outcome observed in this case. *Conclusion:* Utilization of an oxy-acetylene torch for deicing refrigeration coils may result in the release of P&CF, both capable of producing ALI. This case suggests that deicing should be performed by alternative methods that will not generate P&CF. Otherwise, engineering controls and/or respiratory protection should be required if a torch is used for this purpose.

135. Public Health Savings from a Regional Poison Center

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Background: We studied the financial savings from our PCC providing home management. *Methods:* From 2/1–4/1 2007, a survey was conducted of callers regarding human exposures and who were home-managed. The convenience survey was administered by CPISs, when time permitted, only after completion of home management and obtaining verbal consent. 12/36 representative EDs serving our catchments were surveyed. ED coders for hospital charges were queried regarding hospital services billed for an asymptomatic pt with an accidental or non-suicidal known or possible exposure, who underwent only a history and examination, and for whom the ED stay was limited to 1 h before discharge. Coders provided levels of hospital services that would be billed (range 1–5). EPs working at the 12 hospitals provided the CPT code that such a visit would typically generate. *Results:* During the survey, 7627 human exposure calls were received; surveys were completed on 600 of 610 callers who were asked to participate. 418/600 callers (70%) would have gone to, or asked for ambulance transport to an ED if the PCC wasn't available. In 2007, the PCC home-managed 41,262 human exposures. If 70% would have been seen in an ED, then 28,883 unnecessary ED visits were prevented. All hospitals stated that the scenario pt would have generated level 4 or 5 bills. 10/12 EP billers stated that the same pt would have generated a level 5 bill; 2/10 would have billed level 4. Using the most conservative assumptions (both facility and EP level 4 billing), a mean of $33,270,000 in unnecessary health care charges was prevented (range $18.2 to $45.9 million). *Discussion:* Given costs of EMS services, the fact that most EPs would bill greater amounts that our analysis excluded lab studies, medications and other factors, actual savings to the public were undoubtedly much greater. Since our PCC receives $925,000 in annual state support, our PCC prevents at least $36 in unnecessary health care charges for each dollar of state support received. *Conclusion:* Our PCC prevents at least $36 in unnecessary health care charges for each dollar of State funding provided and provides a very cost-effective service to our citizens.

136. Pediatric Ingestions of Triptans

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Background: Little data exists regarding unintentional ingestions of triptans in children <6 yr. The triptans are $5HT_1$ receptor agonists used to treat migraines in adults. Adult overdoses have resulted in HTN, and rare adverse effects in therapeutic use include coronary vasospasm, MI, and ventricular fibrillation/tachycardia. *Methods:* A 7 year review of PCC data from 1/1/2001–12/31/2007 was undertaken. All patients ≤ age 5 with a history of unintentional ingestion of rizatriptan, sumatriptan, zolmitriptan, eletriptan, almotriptan, naratriptan, or frovatriptan were included. *Results:* 51 cases were identified. Ages ranged from 2 mo to 5 yr: 43 were between ages 1–3yr. 22 cases involved sumatriptan, 21 zolmitriptan, 4 rizatriptan, 2 eletriptan, and 1 frovatriptan. 3 cases involved an unknown number of tablets, 43 involved one tablet or less, 2 involved 2 tablets, 1 involved 3 tablets and 2 involved 4 tablets. 1 case involved one other drug (metformin). 20 cases were managed on site, 10 were referred to HCF and lost to follow up, and 21 cases were managed in a HCF: 2 patients were admitted and 19 were d/c'd from ED. 14 patients received activated charcoal, and one patient received ipecac before call to PCC. Of the 39 cases with documented follow up, 33 patients had no effect, 2 had an adverse reaction to decontamination (vomiting) and 4 developed minor effects described below.

Table 1

Age	Reason	Drug/Dose	Sx
2 mo	Therapeutic Error	Sumatriptan 100mg	"fussy" per family but appropriate per ED staff
4 yr	Unintentional	Sumatriptan 400mg	Vomit × 6 PTA, remained asx in HCF
3 yr	Unintentional	Zolmitriptan 2.5mg	Vomit × 1 after excess water given by parent
2 yr	Unintentional	Zolmitriptan 1.5mg	Vomit × 2

Discussion: Our review of 51 unintentional pediatric triptan ingestions revealed no reports of serious adverse effects. There are rare reports of severe side effects during therapeutic use in adolescents, similar to those of adults. No major adverse effects involving unintentional exposure to triptans in children ≤ 5 yrs were found in the literature. *Conclusion:* Unintentional ingestion of ≤ an adult therapeutic dose of a triptan in children age 5 and under was not associated with significant toxicity. Patients matching this profile may be managed at home with telephone follow up.

137. Current Trends in the Risk Assessment of 650mg Tylenol Extended Relief

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Background: The kinetics of TER in excessive dosing situations has not be elucidated. In addition, it is not known whether physicians can rely on the Rumack-Matthew nomogram (RMN) to guide treatment. Previous studies evaluating exposures to this product offer conflicting recommendations in regards to risk assessment. *Methods:* This was an Internet-based analysis involving an 8-question survey sent via email to all ACMT members asking about their current practices in the assessment and management of acute TER exposures. All surveys were sent anonymously to an email account with their recorded answers. *Results:* A total of 657 surveys were emailed to current ACMT members. 83 (13%) were delivery failures. 137 (21%) members responded to the survey. One survey was rejected from analysis due to conflicting answers. Of the surveys analyzed, 69% were attending toxicologists. 68% of respondents had previously evaluated or treated a patient with an acute overdose of TER

and nearly half (48%) had patients with an initial APAP level below the RMN recommended treatment line but became high/probable risk (aka "line crossers"). 16% of patients that became high risk, had coingestants that might affect gut motility. Nearly 90% of "line-crossers" did not develop hepatoxicity. The majority of respondents (60%) repeat a second level in 4 hours to determine risk of hepatoxicity and need for NAC. 23% of respondents stated that they would treat these patients the same as any other acute APAP overdose. *Discussion:* There is significant variability in management practices of TER exposures. Several papers outline different strategies in the risk assessment of these patients, but no consensus guidelines for poison center staff or physicians are currently available to aid in the risk stratification of this patient population. Based on this survey, a significant number of patients became "high risk". However, the vast majority of these patients did not develop hepatotoxicity. *Conclusion:* Wide variability in practices in the risk assessment of patients with TER should prompt consensus guideline development for risk stratifying these acutely poisoned patients.

138. Myelin Basic Protein in the CSF May Represent a Predictive Marker of Delayed Encephalopathy from CO Poisoning

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Background: There has been no reliable predictive marker of delayed encephalopathy (DE) in carbon monoxide (CO) poisoning. *Methods:* This study was designed to investigate whether myelin basic protein (MBP) in cerebrospinal fluid (CSF) can be a predictive marker of DE from CO poisoning. This study was a prospective human trial conducted at an emergency center in a university hospital. The 10 patients with CO poisoning who were admitted to our hospital during the 27 months from Oct 2005 to Dec 2007 were included in this study. Including criteria are: 1. evidence of CO exposure, 2. loss of consciousness, and 3. 16 years or older. All patients were treated with hyperbaric oxygen therapy for 3 days starting the day of admission (2.8 atm, 70 min). The CSF was serially sampled every week to determine the MBP concentrations by an enzyme-linked immunosorbent assay. The patients were classified into either group DE or group non-DE according to whether DE developed clinically or not. The protocol was approved by the Ethics Committee of Kitasato University Hospital. *Results:* Ten patients (5 men, mean age 49.6) were included in the study. In all 4 patients in the DE group, the MBP levels in the CSF elevated preceding the clinical manifestations of DE. Among the 6 patients in the non-DE group, the MBP concentrations in the CSF were not at all elevated in 2 patients however, slightly elevated in 4 patients. *Discussion:* In DE patients, delayed MBP elevation was observed preceding the clinical manifestation of DE. These events may reflect demyelination or destruction of oligodendroglia. However, in non-DE patients, delayed, slight elevations of MBP in the CSF were observed in 4 patients. This suggests subclinical demyelination in the CNS. The mechanisms of DE remain unknown, however, an autoimmune reaction against MBP or glial apoptosis is suspected. Further study is warranted to more definitively determine these mechanisms. *Conclusion:* Elevated MBP concentrations in the CSF may represent a predictive marker of DE from CO poisoning.

139. Fatality Following Drotaverine Overdose

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Background: Drotaverine is a Russian medication available over the counter for its antispasmodic effects. We describe a death that was potentially related from intentional overdose of this product. *Case Report:* The Regional Poison Center was consulted approximately 18 hours post-ingestion concerning a 21 year old female of Russian descent who by history ingested 800mg of drotaverine. The medication had been reportedly sent from Russia. In the pre-hospital setting, she experienced asystole, was administered epinephrine and atropine, and was intubated. Upon ED arrival, the patient experienced seizures and later posturing, although an initial CT of the brain was reported normal. She subsequently received activated charcoal and required norepinephrine for hypotension. Her initial pH was 6.5 by ABG. Other laboratory values: CPK 14,291 U/L, CKMB 65.8 U/L, BUN 13 mg/dL, and serum creatinine 1.0 mg/dL. Approximately 24 hours post ingestion, physical examination demonstrated reactive pupils but decreased gag and corneal reflexes. An EEG showed brain wave activity. CPK peaked at 18,615 U/L on hospital day 2. On day 3, she was still experiencing posturing and papillary light reaction no longer was present. Repeat EEG showed generalized slowing of brain wave activity. Her neurologic status continued to deteriorate and on hospital day 5 an MRI of the brain showed ischemic injury. She was continued on ventilatory support and other supportive therapy. On day 15 the patient's family elected for withdrawal of supportive care and organ donation. *Case Discussion:* There is minimal published literature concerning drotaverine. This product is available in several countries. An analogue of papaverine, it produces smooth muscle relaxation by increasing intracellular levels of cyclic adenosine monophosphate. No case reports regarding toxic effects or death have been reported, although studies have reported hypotension with IV use. Drug information from the manufacturer website states drotaverine is "particularly well suited for quickly and effectively easing spasmodic gastro-intestinal, biliary, or gynecological pain." *Conclusion:* We present a case of intentional overdose of drotaverine resulting in death. We believe this is the first case reported in the literature.

140. Validity of the AAPCC Atypical Antipsychotic Ingestion Guideline for Quetiapine

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Background: Quetiapine (Seroquel®) is an atypical antipsychotic approved by the FDA in 1997 for schizophrenia and bipolar disorder. In 2007, the AAPCC published the atypical antipsychotic guideline that stated children who ingested 100 mg or less of quetiapine and who have only mild drowsiness may be safely observed at home rather than in a health care facility (HCF). Due to the lack of published studies of ingestion by young children, the expert consensus panel used 4 times the initial adult dose (25 mg) as the triage amount. We wanted to validate this guideline using actual pediatric patients. *Methods:* Retrospective study of cases from poison centers in one state for single substance ingestion of quetiapine from 2002 to 2007. Only children under the age of 7 years with documented ingested amount and a follow up call with a known outcome were included. *Results:* There were a total of 76 children. Their ages ranged from 9 months to 6.5 years, and the dosages ranged from 25 to 800 mg. Most (79%) children had no symptoms, and the others (21%) had only drowsiness or lethargy. There were no deaths and no severe symptoms noted (0%, 95%CI: 0 - 4.8%). Nineteen children (25.0%) ingested more than 100 mg. Of these, 15 had no effects, 3 had mild drowsiness, and only 1 had moderate lethargy (this child was 4 years old and ingested 200 mg. Of the 64 children who ingested 100 mg or less, only 12 had mild drowsiness. Forty-five children (59.2%) were treated in a HCF, and 31 (40.7%) received activated charcoal. *Discussion:* If the guideline had been used, 26 fewer children would have been treated at an HCF (34.2% of total). Although the positive predictive value for moderate or severe symptoms is only 5.3% (95%CI: 0.9% to 24.6%), the guideline did predict the one patient with moderate symptoms. The negative predictive value is 100% (95%CI: 93.7% to 100%) which makes the guideline appear very safe. *Conclusion:* This is the first study of the adverse effects of quetiapine ingestion by children under 7 years of age. Based on this small study, the new guideline appears to provide safe triage dosages for these children.

141. Secular Trends in Adverse Exposure Outcomes from the National Poison Data System, 2000–2007

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Background: A poison center (PC) observed an increased frequency and more severe clonidine exposure outcomes in 2007 compared to prior years. We wished to determine if this was the case nationally. *Methods:* Clonidine calls with medical outcomes moderate, major or death (MMD) in National Poison Data System (NPDS) were examined for 2000 – 2007 for correlation and slope of log-MMD vs. time and for comparison, other cardiovascular (CV) products and all exposure calls. *Results:* Clonidine MMD showed a log-linear increase over time (R-square = 0.976, p<0.001, N=8) and doubling-time and 95% confidence interval (CI) 8.00 [5.42, 15.3]. The table shows these results for clonidine and the comparison groups.

Drug Group	Median [min, max]	Doubling time [95% CI]	R-squared
Angiotensin receptor blocker MMD	383 [152, 636]	1.45 [1.20, 1.82]	0.960
Antihyperlipidemic MMD	1469 [1163, 1895]	4.16 [3.60, 4.92]	0.968
ACE inhibitor MMD	582 [273, 892]	1.82 [1.54, 2.22]	0.972
Clonidine MMD	1554 [1291, 1790]	8.00 [5.42, 15.3]	0.976
Calcium antagonist MMD	1185 [763, 1634]	3.04 [2.6, 3.67]	0.815
Beta blocker MMD	2316 [1445, 3313]	1.94 [1.58, 2.5]	0.990
CV Category MMD	9290 [6591, 12588]	3.35 [3.17, 3.55]	0.997
All Exposure Calls/1000	2400 [2168, 2439]	49.4 [29.3, 159]	0.678

Discussion: Comparison of clonidine MMDs/year to the other CV products shows that clonidine had the slowest rate of increase (the longest doubling time). The non-overlapping CIs mean these differences were statistically significant. The MMD slopes for CV products were greater than (were not explained by) the increase in all exposure calls. *Conclusion:* We confirmed the increased frequency in severe outcomes with clonidine exposures, but severe outcomes associated with other CV products increased at a greater rate. These simple analyses illustrate the value inherent in NPDS data to understand and quantitate adverse outcomes by product and category over time.

142. Factors Associated with Poison Related Fatality: A Case Control Study

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Background: Prediction of poison-related fatality (PRF) in patients with suspected acute poisoning (SAP) is difficult. *Methods:* This case-control study compared clinical features (history, exam, routine ED tests) between cases (adults with PRF) and controls (adults with SAP surviving to discharge). Patients were identified by referral to one Poison Control Center (PCC). Case data was collected from electronic records, death reports, and medical examiner autopsy reports. All controls had bedside consultation and hospital medical records review. PRF was defined as a clinical course consistent with death by poisoning, and was adjudicated by 3 medical toxicologists. *Results:* 444 PCC referrals died during 7 years (2000–06). Of the 233 adjudicated as PRF, 110 were analyzed after excluding pre-hospital arrest (73), missing data (21), chronic poisoning (13), burns (8), DNR (6), and anaphylaxis (2). Controls consisted of 110 ED patients with SAP over 3-months at 3 teaching hospitals. Exposure was confirmed in 86% of cases and 49% of controls. Factors significantly associated with PRF (p<0.05 using chi-squared and t-test) are shown in Table 1.

Discussion: We tested for associations between a routine ED workup and PRF in PCC referrals with SAP, and found significant associations with several historical, clinical, and laboratory factors. *Conclusion:* Elements of the history and routine ED workup may be used to identify patients at risk for PRF.

Table 1. Factors associated with PRF

Factors:	OR (CI):
Historical	
Suicidal	2.9 (1.6–5.0)
All intentional	2.3 (1.2–4.5)
PCC-Data	
Noncompliance with PCC Antidote Rec	9.7 (1.2–78)
Presentation >24h	6.3 (2.5–15)
Late PCC Consult	4.8 (1.6–14)
Clinical	
RR ≥ 25	13.8 (4.0–47)
MAP < 65	10.6 (2.4–46)
QTc ≥ 500 ms	9.8 (1.8–52)
Temp ≥ 101.5	5.1 (1.1–24)
Coma	5.1 (2.5–10)
HR < 60	3.5 (1.1–11)
Any AMS	3.3 (1.9–5.8)
HR ≥ 100	2.5 (1.4–4.4)
Laboratory	
$K^+ \geq 5.5$	∞
$Ca^{2+} \geq 10.5$	∞
$HCO_3 < 20$	48.9 (17.7–135)
Cr > 1.5	26.9 (9.7–74)
$Ca^{2+} < 9.0$	13.4 (3.7–48)
Anion gap > 12	6.1 (2.9–13)
Glucose < 65	5.4 (1.4–21)

143. Zopiclone-Induced Methemoglobinemia and Renal Impairment

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Background: In acute zopiclone overdose, central nervous system depression is the main feature. Zopiclone induced methemoglobinemia were reported recently. We reported a case series of zopiclone related methemoglobinemia and acute renal impairment. *Case Report:* Retrospective review of zopiclone related poisoning was performed in the Hong Kong Poison Information Centre from July 2005 to March 2008. Five hundred and six patients were identified. Seven patients had methemoglobinemia. The ingestion doses ranged from 75 0mg to 3750 mg. Methemoglobin levels were raised at 2 to 4 hours post ingestion. The peak levels usually occurred at 8 to 18 hours. The highest measured methemoglobin level was 32.8%. Methylene blue was given in five symptomatic patients. Among the seven patients, four of them had renal impairment, suggested to be acute tubular necrosis from laboratory investigations. Creatinine levels were usually raised at 3 to 4 hours post ingestion. The peaks occurred at 36 hours to 80 hours. The highest measured blood creatinine level was 5.4 milligram per deciliter (477 microgram per liter). All seven patients recovered with supportive management. *Case Discussion:* Zopiclone or its metabolite may cause oxidizing stress on red blood cells and renal tubules. Massive dose or racial genetic susceptibility may contribute to the occurrence of these two complications. Methemoglobin level and renal function should be monitored in zopiclone overdose. Supportive measures, methylene blue in appropriate cases are the mainstay of treatment. *Conclusion:* Massive zopiclone overdose (equal or more than 750 mg) can cause significant methemoglobinemia and renal impairment. It should be considered in patients with unknown hypnotics overdose with cyanosis or renal impairment. The prognosis is good with supportive management.

144. Pediatric Hypertensive Encephalopathy after Abrupt Withdrawal of Guanfacine

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Background: Alpha-2 agonists are increasingly used adjunctively for children with attention deficit disorder (ADD). Guanfacine purportedly causes fewer blood pressure and sedative side effects than clonidine. We present a pediatric case of hypertensive encephalopathy from abrupt guanfacine withdrawal. Symptomatic rebound hypertension is not previously reported in this setting. *Case Report:* An eight-year-old male with no prior history of hypertension was treated for ADD with guanfacine, 4 mg daily for more than 6 months. He was also on quetiapine, 125 mg and extended-release amphetamine/dextroamphetamine, 20 mg daily. Ten days before admission he was started on aripiprazole, while rapidly tapered off guanfacine and quetiapine. Four days before admission, his mother elected to stop all of his medications. On the morning of admission he was found unresponsive and convulsing. On arriving in the emergency department, his blood pressure was 156/116 mmHg. Shortly after transfer to the PICU he had a brief, generalized seizure. CT scan of his brain demonstrated subtle hypoattenuation in the right parietal lobe. MRI showed edema in the subcortical white matter and adjacent gray matter, consistent with hypertensive encephalopathy. Routine labs, echocardiogram, renal ultrasound and brain MRA were all normal. His blood pressure remained elevated despite esmolol, but no further seizure activity occurred. Blood pressure was ultimately controlled with clonidine, and he was discharged on this for maintenance. Repeat MRI showed improvement after three weeks. *Case Discussion:* This hypertensive crisis was temporally related to abrupt discontinuation of guanfacine. Blood pressure was controlled only after initiating another alpha-2 agonist. While rebound hypertension is documented after withdrawing this agent in hypertensive adults, symptomatic rebound hypertension is not previously reported in pediatric patients. This is the first radiographically documented end-organ injury from guanfacine withdrawal. It is concerning that this patient was not previously hypertensive. *Conclusion:* Providers, parents and patients need to be aware of the risk of abruptly stopping these agents.

145. Coma and Recurrent Asystole Following Unintentional Self-Injection of Xylazine

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Background: Xylazine is an $alpha_2$ agonist used for sedation and anesthesia in veterinary medicine. We describe unsuspected & unintentional self-poisoning with this agent. *Case Report:* A 43-year-old, 113 Kg, man who owned a veterinary facility and horse boarding farm was found unconscious about 2 h after last being seen on his property. On scene he was tracheally intubated; BP 143/94; HR 76. On hospital arrival he was comatose with a bruise noted over L buttocks; HRs in 60s; BP 120/65; T 100 F. CXR, head CT & ECG nl; leukocytosis present. CSF was normal, blood and urine cultures obtained; & antibiotics begun for suspected sepsis. 13 h after being found, sudden bradycardia & asystole occurred; 10 min of CPR, IV epi & atropine resulted in HR 64 & BP 100/70. MRI brain: acute stroke in the left frontal lobe. CT abd and pelvis: small gas bubbles in the left gluteal region. Echocardiogram normal. Gradual hypotension responded to dopamine, and more antibiotics were added. 21 h after being found bradycardia and asystole recurred, with ~5 min CPR & epi; BP supported with pressors after resuscitation. Repeat ECG: NSR with rate 71 and QRS 80 ms. Serum dig was 0. UDS by GC/MS: large xylazine peak, only. Pressors were withdrawn over 12 h & pt awoke on day 2 & stated that because of a cold, he had self-injected vet penicillin in the left buttocks several min prior to his collapse. Analysis of his vial labeled procaine penicillin revealed xylazine with only a trace of procaine penicillin. Family suspected a disgruntled individual filled the penicillin container with xylazine so that horses would be injured, thus ruining pt's business. *Case Discussion:* Xylazine produces CNS depression, hypotension, and bradycardia, is rapidly absorbed after injection, with a terminal $t_{1/2}$ in animals of 20–90 min, though sedation can last a few hours. The exact amt our pt injected is unknown, but could have exceeded a few hundred mg. A typical sedative dose is 1 mg/Kg in animals. Our pt's cerebral ischemia resulted from cardiac arrest, and an MRA after recovery showed no disease. *Conclusion:* Xylazine should be kept in the differential diagnosis of unexplained coma, bradycardia and hypotension, especially in the setting of availability of veterinary drugs.

146. Delayed Ischemic Cerebrovascular Accident Following Mojave Rattlesnake Envenomation

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Background: North American rattlesnake envenomations (RSE) are associated with cytotoxicity, hematotoxicity, and rarely, neurotoxicity. CVA is unexpected. Ischemic stroke has been reported following envenomations by *Bothrops* species and *Crotalus durissus* but has not been observed in North American RSE. We report a patient who developed an ischemic CVA after a Mojave RSE. *Case Report:* A 49 yo man presented to an ED 30 min after being bitten on the right index finger by a Mojave rattlesnake. Initial SBP < 60 mm Hg and HR > 120 bpm. He was awake with minimal swelling and ecchymosis at the bite site but progressive airway edema requiring emergent intubation. He was given 7 liters IVFs, 6 vials CroFab™ antivenom, and placed on an epinephrine drip. In the ICU 6 h after the bite the epi was rapidly weaned. An additional loading dose of 16 vials, followed by maintenance antivenom, was given. Labs included Hb=13.3 g/dL, PT=13.4 s, fibrinogen (FIB)=152 mg/dL, and platelets (PLT)=152 K/mm^3. Airway edema resolved, with extubation 24 h later. Pt's neuro exam was normal, but hospitalization continued for treatment of aspiration pneumonia and rhabdomyolysis. On day 2 PLT=139 but slowly declined, reaching 17 k/mm^3 on day 4. FIB was normal. He was given 6 more vials antivenom, and PLT rose to 65. On day 4 he complained of mild headache which worsened on day 5. CT revealed several areas of low attenuation in the cerebellum and cerebrum but no hemorrhage. MRI confirmed multiple infarctions. He then became increasingly confused and ataxic over several days. Slow clinical improvement occurred over months. *Case Discussion:* The exact etiology of the CVA is unclear. Although he exhibited venom-induced thrombocytopenia, neuroimaging excluded hemorrhage. Thromboembolic etiologies seem unlikely considering brain and neck MRAs and an echocardiogram were normal, and there was no DIC. Hypoperfusion would seem the most obvious explanation, but the neuro exam was normal until 3 days after the hypotension resolved. Alternatively, venom may have produced microvascular endothelial cell damage contributing to ischemia. *Conclusion:* In this patient with a Mojave RSE, CVA signs and symptoms emerged after apparent neurological recovery several days after hypotension resolved.

147. Clinical Effects Following Acute Donepezil (Aricept) Ingestion by Young Children

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Background: Donepezil (Aricept) is a centrally active reversible specific acetylcholinesterase inhibitor, approved by the FDA for dementia. It is the most commonly prescribed Alzheimer's medication. Cholinergic effects have been reported with overdose and as adverse therapeutic effects in adults. No reports have been published on its adverse clinical effects in children. Our goal was to determine the clinical effects of donepezil following acute ingestions by young children. *Methods:* A retrospective, cohort study of exposure calls to six poison centers involving unintential single, acute donepezil exposures followed to a known outcome from 1/1/00–1/1/08 for children under seven years old. When weight was not recorded, we used the 5th percentile for age. *Results:* Forty-six children met our inclusion criteria. Their ages ranged from 8 months to 6 years, and the ingested amount ranged from 0.1 – 1.6 mg/kg. Most patients (78%) [95% CI: 64%–88%] had no clinical symptoms. The two most common symptoms were nausea (9%) [95% CI: 3%–20%] and vomiting (15%) [95% CI: 8%–28%]. One patient each had drooling, flushing and irritability, but did not require treatment. 19 children (41%) were managed in an Emergency Department, and all were discharged home. Activated charcoal was used in 53% of cases. 8 children (23%) were observed and did not receive any treatments. None of the cases reported significant cholinergic symptoms, required hospital admission, or died. *Discussion:* This study is limited by its retrospective nature, the small number of subjects, reliance on caller information, and limited poison center data. Future prospective studies should be performed to determine appropriate out of hospital and emergency management in young

children. *Conclusion:* Our study is the first report of donepezil's clinical effects in unintentional ingestions by children under seven years old. Since no significant outcomes were reported, based on this study, most children can be managed at home.

148. Pediatric Ingestions of Pramipexole and Ropinirole

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Background: Pramipexole (Mirapex®) and ropinirole (Requip®) are non-ergot dopamine agonists used in the treatment of Parkinson's disease and have recently obtained FDA approval for treatment of restless legs syndrome (RLS). Although there are isolated case reports of therapeutic use in older children for sleep disorders/RLS, there is little data describing unintentional ingestion of these medications in children under the age of 6. One published case report describes a 17 month old child who developed vomiting and drowsiness after ingesting 1mg of pramipexole. *Methods:* A 7 year review of PCC data from 1/1/2001–12/31/2007 was undertaken. All healthy patients age 5 and under were included. *Results:* 44 cases were identified, 15 were excluded due to coingestants (e.g. carbidopa/levodopa, selegiline, trihexiphenidyl, etc). The remaining 29 cases ranged in ages from 18 months to 4 years. 22 cases involved pramipexole and 7 involved ropinirole. Ingested doses of pramipexole: 9 cases <0.5mg, 5 cases 0.5mg-1mg, 6 cases >1mg and 2 cases with an unknown amount. Ingested doses of ropinirole: 3 cases <1mg, 2 cases >1mg and 2 cases with an unknown amount. 12 cases were managed on site, 17 managed in HCF: 2 were admitted. 4 received activated charcoal. Of the 28 cases with documented follow up, 9 had no effect, 16 had a minor effect, and 3 had unrelated effects. Minor effects included vomiting(10), and drowsiness(9). Of the 7 patients with documented vital signs, none had significant tachycardia. *Discussion:* A 7 year review of PCC records described 29 unintentional pediatric ingestions of pramipexole/ ropinirole. None of these ingestions resulted in significant toxicity. Additionally, no major adverse effects involving these medications in children age 5 and under were found in the literature. *Conclusion:* Unintentional ingestion of an adult therapeutic dose or less of pramipexole or ropinirole in children age 5 and under was not associated with significant toxicity. Patients matching this profile may be managed at home with telephone follow up.

149. The Current Role of Clinical Toxicology and Poison Centers in Local and State Public Health

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Background: The current state of collaboration among clinical toxicologists, poison centers (PC) and health departments (HDs) is unclear. Our primary objective was to describe current relationships among clinical toxicologists with local and state HDs. Our secondary objective was to identify areas of mutually beneficial collaborative partnerships that exist or may be formed. *Methods:* A on-line survey was sent to the medical or managing directors of PCs, state epidemiologists, and the most senior public health (PH) official within each state and selected major metropolitan areas. This survey was tailored to each group and focused on four topic areas: remuneration, service, structure within the local or state PH system, and overall opinions regarding the utility of enhanced PC collaboration with their respective HDs. *Results:* 171 subjects were contacted for the survey. 89/171(52%) surveys were completed. PC directors accounted for 33 responses (33/89, 37%), state epidemiologist accounted for 36 responses (36/89, 40%) and senior state and local PH officials accounted for 20 responses (20/89, 23%). Regarding remuneration, 30/33 (91%) of PC directors receive no specific local or state compensation for services as a consultant. However, 15/32 (47%) of PC directors participate in PH epidemic and illness surveillance and 10/31 (32%) take PH rabies calls. 29/32 (91%) serve as advisors to PH officials for terrorism preparedness. Regarding structure, 18/33 (55%) PC directors, 22/26 (61%) of state epidemiologists and 17/20 (85%) of senior state and local health officials all feel PCs should remain separate organizations. However, all groups overwhelmingly believe that relations between PCs and HDs need to be strengthened with increased collaboration. *Discussion:* We identified areas where some PCs and HDs are collaborating in order to highlight opportunities for beneficial partnerships. Current areas of collaboration include rabies, terrorism preparedness, and epidemic and illness surveillance. *Conclusion:* PC and PH officials should seek to increase collaborations which will be mutually beneficial. These collaborations can reduce PH workload and improve remuneration to the PC.

150. Lead Toxicity from Lead Tetroxide Used in Hobbyist Advanced Model Rocketry

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Background: Hobbies involving ceramics, jewelry-making, stained glass, firearms and home remodeling are considered potential sources of lead exposure. Rocketry is a hobby which may include assembly and firing of high-powered rockets to altitudes of over 10,000 feet. Lead tetroxide (Pb_3O_4), an oxidizer, has been used in rocketry ignition systems. *Case Report:* A 48 year-old male management consultant had a five-year history of progressive cognitive decline involving short-term memory, word finding, and concentration in addition to fatigue, irritability, headaches and abdominal pains. For the last two years, cognitive problems prevented him from working. Medical work-ups failed to explain his neurological and other symptoms. Imaging studies, including a brain MRI and FDG PET/CT, were normal. Neuropsychological testing revealed lower then expected performance in several domains, including attention, concentration, information processing speed, language, and visual-perception but fluctuations of attention and effort limited the test conclusions. An environmental exposure history revealed that the patient had a hobby with potential lead exposure. He reported exposure to powdered lead on a near monthly basis, while wearing gloves but no respirator. A non-HEPA filter vacuum cleaner was used to clean a home garage work area where he would occasionally eat and drink. *Case Discussion:* His baseline blood lead was 48 ug/dL and urine lead was 28 ug/L. Chelation with succimer resulted in increased urinary lead levels up to 1265 ug/L and a decreased blood lead of 10.3 ug/dL. About one month after chelation, his blood lead returned to 28.5 ug/dL, consistent with lead redistribution from bone. He received a second course of succimer, at which time his blood lead decreased to 5.9 ug/dL. He reported marked improvement of symptoms. *Conclusion:* Lead used for advanced rocket ignition systems can result in significant absorption. Although the patient's main symptoms were consistent with those reported with lead toxicity, blood lead levels were below concentrations where such effects are generally expected. Symptom improvement following chelation does not establish a causal association, although the findings suggest lead had a contributing role.

151. Suicidal Cyanide Deaths in the Hmong Community

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Background: The use of metal polish cleaners in suicidal ingestions has been reported in the Hmong community in California. We report two deaths as a result of intentional ingestion of cyanide-containing cleaners in Minnesota Hmong women. *Case Report:* Case 1: A 41 yo Hmong female collapsed at home within minutes of ingesting a liquid jewelry cleaner in a suicide attempt. Her son described a rock-like substance that had been dissolved in water prior to ingestion. Upon arrival to the ED she was asystolic and apneic with a metabolic acidosis. Resuscitation efforts failed and she was pronounced dead shortly after arrival. Post-mortem serum cyanide level was 289.5 mg/L (lethal range 2–3 mg/L). Analysis of the solid substance revealed it to be 40–50% sodium cyanide by weight. Case 2: A 35 yo Hmong female was brought to the same ED after ingesting an unknown quantity of a liquid coin cleaner. Upon arrival she was unresponsive, hypotensive at 40/20, and profoundly bradycardic. Her cardiovascular status continued to decline and resuscitative attempts were unsuccessful. Post-mortem serum cyanide level was 7.3 mg/L. Analysis of the liquid sample revealed sodium cyanide at a concentration of 1%. *Case Discussion:* The use of cyanide-containing metal polish cleaners as suicidal ingestants has been reported by the California Poison Control System. Reportedly it is known among the Minnesota Hmong community that a specific jewelry polish, available in bulk from a local ethnic market, can be fatal if ingested. With the assistance of a local Hmong physician, a sample was purchased which upon analysis was found to be 40–50% sodium cyanide - a concentration identical to the sample from Case 1, supporting a common origin. These patients presented to the ED in acute, unrecoverable cardiovascular collapse and cyanide ingestion was not suspected until after patient demise. *Conclusion:* Cyanide toxicity should be suspected in patients of Hmong descent who present with rapid cardiovascular decline, coma, and acidosis. Serum cyanide and lactate levels should be obtained, and empiric antidote therapy should be considered.

152. Extensive Dermal Hypersensitivity Reaction Related to Dermal Exposure to Diphenylcyclopropenone

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Background: Diphenylcyclopropenone (DPCP), also known as diphencyprone, is a potent contact allergen and in a subcategory of topical immunotherapy agents used for treatment of various dermatoses. After sensitization, DPCP induces an allergic contact dermatitis with continued application. Its mechanism of action in the treatment of viral warts is thought to include alterations in cytokine levels, nonspecific inflammation causing regression, and binding of DPCP to proteins inducing an immune response. We report a case of extensive dermal sensitivity reaction and widespread urticaria from an accidental spill to a patient's thigh after applying DPCP to a wart. *Case Report:* A 10 yo female applied DPCP 0.1% to a wart on her leg and spilled some on her thigh. She immediately showered and washed the area. She had no initial reaction. 10 hours post exposure the area was red and painful. Diphenhydramine was given. Within 18 hours of exposure, her thigh was red, inflamed, extremely painful, with welting and blistering. In the ED, the initial area of redness and pain had progressed from the knee to the genital area. She was seen the next day by a dermatologist and started on prednisone and pain medication. Over the next 2 weeks, she had outbreaks of hives and rashes to areas of her body not involved in the initial exposure. The initial area of blisters resolved and skin sloughed leaving the area leathery in appearance. *Case Discussion:* Generalized urticaria is an adverse, serious side effect of topical DPCP. Complications with contact allergens include eczema, regional lymphadenopathy, vitilgio, leukoderma, erythema multiforme, and contact urticaria. Most side-effects are mild but severe reactions require discontinuation of treatment. *Conclusion:* Although most side effects of topical DPCP use are mild, this case indicates the potential for generalized hypersensitivity reaction related to accidental dermal exposure in a sensitized patient. Patients should be cautioned of the potential for hypersensitivity reaction which could progress to more severe or life-threatening symptoms.

153. A Recent Outbreak of Honey Poisoning Linked to the Tutu Plant *(Coriaria arborea)*

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Background: The Tutu plant (*Coriaria arborea)* of New Zealand contains tutin, similar to picrotoxin in structure and toxicity. This involves antagonism of inhibitory gamma-aminobutyric acid (GABA) receptors, with resultant CNS stimulation causing seizures amongst other effects. Direct human poisoning is sporadic, but can occur from uninformed consumption by hikers including tourists. There is also recognised risk of secondary poisoning. The "vine hopper" *(Scolypopa australis)* feeds on tutu and deposits a "honey dew", rich in the metabolite hydroxytutin (hyenanchin). With drought conditions (and inappropriately located hives), bees are drawn to this source, with risk of producing contaminated honey. One teaspoonful may be toxic. *Case Report:* An outbreak (mid March, 2008) of "toxic honey" poisoning occurred in one area, due to the interplay of these factors. This is being investigated and managed by the relevant authorities, and some data including full clinical reports are not yet available. The source has been linked to one apiary, which has withdrawn its honey from sale. Three index cases developed vomiting and two (including a young child) later had seizures requiring treatment. By month's end, at least twenty people had become ill. Questions were raised regarding the kinetics of tutin, its possible effects in pregnancy, and fitness for driving of those having seizures. *Case Discussion:* This appears a relatively small outbreak. There is very limited data on the kinetics of tutin, even experimentally, but its elimination seems prompt.

Earlier reports suggest its more obvious effects typically last no more than a few days, and that appears borne out by this episode. "One-off" toxin-induced seizures should not be subject to the same degree of restriction as that for epilepsy in general, but case-by- case assessment is indicated. Fetal exposures will be followed up. *Conclusion:* This outbreak illustrates that even quite well known environmental hazards can resurface when climatic risk factors increase and/or controls lapse slightly. The impending clinical reports should provide more insight into the features of tutin (and hyenanchin) poisoning, including the range of effects, times to onset and duration of symptoms, and clinical course and prognosis.

154. Improved Access to Reliable Poisons Information in Norway

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Background: The number of calls to the Norwegian Poisons Information Center (NPIC) has increased considerably during the last years. There is a growing demand for easily accessible poisons information at all hours. The NPIC's budget has not increased correspondingly, so there is a need to develop solutions to meet this demand. *Methods:* The NPIC has developed a homepage on Internet to present poisons and first aid information for the public and media. Some topics are emphasized seasonally, others are fronted as news when incidents occur. In case of a chemical accident, information may be displayed on the homepage to reach as many of our target groups as possible without overloading the telephone service line. From Dec 2007 the NPIC has published information regarding toxicology for Norwegian health care professionals on the Norwegian Electronic Health Library (NEHL). NEHL provides free access to important sources of health knowledge for Norwegian health practitioners. The topic library on toxicology presented by the NPIC mainly consists of treatment guidelines for acute intoxications and information about antidotes and elimination methods. *Results:* In 2007 the homepage had about 40 000 visitors, the same number as calls to the 24 hour service phone line. Numbers from NEHL are so far not available. From the topic library on toxicology Norwegian health care professionals can subscribe and download news and treatment guidelines for acute intoxications. This will replace distribution of documents on paper, as has been done until now. *Discussion:* Internet has the ability to effectively inform the public, and through written information reduce the risk of misapprehension. It is an effective way of providing poisons information to different groups, both in acute situations and as a preventive purpose. On the other hand the public and practitioners may loose the individual considerations done by the poisons information staff. *Conclusion:* NPIC has made changes to meet the increased request from health care professionals, public and media with no change in staff or budget. We provide easily accessible, updated and reliable information about poisonings in Norwegian at all hours through the telephone service, in addition to our homepage and on the topic library on toxicology.

155. Integrating Poison Prevention Training into the EMS CE Program

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Background: In Oct. 2006, the PCC presented at the annual state EMS Coordinator/Educator Conference regarding integrating the PCC Poison Prevention Educator Training Course (PPETC) into the EMS CE Program via a Train-the-EMS Trainer Initiative (TETI). All EMS coordinators/educators in attendance expressed interest in the TETI. *Methods:* The goal of the TETI was to promote poison safety and prevention to the public through advocacy of EMT professionals via the EMS System. Utilizing the help of 5 PCC satellite center educators, the PCC set out to: 1. Develop a didactic training program and materials for EMS professionals. 2. Seek approval from the Department of Public Health for EMS CE credit 1.0 hr. 3. Promote TETI to all EMS coordinators/educators in the state. 4. Conduct train-the-trainer sessions (1 hr) during the first part of 2007 so that EMS coordinators/educators could train their EMT's by the end of 2007. 5. Encourage trained EMT's to register for the PCC's online Poison Prevention Education Resource Center (PPERC) giving them unlimited access to free poison prevention materials and presentation tools. 6. Encourage and prepare trained EMT's to participate in the NPPW 2008 campaign and to continue to integrate poison prevention materials into their ongoing community education projects thereafter. *Results:* 1. In Dec. 2006, the PCC received the EMS 2007 site code from the PHD. 2. The PCC trained 37 of 115 IL EMS coordinators/ educators from 17 training offices located in 9 of the 11 EMS regions across the state. 3. Focused effort to train EMS coordinators/educators in the most densely populated area of the state resulted in the training of 4,400 EMT's in this area. 4. By the end of 2007, 232 trained EMT's registered on the PCC's PPERC. 5. By the end of 2007, registered/trained EMT's educated 18,897 people via 67 events. *Conclusion:* The creation and action implementations of the TETI have resulted in expanded opportunities for cooperation between the PCC and the EMS Systems in our state. EMT's have and will continue to be given the training, tools and materials to better understand and utilize the PCC services and act as poison prevention educators in their communities.

156. Methylmalonic Acidemia (MMA) Presenting as Methanol Toxicity in an Infant

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Background: MMA is an inborn error of metabolism that has been mistaken for ethylene glycol (EG) toxicity. We report a case of MMA nearly mistaken for methanol (MtOH) toxicity. *Case Report:* A 10 mo boy was brought to the ED after being found lethargic and tachypneic. On arrival: BP 100/58, HR 149, RR 48, T 37.1 C, Sat 98%. He was intubated for respiratory distress and coma and transferred to the PICU. Labs: CO_2 <5 mmol/L; VBG showed a pH 7.15, pCO_2 14, PO_2 51, HCO_3 4.8, base deficit 23 mmol/L; WBC 17.1 K/mm^3; osm gap of 16; NH_3 20 micromole/L; and lactate 1.3 mmol/L; serum positive for acetone. A brain CT scan was normal. Comprehensive UDS revealed MtOH. A serum MtOH level obtained from admission using liquid injection GC/FID was reported at 8.6 mg/dL; EG was negative. Fomepizole and folinic acid were given due to the possibility of late-presenting MtOH toxicity. After >12 h of therapy on a HCO_3 drip, serum HCO_3 remained < 5, and base deficit was >20. Because of persistent severe acidemia (ABG pH 7.30, pCO_2 10, pO_2 202, HCO_3 4.6, base deficit 22), hemodialysis was performed. The patient developed tonic-clonic seizures treated with midazolam, and phenobarbital. A brain MRI revealed bilateral basal ganglia infarctions. Ophthalmologic evaluation was negative. Due to patient age, lack of known exposure, normal lactate and relatively low MtOH level, the diagnosis of MtOH toxicity was questioned. Serum from admission was tested using split column head space analysis by GC/FID. No MtOH was detected. Quantitative formic acid could not be performed due to an interfering substance. Eventually, urine organic acids confirmed the patient suffered from MMA. He has continued to suffer intermittent metabolic crises from this disease. *Case Discussion:* Clinically, MMA can resemble MtOH toxicity, including acute acidosis and basal ganglial lesions. Furthermore, GC can result in a false positive MtOH due to similar retention times of MtOH and methylmalonic acid. *Conclusion:* Infants with severe metabolic acidosis and detection of volatile alcohols without a history of exposure must be evaluated for inborn errors of metabolism. GC/FID can result in misdiagnosis of MtOH toxicity when retention times of methylmalonic acid are similar to those of MtOH.

157. Incomplete Calls – How Bad is it?

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Background: In early 2008 New Jersey Poison Information and Education System (NJPIES) experienced a dramatic increase in the number of incomplete calls to its 800–222–1222 toll free line. The majority of the incompleted calls were categorized as "Network Condition" (NC) – a call determined by AT&T's private branch exchange (PBX) as occurring because there were not enough circuits available to accept the call at the time it came in. This study investigated the impact on the poison center activity. *Methods:* All incomplete calls reported by AT&T from January 1 to March 15, 2008 were used for this study. Information collected consisted of date and time of call, originating number, dialed number, terminating number, and call disposition code. All incomplete calls were matched to the NJPIES' poison database for the same period to determine the potential call lost to the center. *Results:* During the study period, NJPIES received 1,954 incomplete calls (1,207 unique numbers). Of this total, 1,624 (83.1%) were due to NC, 305 (15.6%) were reported as 0 to 5 seconds of ring-no-answer (RNA), and 25 (1.3%) were RNA for at least 6 seconds. Among the1,954 calls, 840 were single calls and 1,114 were multiple calls (367 unique numbers) and a range of 2 to 23 calls per number. Matching these 1,207 unique telephone numbers to NJPIES's database from the same period, 474 (39.3%) calls were found on the database, and 733 (60.7%) could not be matched. If, we apply the 83% to the 733 calls that could not be found on the poison database, it could translate to approximately 245 calls lost per month or nearly 3,000 calls per year. Since NJPIES has the capability of receiving 46 calls simultaneously, we have been unable to account for the NC error. *Discussion:* Compared to an average of 800 incomplete calls/month in 2008 to 150 calls/month in 2007 provided an important indication to address this issue. *Conclusion:* In general, incomplete calls exist and there may be no way to control such calls. However, it is important to determine the reason for the large number incomplete calls attributed to "network condition" NJPIES is in the process of working with AT&T Call Center to identify the problem.

158. Changes in Serum Osmolality after Intravnous Contrast Administration

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Background: Reports have suggested the administration of IV contrast to patients undergoing CT may raise serum osmolality, producing an osmolal gap. However, this effect has not been systematically investigated. *Methods:* We evaluated serum osmolality and osmolal gap in patients who presented to the ED with abdominal pain necessitating a diagnostic contrast-enhanced CT scan. Optiray®320 (ioversol 68%) was administered to all patients in a dose of 2 mL/kg (1.36 g/kg). We collected serum osmolality, sodium, BUN, and glucose prior to and 30 minutes after contrast administration. Our IRB provided approval for the study. A paired t-test was used to assess pre- and post-contrast parameters. SPSS was used to conduct the statistical analyses. *Results:* Ten patients were enrolled over the initial study period. Mean patient age + SD was 14.4 + 3.00 yrs. Patients received a mean 113.4 ml (77.1gm) of Optiray. The mean serum osmolality was 292.75 mOsm/L prior to contrast administration and 292.875 mOsm/L afterwards (p=0.93). Pre- and post-contrast osmolal gaps were 9 and 12 mOsm/L, respectively (p=0.133). The mean calculated difference between the pre- and post-contrast osmolal gap was 0.125 mOsm/L. There was no statistically significant correlation between the dose of contrast administered and the post-contrast osmolality or osmolal gap. *Discussion:* Ioversol (68%) is a hypertonic solution with an osmolality of 706 mOsm/L. The effect of hyperosmolar contrast agents on serum osmolality has not been well described in the literature. Clinical implications of its hyperosmolality remain speculative due to the lack of rigorous human studies. However, in animal models radiocontrast agent hypertonicity has been associated with renal tubular cell cytotoxicity. The results of our study provide some reassurance that there are no significant disturbances in serum osmolality or osmolal gap values after administration of intravenous contrast agent. *Conclusion:* Intravenous contrast agents, when administered at recommended doses, do not significantly alter serum osmolality.

159. Postcards in Persia: A Randomized Controlled Trial of an Intervention To Reduce Repetition of Hospital Treated Deliberate Self Poisoning

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Background: Repetition of hospital treated deliberate self poisoning (DSP) is common in westen countries and only a limited number of interventions have been effective.The main aim of this study was to determine the effectiveness of a postcard intervention to reduce the rates of suicidal ideation, and repetition of suicidal behaviour. *Methods:* A randomized controlled trial with primary outcomes measured by self report at interview 12 months after index DSP event; suicidal ideation and repetition of DSP, using intent to treat analysis. Subjects were 2300 consenting DSP patients >12 years hospitalized in Loghman-Hakim Hospital, Tehran. The intervention was 8 to 9 postcards sent over a period of 12 months after DSP. *Results:* 2113 patients (91.9 %) were retained in the study. There were no significant differences in baseline characteristics of the two groups. We mailed more than 8500 postcards for the intervention group of which nearly 75% were received (mode 8, mean 6, range 1–9). There was a significant reduction in any suicidal ideation (29.0% vs 41.7%) and proportion of subjects repeating DSP (3.0% vs 5.1%).

Table 1. Self-report outcomes for intervention vs. control

Principal Outcomes	Intervention (n = 1043)	Control (n = 1070)	Statistic
Suicidal Ideation	n (%)	n (%)	
Yes	302 (29.0)	446 (41.7)	
No	741 (71.0)	624 (58.3)	Chi square 37.41 (1) p < .001
Suicide Attempt			
Yes	31 (3.0)	55 (5.1)	
No	1012 (97)	1015 (94.9)	Chi square 6.36 (1) p = 0.01
Self cutting (mutilation)			
Yes	42 (4.0)	50 (4.7)	
No	1001 (96.0)	1020 (95.3)	Chi square 0.53 (1) p = 0.47

Discussion: A modification of the Postcards from the EDge intervention (Carter 2005) proved effective in reducing suicidal ideation and repeat suicide attempt. This result was achieved in a population with substantial differences in language and culture from the western country where the original intervention was developed. *Conclusion:* We recommend this intervention be replicated particularly in developing countries due to feasibility and low cost.

160. Management of Paediatric Poisoning at a Referral Hospital in Zimbabwe

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Background: Acute poisoning is an important cause of morbidity and mortality in children especially in the developing countries. Despite its significant contribution to childhood injury few studies have been reported from the developing world. In Zimbabwe published work on acute childhood poisoning has focused mainly on the epidemiological trends, with little information on the management of the poisoned patient. Thus limited information is available on the appropriate management of the poisoned child in Zimbabwe and as such there is no baseline data for audit and evaluation of the management. This paucity of publications necessitated this study on the management of paediatric poisoning in Zimbabwe.Objective. *Methods:* A retrospective review of case notes for all poisoning admissions of children 15years old and youngerfor the period January 2003 to December 2005. *Results:* A total of 115 cases were reviewed. Distribution of cases according to age was as follows; 0–5yrs (30.4%), 6–11yrs (11.3%) and 12–15yrs (58.3%). The main agents involved in child poisoning were pesticides (51.3%), Pharmaceuticals (18.26%), Animal envenomations (15.65%), Household chemicals (8.70%) and others (5.12%). Emergency care measures instituted included antidote use (46.09%), circulatory support (35.65%), gastric lavage (33.91%), single dose activated charcoal (12.17%) and emesis (2.61%). Vital signs monitored were temperature (93.04%), blood pressure (61.74%), pulse rate (86.96%), respiratory rate (75.65%). The mean stay in hospital was 2.04days (SD 1.34). Only on e death was recorded for the study period. *Conclusion:* The major toxicant class in children was pesticides. Emergency management mainly consisted of antidote use circulatory support. Clinical evaluation extensively employed monitoring of vital signs, temperature, pulse and minimal use of laboratory tests. Gastric lavage was the GIT decontamination that mostly used. Atropine was the mainly used antidote due to the High incidences of Pesticide poisoning. Patients were hospitalised for a relatively short period.

161. Increased Anion Gap, Metabolic Acidosis with Prolonged Dexmedetomidine

Farooqi MF, Seifert SA, Benson BE. *New Mexico Poison Center, Albuquerque, NM, USA.*

Background: Anion gap, metabolic acidosis (AGMA) in patients receiving a prolonged infusion of dexmedetomidine has not been described. *Case Report:* A 40 year-old male presented with a baclofen overdose (170 mg over 6 hours) and was intubated. Due to persistent agitation despite administration of intravenous (IV) infusion of benzodiazepine, he was switched to an IV dexmedetomidine. The patient received no loading dose and was maintained at the maximum FDA recommended maintenance dose. At 36 hours he was noted to have developed an AGMA. The infusion was tapered, with stabilization and then resolution of the acidosis. The patient was noted to have a normal lactate and elevated urine ketones during this time. A number of common causes of an AGMA were ruled out. *Case Discussion:* There was a temporal relationship between the development of the acidosis and the infusion, as well as between the stabilization and correction of the acidosis with the tapering and discontinuation of the infusion. Dexmedetomidine's package insert lists acidosis as a possible adverse reaction but the type of acidosis is not further described and there are no such cases documented in the medical literature. *Conclusion:* A causal relationship between a prolonged dexmedetomidine infusion and an AGMA is suggested.

162. Neuromuscular Blockade in Poisoned Patients

Rowden AK, Basiaga M, Cadar S, Viloria A, O'Malley GF. *Albert Einstein Healthcare Network, Philadelphia, PA, USA.*

Background: Many commonly encountered overdoses are associated with seizures. Because of the risk of unrecognized seizure activity in a paralyzed patient, avoidance of long-acting neuromuscular blocking agents (NMBA) on potentially poisoned patients requiring intubation and mechanical ventilation is commonly taught and practiced. The incidence and consequence of NMBA usage in intubated, poisoned patients in urban, tertiary-care center is unknown. *Methods:* Retrospective medical record review. Medical students trained to use a pre-printed data collection instrument but blinded to the purpose of the study abstracted the data. Records were identified via ICD 9 codes for poisoning and intubation. A convenience sample of one hundred consecutive records of intubated, poisoned patients were reviewed. Data collected included: patient demographics, presumed overdose agent, usage of NMBA, EEG results, and laboratory values. Succinyl choline was not considered a long-acting NMBA. *Results:* Average age = 46 years old (range 13–84). Males = 46%; 55 patients in the sample received at least one dose of a NMBA. Only 1 patient in the NMBA group had an EEG while paralyzed. The presumed intoxicating agents included many associated with seizures including, cocaine, diphenhydramine, propoxyphene, tramadol, aspirin, pcp, cyclic antidepressants, amphetamines, antispychotics, and buproprion. Other agents, less associated with seizures included acetaminophen, benzodiazepines, muscle relaxants, and opioids. Vecuronium was the most commonly used NMBA. *Discussion:* The incidence of subclinical seizures in ICU patients has been estimated to be as high as 20% and is associated with increased mortality and poor neurologic outcome. The poisoned population, is probably at high risk, given the propensity for some intoxicants to induce seizures. The use NMBA for intubated poisoned patients, especially those exposed to seizure-associated toxins, should be avoided. For those receiving NMBA, EEG monitoring is warranted. In this small study, a majority of intubated, poisoned patients received NMBA and only a tiny fraction had EEG monitoring. *Conclusion:* The incidence of NMBA use in poisoned patients appears high. Further study regarding neurologic outcome is warranted.

163. Persistent Toxicity after Suboxone Ingestion in a Toddler

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Background: Suboxone® (buprenorphine/naloxone) has been approved by the FDA for treatment of opioid addiction. Its advantage over methadone is a thrice weekly dosing and proposed ceiling effect on respiratory depression. We report ingestion in a toddler requiring prolonged supportive care for hypoventilation and persistent sedation. *Case Report:* A 2 yo (14 kg) male with a history remarkable only for asthma was witnessed by his mother to ingest a single suboxone (8mg/2mg) tablet. Presentation to the ED 1 hour post-ingestion revealed him to be obtunded with pinpoint pupils. Vital signs were: 37.0°C, HR 126 bpm, RR 18/minute, 96%on RA. His O_2 saturation then dropped to 91%. He was initially given 1.4 mg of naloxone IV and woke slightly but quickly became somnolent again. After being given a total of 7 mg of naloxone he became awake and appropriate. He was then transported by EMS to the nearest PICU after being placed on a naloxone drip. On arrival to the PICU he was awake and interactive with normal vital signs. Initial urine drug screen was negative. Multiple attempts to stop the naloxone drip over the next 48 hours resulted in obtundation and apneic episodes even requiring intubation for respiratory acidosis for 7 hours. A confirmatory urine immunoassay for buprenorphine was confirmed positive. The naloxone drip continued for additional 44 hours. Ninety-six hours post-ingestion the drip was discontinued and he remained asymptomatic. *Case Discussion:* This is the highest reported dose and duration of naloxone use in a toddler to reverse both somnolence and respiratory depression. His presentation was consistent with an opioid toxidrome, with no other ingestion confirmed by history or urine drug screen. Consistent with other previous reports of toddler ingestion, higher doses of naloxone may be required rather than the recommended 0.1 mg/kg dose. *Conclusion:* We report an ingestion of suboxone in a toddler requiring prolonged supportive care than has previously been reported. As this medication is becoming more commonly prescribed, clinicians should be aware of the possibility of persistent respiratory depression and somnolence.

164. Delayed Severe Cardiotoxicity and Prolonged Mental Status Changes Associated with Chronic Lithium Toxicity

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Background: We present the case of a patient with prolonged coma, diabetes insipidus responsive to vasopressin and delayed symptomatic bradycardia resulting from chronic lithium toxicity. *Case Report:* A 59 year old female presented to the ED via ambulance with decreased level of consciousness, an initial lithium level of 5.5 mmol/L and a Cr of 2.0mg/dL. Within 12 hours of aggressive fluid resuscitation, her lithium level had decreased to 3.5mmol/L and creatinine normalized. However, her mental status continued to decline and she was noted to be severely bradycardic with a heart rate of 20bpm and hypotension responsive to levophed administration. Rapid sequence intubation was accomplished with etomidate and succinylcholine and transcutaneous pacing was started yielding a heart rate of 80bpm and BP of 100/60. She was maintained on a versed and fentanyl drip for a total of 48 hours. Nephrology was consulted and the patient underwent two sessions of hemodialysis that resulted in a lithium level < 1 mmol/L. After the second run, she still required transvenous pacing and levophed for several additional hours. Despite lithium levels of < 1 mmol/L, the patient's neurologic status did not improve for 8 days. CT, MRI and LP were negative and EEG revealed a pattern of diffuse injury. On Day 6, the patient developed diabetes insipidus (DI) that appeared to be responsive to vasopressin. *Case Discussion:* This case highlights both the severe delayed cardiotoxicity and prolonged central nervous system depression that can be seen in chronic lithium toxicity. Lithium classically induces a nephrogenic DI, however it may be prudent to try vasopressin in the course of treatment. In this case, the DI may have been caused by a direct CNS insult. *Conclusion:* The cardiotoxicity seen with chronic lithium toxicity may be severe and delayed, even presenting in the face of improving serum lithium levels.

165. Intravenous Fat Emulsion for Refractory Verapamil and Atenolol Induced Shock: A Human Case Report

Dolcourt BA, Aaron CK. *Children's Hospital of Michigan Regional Poison Control Center, Detroit, MI, USA.*

Background: Intravenous fat emulsion therapy (IFE), ignominiously known as "the Gift of the Glob," has been advanced as rescue therapy for a variety of intoxicants. We describe dramatic, temporary results from IFE rescue for an overdose of verapamil and metoprolol. *Case Report:* A 52 y/o unconscious male presented hypotensive (40/p) and bradycardic (49 bpm), reportedly from a verapamil and atenolol ingestion. He was anuric, with cold extremities and absent bowel sounds. Hypotension improved following intubation, infusions of crystalloid, calcium, dopamine, norepinephrine, placement of a transvenous pacemaker, and high dose insulin therapy, but without resolution of shock. IFE 20% was given as a 1.5 ml/kg bolus followed by an infusion of 0.25 ml/kg/min for 30 minutes. Within minutes the patient awoke and attempted to talk. Urine output improved, fingers warmed, and bowel sounds were ausculatable.

Three hours post infusion, the blood pressure improved to 109/60 with a paced rate of 80. Eight hours post infusion, shock returned with a blood pressure of 80/50. IFE infusion was restarted for 1 hour. During infusion, shock improved and blood pressure increased to 103/56 with a non-paced rate of 62. Four hours after discontinuing IFE he returned to the shock state. A balloon pump was placed without improvement. Despite aggressive resuscitation he expired 12 hours later. *Case Discussion:* The applicability of IFE to enteral ingestions is not known as all current scientific data is limited to animal studies using parenterally administered medication. Optimal dosing is unknown as regimens are based on expert opinion, not studies. Despite competeing theories, IFE's mechanism of action is undetermined. *Conclusion:* IFE appears to be a promising therapy, providing recurrent, dramatic, temporary results in this patient. It may provide stability for critically ill patients until definitive therapy is instituted. Optimal utilization of IFE may be improved if animal models simulated oral ingestions and evaluated dosing regimens tailored for humans. Further work to delineate the mechanism of action should enhance applicability of IFE use for this and other intoxications.

166. Normal Anion Gap in Aspirin Poisoning

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Background: In 2006 over 17,000 salicylate exposures were reported to the AAPCC. Salicylate (ASA) screening in potential poisonings is not routinely advocated because salicylism is clinically evident through signs and symptoms as well as elevated anion gap and acidosis. We reviewed the clinical presentation and laboratory data of consecutive ASA poisonings presenting to an urban, tertiary center to determine the number of aspirin poisoned patients presenting with normal anion gaps. *Methods:* Retrospective medical record review. Medical students trained to use a pre-printed data collection instrument but blinded to the purpose of the study abstracted the data. 50 consecutive charts with ICD-9 codes of salicylate or aspirin were reviewed. The charts were analyzed for demographics, lab values, and therapy received. Acute versus chronic exposure was also recorded, as was time from presentation to diagnosis. Acute poisoning was defined as acute, intentional ingestion. All others were deemed chronic poisoning. Clinically significant salicylate poisoning was defined as salicylate level greater than 15 mg/dL as this would generally necessitate further observation in the setting of possible overdose. A normal anion gap was defined as 12 or less. *Results:* 41 cases fulfilled the set criteria for ASA toxicity. Age range 13–84; males = 13(34%). 13 patients (31% (95% C.I. of 19–47%)) had a normal anion gap on presenting serum chemistries. Only 2 cases were due to chronic exposure both of which were diagnosed on presentation to the ED. 1 acute exposure had a 9 hour delay to diagnosis. One acutely poisoned patient presented with a normal anion gap and subsequently died (overall mortality rate of 2.5%). Kappa 0.96. *Discussion:* Routine salicylate screening in potential poisonings is not advocated because salicylism is clinically evident and patients are thought to have an elevated anion gap. This small study suggests that a significant minority of patients present with a normal anion gap but, in fact, already have elevated salicylate levels or go on to develop salicylate toxicity. *Conclusion:* This small study suggests that salicylate screening in potentially poisoned patients may be indicated and needs prospective study.

167. Computerized N-Acetylcysteine Physician Order Entry by Template Protocol for Acetaminophen Toxicity: An Update

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Background: Some antidotal treatment protocols, such as the Prescott IV n-acetylcysteine protocol, are logistically complicated for traditional physician ordering. Computerized physician order entry (POE) is a component of the electronic medical record used at three institutions where one of the co-authors provides medical toxicology consulting services. This study represents an update to our previously reported experience with ordering n-acetylcysteine for acetaminophen (APAP) toxicity with the use of pre-arranged templates, or order sets, at these institutions. *Methods:* All computerized physician n-acetylcycteine orders (by template through the commercial EPIC system) for APAP toxicity were retrospectively analyzed over an 18-month period, from September 2004 to February 2006. *Results:* There were 82 total cases. In thirty-six (44%) of the cases, the Prescott continuous infusion protocol was used. Fifteen (18%) of the cases involved the Rocky Mountain 48-hour intravenous protocol, and in 31 (38%) cases the oral protocol was used. There were no medication administration errors. All APAP toxicity cases were successfully treated with no deaths reported. *Discussion:* The advantages of computerized and templated POE include standardized ordering protocols, computerized weight-based dosing calculation, physician prompts for correct sequencing of orders, legible and rapid communication to pharmacy, and direct physician to pharmacist communication with no intermediaries. *Conclusion:* This experience demonstrates that templated POE is well-suited for n-acetylcysteine treatment protocols, especially complicated ones such as the Prescott protocol.

168. False-Positive Phencyclidine Urine Immunoassay Screen Due to Tramadol

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Background: We report 2 adults without prior history of epilepsy presenting for evaluation after experiencing convulsion associated with overdoses of tramadol (TMD). Both patients had positive (+) urine IA results for PCP without a history of exposure to PCP.Tramadol is a novel analgesic with both opioid and non-opioid mechanisms of action and is known to be associated with seizures in overdose. Both falsely negative and positive results are common with urine immunoassay (IA) testing. *Case Report:* 28 yo woman and 31 yo man presented for medical care following generalized convulsions. She took a total of 1200–1600mg tramadol over the prior 2 days. He acutely ingested a total of 420mg of tramadol. Urine IA was + for PCP but confirmatory testing with gas chromatography/mass spectroscopy (GC/MS) was negative for PCP in both cases. GC/MS also demonstrated large, merged peaks for TMD and 2 of its metabolites, n-desmethyltramadol (n-TMD) and o-desmethyltramadol (o-TMD). *Case Discussion:* To verify that TMD or its metabolites was the culprit for triggering the false + PCP IA results, we performed in vitro studies by spiking pure standards of TMD, n-TMD, and o-TMD into drug free urine to obtain concentrations of 100000, 200000, and 500000 ng/mL. PCP IA was then performed on these samples. The standard cutoff to report presumptively +PCP results by IA is above 25ng/mL. At the highest urine concentration tested, both TMD and n-TMD produced +PCP IA results above this threshold at 28 ng/mL and 35 ng/mL, respectively. o-TMD did not reach the + cutoff at any urine concentration tested. The 2 lower concentrations of TMD and n-TMD tested also yielded negative IA results for PCP. *Conclusion:* False + urine IA screens for phencyclidine (PCP) are known to occur as a result of interference by a number of medications. Our cases along with the accompanying in vitro data demonstrate that TMD and n-TMD may cross-react with urine PCP IA to produce false + results. Currently, there is no commercially available IA screen for tramadol. Positive results for PCP or other drugs of abuse by IA should be confirmed as clinically indicated.

169. Poison Center and Telemedicine Virtual Enhanced ICU Service Collaborate

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Background: Comprehensive clinical data can be difficult for Poison Centers(PC) to obtain, especially for complicated ICU patients. Collaboration has been forged between a PC and a network telemedicine virtual enhanced ICU system (eICU®). The eICU® staff of critical care intensivists and nurses provides monitoring and support to bedside providers in multiple, geographically disparate ICUs. The eICU® provides the PC with more comprehensive, real-time patient data. *Methods:* First steps in this early stage of collaboration included installing eICU® databases to PC computers, followed by PC staff training.PC staff is granted access to patient information for ICU toxicology consultations. Consultation may occur via the eICU® intensivists in addition to other critical care providers. *Results:* Collection of escalated data including history and continuous view clinical data contrasts previous data collection limitations. Dependence upon the bedside clinician to provide pertinent clinical data is alleviated. New capacity for the PC to remotely view comprehensive data decreases burden on bedside clinicians in providing in-depth clinical information meanwhile improving selection of clinical data. *Discussion:* Collaboration now exists between eICU®, PC and a major hospital. Telemedicine collaboration with PC is anticipated for all network hospitals, potentially resulting in a small core team of intensivists and toxicologists addressing the needs of a large, geographically remote population. *Conclusion:* With access to a wider bandwidth of clinical information the PC can continuously monitor and refine responses to therapy, potentially improving outcomes. Over time this collaboration may increase ICU staff's familiarity with toxicological perspectives, improve utilization of toxicology consultation, and improve overall compliance with recommendations. More complete and accurate data volume and reliability improves research capacity. Further study is needed on PC staff clinical abilities to discern important data elements and well-defined quality indicators including client satisfaction, costs and clinical outcomes.

170. Yew Tree Poisoning Treated with Amiodarone

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Background: Yew trees (*taxus* sp.) are known to have many bioactive alkaloids. Poisoning with its leaves and its use in suicide rites have been reported in the literature reaching back to at least Caesar. There are a number of bioactive alkaloids from this species and several therapeutic drugs have been derived from them. We report a patient who ingested tea from yew tree leaves who suffered cardiac arrest but was successfully resuscitated with a treatment not yet reported in the literature. *Case Report:* A 43 yo Korean female with no past history presented 12 h after ingestion and 10 h after the onset of nausea and vomiting. BP 55/33 and HR 180- v. tach. She was initially treated with lidocaine then arrested. Resuscitation with a combination of epinephrine and atropine restarted the patient's heart but still with a wide QRS. Amiodarone and sodium bicarb drips were started per ACLS protocol and eventually the patient's QRS narrowed. She was extubated after her vitals stabilized. A cutting from the patient's plant was identified by a PhD botanist as from *Taxus x media*, (a hybrid between *T. baccata* and *T. cuspidate*). *Case Discussion:* Various case reports and animal models have attempted to divine a treatment for *Taxus* poisoning as well as the main alkaloid responsible for the cardiac toxicity. Given the variety of active alkaloids, this has been difficult, but taxine appears to be the major culprit. Literature suggests that taxine's cardiac toxicity is related to calcium and sodium channel blockade. The widened QRS complex which is typical in overdoses has invited some treatment strategies. Sodium bicarb and lidocaine have both been successful in some case reports, but when hypertonic bicarb was studied in pigs, there was no benefit. Our patient received lidocaine but arrested. Amiodarone was started and may have played a role in her recovery. *Conclusion:* Taxine and other alkaloids from *Taxus* overdose do not have a widely accepted treatment algorithm. Supportive care and possibly pacing are recommended. Further study of amiodarone use in the treatment of yew poisonings is needed.

171. Adverse Effects Associated with Arginine α-Ketoglutarate Containing Supplementsvt

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Background: The athletic performance supplement industry is a multibillion-dollar business. One popular category of ergogenic aids are products that claim to increase nitric oxide (NO) production and cause "hemodilation". We report 3 patients presenting to the ED with adverse effects after the use of such supplements. *Case Report:* A 21-year-old man presented with palpitations, dizziness, and vomiting, followed by syncope, after the use of "NO2 Platinum" at the gym. His vital signs at presentation were: BP 122/79 mmHg; HR 72 bpm. His examination and ECG were normal. The dizziness persisted requiring admission overnight. A 24-year-old man presented 45 minutes after taking NO-Xplode. He had palpitations and a headache. His vital signs were: BP 110/70 mmHg; HR 85 bpm. He had a normal exam, laboratory values, and ECG, and was discharged. The third patient was a 21-year-old man with palpitations and near

syncope who used a "nitric oxide" supplement just prior to weightlifting. His vitals signs were: BP 115/70 mmHg; HR 115 bpm. His exam, laboratory values including methemoglobin, and ECG were otherwise unremarkable. He was treated with 1 liter of saline with no change in HR. He was admitted for observation. *Case Discussion:* The patients in this series were taking "recommended doses" of these supplements. The purported active ingredient in these products is arginine α-ketoglutarate (AAK), which is claimed to increase NO production by supplying the precursor L-arginine for nitric oxide synthetase. NO2 Platinum contains a patented "extended release AAK formulation." NO-Xplode also contains caffeine, other amino acids, creatine, and electrolytes. No published clinical studies have evaluated these supplements for safety or efficacy. The symptoms these patients experienced could be from vasodilation consistent with increased levels of NO, however we cannot eliminate effects from other ingredients. Because of the limited authority of the FDA to regulate supplements, they may carry unsubstantiated claims of safety and efficacy. *Conclusion:* AAK containing supplements may be associated with adverse effects requiring hospital admission.

172. Quetiapine-Associated Sedation Responding to Naloxone Therapy

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Background: Naloxone has been effective in the treatment of opiate and non-opiate toxicities. This is the first reported case of quetiapine associated sedation responding to naloxone. *Case Report:* A 16-year-old male without any past medical history, presented to the emergency department (ED) with lethargy and dizziness. After eating lunch, he began to feel dizzy and drowsy. He went to the school nurse who called EMS and was brought to the ED for evaluation. The patient denied dyspnea, abdominal pain, nausea, or vomiting. There was no change in his dietary habits, and no stressors. The patient also denied taking any illicit drugs, tobacco, alcohol, or medications. A review of systems was negative. EMS reported normal vital signs prior to arriving to the ED. In the ED, the patient was drowsy but arousable with normal vital signs and a normal glucose level. His physical examination was also normal except for sluggishly reactive, pinpoint pupils. The patient received one mg of intravenous naloxone with some resultant arousal and 5 minutes later was given another dose. Shortly after the second dose, the patient became more alert and his pupils became 3 mm in size. After 10 minutes had past, the patient became somnolent again and he stated his lethargy had returned. His laboratory analysis and head CT were normal. A urine drug screen was negative for opiates, cocaine, marijuana, benzodiazepines, and barbiturates. Three hours later, he admitted to taking one 200 mg tablet of quetiapine from his friend at lunchtime. His serum quetiapine level five hours post ingestion was 180 ng/ml which was within the therapeutic range. The patient was released from the ED after 6 hours of observation without sequelae. *Case Discussion:* This is the first report of quetiapine-associated CNS depression responding to naloxone. Reversal of sedation is not typically a goal of naloxone therapy, however this effect may be beneficial in patients who are not opioid tolerant. In our case, reversal of sedation allowed a complete history to be obtained, preventing unnecessary invasive testing and admission to the hospital. *Conclusion:* Quetiapine associated sedation may be responsive to naloxone therapy and thus, should be considered in select patients.

173. Dextromethorphan Abuse Masquerading as Recurrent Seizure Disorder

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Background: Dextromethorphan (DXM) has unique toxicity that may be difficult to diagnose. We present a case of a young woman who presented to our Emergency Department (ED) initially diagnosed with recurrent seizures. *Case Report:* Paramedics brought a 19-year-old woman to the ED. Witnesses noted "shaking" which the patient did not recall. The patient denied fever, antecedent trauma, or neurologic complaint. She was recently started on lamotrigine for bipolar disorder. She was a former alcoholic with no history of developing withdrawal. She admitted to marijuana use but denied use of any other illicit substances. Her vital signs and physical examination were unremarkable. She had a normal brain CT, electrocardiogram, and laboratory evaluation. There was no alcohol detected. Her urine drug screen was negative for opiates, benzodiazepines, cocaine, amphetamines, barbiturates, phencyclidine, and tricyclic antidepressants. She was diagnosed with new-onset seizure and discharged home. Brain MRI and EEG were normal. She was scheduled for a cardiac syncope work-up, but never followed through. Two months later, she presented to the hospital again for a similar complaint. Coworkers reported witnessing sudden tonic-clonic movements and confusion. On ED presentation, the patient was tachycardic at 110 bpm and had horizontal nystagmus. She was alert with a flat affect. She did not recall events but answered questions appropriately. Repeat radiographic and laboratory evaluations were normal including urine drug screen and CT. Upon questioning, she admitted to abusing DXM for the past several months. A serum DXM level at this time was 988.3 ng/mL. She was admitted to the hospital for 24 hours without sequelae. All further diagnostic testing was cancelled and she was referred to a drug rehabilitation program. *Case Discussion:* Abuse of DXM is increasing in incidence. The serum level of our patient was almost 10-fold above the reported therapeutic level. The toxicity of DXM is unique and abuse should be considered in all patients presenting to the ED with new-onset seizure. *Conclusion:* DXM abuse should be considered in young adults who present with previously undiagnosed seizure activity.

174. A Local Outbreak of Scombroid Fish Poisoning in Japan

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Background: Despite the frequent consumption of raw fish by the Japanese, only 10 cases of scombroid poisoning occur every year; these cases account for only 0.5% of the total food poisoning cases in Japan. We think that scombroid poisoning is hardly recognized and often misdiagnosed as anaphylactic reaction. We report a small outbreak of scombroid poisoning in Japan. *Case Report:* Three patients were brought to our hospital in an ambulance. They had developed nausea; general malaise; itching sensation; and rashes immediately after consuming sun-dried scombroid fish for lunch at the same restaurant. Since all the 3 patients presented with their symptoms at the same time and after eating the same food at a restaurant, we suspected scombroid poisoning. In spite of treatments at the outpatient clinic, 2 of the 3 patients (2 women) remained hypotensive; therefore, they were admitted to the intensive care unit. Their symptoms disappeared within 2 d of hospitalization; hence, they were discharged. We notified the local public health department of an outbreak of scombroid fish poisoning; a few days later, it was confirmed that sun-dried scombroid fish contained high levels of histamine (160–520 mg/100 g). *Case Discussion:* Scombroid poisoning occurs due to the consumption of foods containing high levels of histamine (greater than 100 mg/100 g); bacteria (e.g., *Morganella* sp. or *Enterobacter* sp.) in the food metabolize histamine to the amino acid histidine. Foods containing histidine include red fish (tuna, scombroid fish, saury, etc.), wine, and cheese. Because the Japanese often consume red fish, we think that scombroid poisoning should occur frequently. To accurately diagnose scombroid poisoning, it is important to recognize scombroid poisoning, which is often manifested by allergy-like symptoms immediately after consuming a specific food. Scombroid poisoning is treated by administering antihistamines and providing supportive care. *Conclusion:* Presently, raw fish has become a very common food consumed by people worldwide. If allergy-like symptoms appear after consuming raw fish, scombroid poisoning should be suspected and a differential diagnosis should be considered.

175. Tranylcypromine Toxicity Resulting in Thrombocytopenia and Subsequent Thrombocytosis

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Background: There are rare reports of thrombocytopenia following tranylcypromine (TCP) overdose. We describe severe TCP toxicity resulting in thrombocytopenia and subsequent thrombocytosis. *Case Report:* A 44 yo male presented to the ED with agitated delirium, uncontrolled motor activity, hyperthermia, diaphoresis, tachycardia and tachypnea following TCP OD. Vital signs: HR 178 RR 36 BP 130/80 T 102° O_2 sat 94%. Despite intubation, IVF's, lorazepam, etomidate, dantrolene, rocuronium and vecuronium his clinical condition worsened. Core temp. reached 106.2° and hypotension developed necessitating norepinephrine drip. In the ICU, exam revealed T 104.4° HR 136 BP 115/67 RR 31, diaphoresis, "Ping-Pong" gaze, sustained clonus, muscle rigidity (Lext >Uext) and no response to noxious stimuli. He developed profuse heme negative diarrhea. Metabolic acidosis, hyperthermia, tachycardia, rigidity, rhabdomyolysis, refractory hypotension, transient renal insufficiency and shock liver ensued. Initial labs: ABG pH 7.26, pCO_2 36, pO_2 278, HCO_3 15.7 mmol/L, base deficit 10.3 mmol/L. WBC 21.3 K/mm^3, Plt 219 K/mm^3, BUN 20 mg/dL, Cr 1.7 mg/dL, Troponin I 12.88 ng/mL, CK 3873 IU/L (peaking at 74,665). UDS GC/MS detected TCP, caffeine, citalopram, nicotine, cotinine, acetaminophen. Serum APAP was negative. History and clinical presentation suggested TCP toxicity. On hospital day (HD) 4 he was extubated, had persistent agitation and platelets (plts) reached a nadir of 15 K/mm^3 requiring transfusion (on HD 2, plts = 154 K/mm^3). Thrombocytopenia resolved on HD 8. Encephalopathy improved on HD 10. Mild ataxia and dysarthria persisted until HD 13. On HD 14, plts increased to 1010 K/mm^3 and peaked at 1101 K/mm^3 on HD 17. Hematologic evaluation concluded this was a reactive thrombocytosis and treatment with aspirin was started. At discharge, HD 24, thrombocytosis (736 K/mm^3) persisted. *Case Discussion:* A MEDLINE search (1998–2008) revealed 4 cases of TCP induced thrombocytopenia, one report describes subsequent reactive thrombocytosis in suspected TCP WD. *Conclusion:* We report a case of severe TCP toxicity resulting in thrombocytopenia and subsequent thrombocytosis. Clinicians should be aware of TCP's adverse effect on plts and possible risk for thrombosis should thrombocytosis occur.

176. Treating Body Stuffers with Whole Bowel Irrigation; Should We Flush the Procedure?

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Background: Hospitals are frequently unsuccessful performing whole bowel irrigation (WBI) as recommended by our poison center. Our aim is to describe the demographics and limitations of this mode of decontamination for body stuffers. *Methods:* Illicit packet ingestion cases from our poison center were reviewed from 7/1/2001 through 12/31/2007. Demographics, type & number of drug packets ingested, & events surrounding WBI are recorded. Those reporting <20 packets ingested were defined as body stuffers. Endpoints & method of WBI were recorded including whether or not the procedure was completed (ie. clear rectal effluent, packets retreived, a nasogastirc (NG) tube was used with 2 L/hour of polyethylene glycol (PEG) solution). Descriptive statistics were utilized to report the data. *Results:* Over 6.5 years, our poison center participated in the care of 434 cases of illicit drug packet ingestion. 359 were male and 74 were female while the average age was 29 years (range 1 to 57). Average number of stated packets ingested were 5–10 (range from 1 to 83). 419 patients were considered body stuffers. Cocaine was the most commonly drug ingested (303). 85 heroin cases occurred, 21 combined heroin & cocaine, and 23 ingested packets containing other drugs. 103 (24%) cases completed WBI while 178 (41%) did not. In 153 (35%) cases it was undetermined by lack of data. 129 (30%) cases specifically mentioned the lack of clear rectal effluent, or no packet recovery, or lack of NG tube & patients "sipping" PEG, or not done per PCC recommendations. 58 (13%) patients were noted to leave AMA prior to completion of WBI. No fatalities occurred. *Discussion:* Although these data are limited due to the retrospective nature of this study, some points are clear. Successful WBI was completed in only 24% of cases. Close to half of the patients did not achieve the follwing; 1) clear rectal effluent, 2) PEG administered via NG tube, or 3) had packets recovered. Despite patients refusing this procedure and/or leaving AMA, there does not appear to be any difference in outcome. *Conclusion:* We question the utility of WBI as a routine mode of decontamination for body stuffers.

177. Corneal Ulceration in a Dog Following Walkingstick Envenomation

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Background: While most species of walkingstick insects are considered harmless, certain US species have the ability to secrete defensive venom at their predators. Upon ocular exposure to the venom, the victim may experience intense pain followed by blurred vision, conjunctivitis, keratitis, and corneal ulceration. Rare cases of human ocular exposures to walkingstick venom have been reported. To date, there is only one reported canine ocular walkingstick envenomation.

We describe a case of a Chihuahua in southeastern Louisiana that developed diffuse corneal ulceration following envenomation. The dog owner identified the insect as a walkingstick; however, it was not captured for professional identification. Based on the location of the incident, the most likely species involved were either *Anisomorpha ferruginea* or *A. buprestoides*. *Case Report:* A 4 year old, male Chihuahua presented to an emergency veterinary hospital approximately 20 hours after it was witnessed to be "nose-to-nose" with a walkingstick in the dog owner's backyard. Within seconds of approach, the dog yelped and jumped away from the insect. The dog immediately developed lacrimation and periocular swelling of the left eye. Upon presentation, the dog was found to have blepharospasms and miosis of the left eye—no foreign body was identified. Fluorescein stain was administered and diffuse corneal uptake of stain was noted. The dog was diagnosed with a superficial corneal ulceration and treated supportively with ocular flushing, topical antibiotics, ocular lubrication, and a 1% solution of ocular atropine, as well as systemic NSAIDs. The dog's signs resolved in ten days. *Case Discussion:* Venomous walkingsticks have been identified in the southern US, Madagascar, and various South American countries. The toxic component of the venom is a terpene dialdehyde. *Conclusion:* Children and animals are at higher risk of ocular envenomation due to their curious nature and proximity in size to the insect. Diffuse corneal stain uptake is often caused by chemical exposure, versus injury due to a foreign body or ocular disease. Upon ruling out chemical toxicity, environmental envenomation should be considered for these presentations.

178. Pediatric Varenicline (Chantix [R]) Exposures over a 27 Month Period

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Background: Chantix(R) (varenicline) is a new drug (available as a 0.5 or 1 mg tablet), indicated as an aid for adult smoking cessation. Its unique mechanism involves partial agonist activity selective for $\alpha_4\beta_2$ nicotinic acetylcholine receptor subtypes while simultaneously preventing nicotine binding to these sites and central nervous system dopamine mesolimbic stimulation. Varenicline is approved only for adults; there is no published pediatric ingestion experience. We used National Poison Data System case data to study this problem in our five-state region. *Case Report:* A retrospective review of all varenicline human exposures within our service area from January 2006 to March 2008 was conducted. We identified 34 exposures and 14 met inclusion criteria: age ≤ 6 years, single agent ingestion, and follow-up to a known outcome. When weight was not provided, it was estimated using the 50th percentile line on the CDC growth chart (www.cdc.gov/growthcharts). The mean [min, max] age was 24.5 [11, 48] months and 57% were male. The mean [min, max] historical dose was 1.64 [0.5, 4] mg or 124.76 [31.75, 400] mcg/kg. Medical outcome was no effect in 11/14 (78.6%) and 3/14 (21.4%) had minor effects. Clinical effects and historical dose are described in the table. Patient 2 was mechanically gagged by parent to induce vomiting. All symptoms resolved within 4 hours.

Patients with clinical effects

Patient	Age (years)	Weight (kg)	Dose (mg)	Tablet Number	Effect
1	2	13.5	1.0	1	V
2	2	15.0	3.0	3	D, L, V
3	3	14.3	0.5	1	V (see text)

D = drowsiness, L = lethargy, V = vomiting.

Case Discussion: In this case series, unintentional pediatric varenicline exposures ranging from 0.5 - 4 mg resulted in no or minor outcomes. When clinical effects occurred, symptoms resolved without sequelae. The most frequently observed adverse effect was vomiting, which is consistent with the drug's known adverse event profile. *Conclusion:* Medical outcome of ingestion of at least 1 tablet (any dose) produced either no or minor effect. Future studies using a larger sample size are needed to further assess pediatric toxicity and determine a dose threshold or probability of dose effect.

179. A Complicated Hospitalization Following Dilute Ammonium Chloride Ingestion

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Background: Unintentional ingestions of cleaning solutions containing dilute (<7.5%) ammonium chloride typically do not cause serious harm. However, intentional large volume ingestions of this acid can cause significant morbidity. Rare case reports are available regarding such ingestions. *Case Report:* A 60 year old bipolar woman was evaluated 1 hour after an intentional ingestion of 15 fluid ounces of a humidifier treatment containing 2.25% ethyl ammonium chloride. Initial complaints included 1 episode of non bloody emesis, dyspnea, chest, and epigastric pain. Additionally, she had cough with frothy sputum, and multiple loose stools. Initial vitals included mild hypertension, tachycardia in the 110s, and an oxygen saturation of 91% on room air. Bilateral wheezing and epigastric tenderness were noted on exam. Initial labwork was unremarkable. An emergent endoscopy demonstrated a Grade 2 esophageal injury and a Grade 3 gastric injury, but no significant damage to the duodenal bulb. Due to persistent cough, copious secretions, and worsening hoarseness, the patient was intubated. Her ICU course was complicated by hypotension, metabolic acidosis, and oliguria. Bronchoscopy showed laryngeal edema and mucosal injury to the segmental level. Patient underwent tracheostomy on hospital day (HD) 6 and was started on parenteral nutrition. She was treated with steroids for the caustic injuries, antibiotics for pneumonia, and was eventually weaned off mechanical ventilation. A swallow study revealed poor esophageal motility in the mid- to lower-thirds of the esophagus. The patient gradually tolerated oral challenges and on HD 20 her tracheostomy tube was removed. She was transferred to psychiatry on HD 22. *Case Discussion:* Although adults comprise only a minority of caustic ingestions, their injuries tend to be more severe due to the volumes involved with suicidal ingestions. Even dilute solutions have potential, in large volume, to cause marked gastrointestinal and pulmonary injury. *Conclusion:* In large amounts, ingestions of dilute ammonium chloride solutions can result in significant morbidity requiring prolonged hospitalization.

180. Employee Satisfaction Survey Following the Implementation of a Novel Drug Identification Service

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Background: Drug identification calls to Poison Centers are frequent. Most of the Drug ID calls from the public involve substances associated with abuse/addiction. Certified Specialists in Poison Information (CSPI) have little to no formal training in substance abuse/addiction. We conducted an employee satisfaction survey of all CSPIs at the Maryland Poison Center before and after implementation of a separate designated Drug ID service staffed with substance abuse counselors. *Methods:* The Drug ID service operated for 6 hours a day, 6 days/week, during the peak evening hours and was physically located in the Poison Center calling area. It was staffed with substance abuse counselors trained in tablet identification who provided motivational interviewing and referral to treatment for substance abuse. During the remaining hours of operation, drug IDs were perfromed by the CSPIs. The employee satisfaction survey was administered to all CSPIs in September 2006 and again in December 2007, before and one year after the implementation of the Drug ID service. Surveys were conducted anonymously. *Results:* Survey response rates were: 9/12 (75%) in 2006 and 10/12 (83%) in 2007. See table for results.

Table 1: Comparison of survey responses

Question	2006 Agree	2007 Agree
Prepared to do motivational interviewing	1/9	1/10
A designated Drug ID service would/did help relieve workload	7/9	10/10
Amount of time devoted to exposure calls is adequate	7/9	10/10
Satisfied with job (including tablet identification)	8/9	10/10

Discussion: Employee satisfaction was generally high before the implementation of the drug ID service and remained high thereafter. A few more CSPIs reported that the drug ID service helped relieve their workload and helped them devote more time to exposure calls. CSPIs felt unprepared to perform motivational interviewing. *Conclusion:* The implementation of a separate designated Drug ID service staffed by substance abuse counselors did not clearly change employee satisfaction.

181. Reversal of Atrial Fibrillation in Cyanide Poisoning

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Background: Cardiac dysrhythmias and myocardial depression are associated with cyanide poisoning. However, we found no specific reports of atrial fibrillation. We report a patient with a work-related exposure to a pentenenitrile mixture and delayed-onset cyanide toxicity, including lactic acidosis and atrial fibrillation that were reversed after antidote treatment. *Case Report:* A 38-year-old previously healthy man had a dermal and inhalation occupational exposure to a pentenenitrile solvent mixture. He reported wearing only partial chemical protective gear and no inhalation protection. Several hours after exposure he developed progressive weakness, prompting him to decontaminate in a shower for 20 minutes. He then became syncopal. EMS found him in atrial fibrillation at a rate of 112 bpm that increased to 177 upon arrival to the hospital. He was awake with headache, nausea and vomiting. Arterial blood gas revealed a fully compensated metabolic acidosis with pH 7.405, pCO_2 20.7, pO_2 69.7 and HCO_3 12.7, MetHb <0.3, and COHb 0.3. His initial serum lactate concentration was 7.2 mmol/L. He received oxygen, ondansetron and amyl nitrite, followed by sodium nitrite and sodium thiosulfate per poison center consultation. Within minutes of completing all antidote treatments, the patient converted to a normal sinus rhythm at a rate of 93 bpm. At thirty minutes after the last antidote infusion his ABG showed pH 7.371, pCO_2 40.2, pO_2 263.3 and nausea and vomiting resolved. Serum lactate was 2.6 mmol/L at 3h normalizing to 1.4 at 7h. He recovered with no recurrence of symptoms. *Case Discussion:* Our patient suffered delayed-onset cyanide poisoning. This was confirmed by his chemical exposure history and an elevated serum thiocyanate concentration drawn prior to sodium thiosulfate administration, reported later as 7.5 µg/mL (ref. range 1–4 µg/mL), consistent with increased endogenous rhodanese activity. His lactic acidosis suggests anaerobic cellular metabolism that was reversed after treatment. *Conclusion:* Atrial fibrillation has not specifically been reported in cyanide poisoning. Our case demonstrates the development of this potentially dangerous dysrhythmia with lactic acidosis, both of which resolved after antidote administration.

182. Creative Chemistry: Microwave Extraction of Dextromethorphan from Sucrets®

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Background: DXM abuse is widespread in the preteen and teenage population. DXM has been abused for its hallucinogenic potential for years with sources including liquid cough medicine, cold tabs ("Triple C") and now extraction from cough suppressant tabs. *Case Report:* A 15 y.o. male, missing for over 24 hrs, was found in the woods with abrasions and altered mental status. Routine meds were duloxetine 60 mg and buspirone 15 mg. He had abused Coricidin® tablets in the past. Fluids, D_{50} and O_2 were administered enroute to the ED where BP was 146/99, HR 111, Tº 99.2, and GCS 10 (E2V3M5). Other labs included tea-colored urine that screened positive for myoglobin and PCP, serum CPK 76,400 U/L, BUN 34 mg/dl, creatinine 2 mg/dL; and brain CT normal. After transfer to a tertiary center; he was treated with IV fluids, $NaHCO_3$, furosemide drip and mannitol. He was unable to move his legs for several days. Suspected pressure necrosis of his gluteal maximii with sciatic nerve compression was confirmed by MRI and nerve conduction studies. Labetolol was initiated for BP 152/96. BUN/creatinine peaked at 54/5.9 mg/dL and gradually returned to normal by day 14. PCP was negative by GC/MS. Serum DXM was 330 ng/mL (0.5–5.9 tx range). Urine DXM was 110 uMol/L with active metabolite dextrorphan 790 uMol/L (extensive-metabolizer phenotype.) He later revealed that

he prepared pure DXM by microwave heating 25 - 30 Sucrets® in a mug of water for 1 min at a time, then stirring and reheating until the DXM separated. An alternative method used lemon juice (acid) and ammonia (base) extraction. Recent MRI revealed mild perivascular leukoencephalopathy. *Case Discussion:* DXM is a preferred OTC hallucinogen because it is readily available, cheap, and effective. Abuse doses of 300 mg to 1 gram have been reported. We report a novel method to extract and concentrate active material. *Conclusion:* DXM has high abuse potential in the adolescent population; even products with low concentrations are potentially abusable. Consequences of DXM abuse may be severe; in this case stasis rhabdomyolysis, acute renal failure, peripheral neuropathy and neurocognitive changes.

183. Retrospective Review of Ramelteon (Rozerem™) Exposures Reported to a Poison Center Network, 2005–2007

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Background: Ramelteon is a novel sleep aid with activity at the melatonin receptors MT1 and MT2 in use since 2005. We describe the epidemiology, symptomatology, and outcomes of ramelteon ingestions using data from a poison center network (PCN). *Methods:* The patient database for a statewide PCN was searched for ramelteon ingestions reported during 2005–2007. Exclusion criteria were multiple drug ingestion and lack of known medical outcome. Cases were analyzed for selected demographic and clinical variables. *Results:* A total of 127 cases of ramelteon ingestions were reported. Of those, only 32 had a known case outcome and ramelteon as a single agent. There were 10 males and 22 females and 13 cases were in those < 20 years of age. Of 28 cases with a reported dose, the mean dose ingested was 113.3 mg (range 4.0–400 mgs). Eight cases were coded as unintentional; 19 were suicidal; 2 cases were due to misuse and 1 from abuse. In terms if clinical effects, 17 patients had "no" effects, 7 had "minor" effects, and 8 had "moderate" effects, as coded using AAPCC-TESS criteria. There were no "major" effects and no deaths reported. Clinical effects reported were: drowsiness/lethargy (n=11), dizziness/vertigo (n=2), bradycardia (n=1), hypotension (n=1), abdominal pain (n=1), vomiting (n=1), electrolyte abnormalities (n=1), agitated/irritable (n=1), ataxia (n=1), multiple seizures (n=1), and slurred speech (n=1). *Discussion:* Since 2005, multiple cases of ramelteon ingestions have been reported to a PCN. Most patients have had "no" to "moderate" clinical effects. No deaths were reported. This dataset is limited by its regional and retrospective natures, its dependence on voluntary reporting, and small number of patients. *Conclusion:* Ramelteon seemed to be relatively safe after ingestions. The most common symptoms reported after ingestion were drowsiness and lethargy. No deaths were attributable to it in this limited case series.

184. Outcomes of Acetaminophen (APAP) Ingestion Patients Unable To Be Classified as Acute or Repeated Supratherapeutic Ingestions (RSTI)

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Background: Some patients with APAP ingestion cannot be categorized as acute (>4 grams in an 8-hour period for adults) or RSTI (ingestion over >8 hours resulting in a total dose of >4 grams a day). We labeled this group *unclassifiable APAP ingestions* (UAI). It has not been previously described. Our aims were to describe the UAI group demographics, presentation, and outcomes and to correlate the presenting international normalized ratio (INR), alanine transferase (ALT) and APAP levels with patient outcome. *Methods:* UAI patients were identified from an ongoing multicenter retrospective safety study of N-acetylcysteine (NAC). Chart reviews were double abstracted by trained abstractors using a standardized form. Data collected included demographics, serum APAP, ALT, and INR. We characterized patients who developed hepatotoxicity (HT) (ALT >1000 IU/L) or died. No patients were transplanted. Descriptive statistics were used. *Results:* Of 433 enrolled patients 91 (21%) could not be classified as acute or RSTI and were categorized as UAI. UAI patient mean age was 40.8 years (SD 15.5), 49 (54%) were female, and 61 (67%) were Caucasian. Outcome data were available for all patients. 34 (37%) developed HT and 10 (11%) died, although 4 patients that died did not develop HT. The median baseline APAP levels were 22.5 and 6.2 for HT and no HT patients respectively. In patients developing HT the median presenting ALT was 2863 IU/L vs. 41.5 IU/L if no HT. The median presenting INR in patients developing HT was 1.8 vs. 1.1 without HT. The lowest recorded presenting ALT in a patient who developed HT was 39 IU/L. *Discussion:* To our knowledge, no previous reports have attempted to quantify or describe the population of UAI patients. *Conclusion:* Unclassifiable acetaminophen ingestion patients are relatively common. Elevated INR and ALT on presentation are associated with hepatotoxicity in UAI patients. The presenting APAP level is not predictive of outcome in this patient group.

185. Developing Culturally Relevant Consumer Education Materials in Hmong

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Background: Despite the California Poison Control System's culturally diverse service area, few calls reflecting the multilingual population are made to the system's 24-hour 800 service, especially by the Hmong population. California has the 2nd largest Hmong community in the U.S. This group is linguistically isolated, at greater risk for childhood poison exposure and historically difficult to reach. *Methods:* The California Hmong Health Collaborative, consisting of bicultural and multilingual community-based organizations and health care agencies serving the Hmong population, was recruited as a key partner. The collaborative audited existing Hmong poison prevention materials and helped determine relevant benefits, tone of voice, content and messaging based on consumer needs, attitudes, understanding, and lifestyle. Concepts were tested with monolingual Hmong residents and the collaborative. *Results:* Poisoning is a perplexing notion in the Hmong culture. Hmong adults had difficulty understanding why you would poison yourself and then call someone for help. In response, detailed information on the concept of poisoning that would appear redundant in English was developed in language. Because the process involved community members and remained open, flexible and free of preconceived notions it yielded materials whose messages appealed to consumers. *Discussion:* Initially only one Hmong document was going to be developed but organizational input indicated the development of the two Hmong language education materials, Hmong Leng and White Hmong, to better meet the needs of the population. Consumer feedback showed a strong preference for photographs of a traditionally dressed Hmong family. Political stances and country region play a role in these languages, which can cause severe upset leading these materials to not be used or well regarded. *Conclusion:* Although CPCS has created materials in over 10 languages, the Hmong tool required a unique strategy that included the development of new concepts and key messages from the Hmong community. Poison prevention and service promotion messages are not universally significant across cultures or Hmong sects. The in-culture creation of Hmong materials was critical to reaching this population.

186. Maternal and Neonatal Metabolic Acidosis after Ingestion of Oral Anesthetic Spray

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Background: Oral anesthetic sprays (OAS) containing phenol or benzocaine as active ingredients are used widely and often considered safe when used as directed. *Case Report:* A 24 year old, 36 week gravid woman ingested 3 bottles of over-the-counter OAS over 2–3 days. Her initial hospital presentation included tachycardia, tachypnea, red discoloration of her lips, and difficulty swallowing. Laboratory analysis was significant for an initial pH of 7.22, an anion gap of 21, an ammonia level of 78 µmol/l, a chloride of 126 mEq/L, and normal liver function studies. An extended toxicology screen detected lidocaine and monoethylglycinexylidide (MEGX), as well as serum acetone of 15 mg/dL. The patient remained acidemic and tachycardic despite supportive care. Maternal esophagogastroduodenoscopy (EGD) revealed Grade 2 corrosive esophagitis and gastritis.On hospital day 2, fetal distress was noted, followed by spontaneous rupture of membranes. Vaginal delivery included an episiotomy but was otherwise uncomplicated with normal Apgar scores. The infant's labs were significant for a serum bicarbonate of 15meq/L, an ammonia of 125 µmol/L, and a chloride of 119 mEq/L. Extended toxicology screen also revealed prilocaine and lidocaine, and a serum acetone of 7 mg/dL. The mother and infant had urine phenol levels of 28 mg/L and 3 mg/L, respectively. The newborn initially was lethargic and had some difficulty feeding, but the mother and newborn gradually improved and were both discharged without residual effects. *Case Discussion:* Ingestion of concentrated phenol can cause corrosive injury and an elevated anion gap acidosis, but there is little data about clinical presentation following large ingestions of a low concentration preparation. The history of ingestion, elevated urinary phenol, metabolic acidosis, and EGD findings are consistent with phenol ingestion. This case suggests that transplacental transfer of phenol occurs after maternal ingestion of OAS, resulting in neonatal toxicity. *Conclusion:* We report the first case of phenol-containing OAS ingestion resulting in maternal and neonatal toxicity, and confirmed by urinary phenol levels.

187. Case Report of Severe Lactic Acidosis from Iatrogenic Propylene Glycol Overdose

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Background: Propylene glycol (PG) is a diluent found in many IV and oral medications. We report a case of severe lactic acidosis from iatrogenic PG overdose. *Case Report:* The patient is a 50 year-old man with history of alcohol and cocaine abuse that presented to the emergency department after PEA/v fib arrest after choking on a large piece of meat. He was admitted on hospital day (HD) 0 to the intensive care unit unresponsive with anoxic brain injury. Initial ethanol level was 406 mg/dL. On the morning of HD 1, he started having seizures, which resolved after several boluses of lorazepam. He was accidentally started on lorazepam sedation at 2 mg/min instead of the more standard dose of 2 mg/hr after a verbal order was given. The patient became increasingly acidotic and 10 hours after the infusion was started on HD 1, the error was recognized and the infusion was stopped. The patient's mean arterial pressure was maintained on norepinephrine infusion with blood pressures in 90/50s. Peak PG level was 659 mg/dL on HD 1 at 2146, 3 hours after the error was noted. At that time, pH was 6.9 and bicarb was 5. Peak lactate level was 18.6 mmol/L at 0205 on HD 2. Fomepizole was started on HD 2 at 1030 and was continued until HD 4. Dosing was 10 mg/kg q 12 hr for 4 doses then increased to 15 mg/kg q 12 hr. Dosing was increased to q 6 hr during continuous veno-venous hemofiltration (CVVH), which was started on HD 2 and was continued until HD 7. The patient did not have renal failure on presentation. In addition, a bicarb drip was started at 2300 on HD 1 and continued until HD 3 at 1800. Acidosis resolved by HD 4, by which point the PG level was 45 mg/dL and fomepizole was discontinued. Prognosis was very poor with no reasonable hope for brain recovery from respiratory arrest. Care was withdrawn on HD 12 and the patient expired minutes later. *Case Discussion:* We present a case of severe PG toxicity caused by an iatrogenic OD of lorazepam from a continuous infusion. Although the patient suffered severe anoxic brain injury and ultimately died, his lactic acidosis was treated successfully with fomepizole and CVVH. *Conclusion:* Iatrogenic lorazepam OD may result in severe PG toxicity.

188. Prolonged Delirium in a Pediatric Patient after Modafinil and Escitalopram Ingestion

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Background: Modafinil (Provigil®), a wakefulness-promoting drug, is used to treat narcolepsy, sleep apnea, and shift work sleep disorder. Reports of modafinil overdose are rare. We present a case of a pediatric patient who exhibited a prolonged delirium after an overdose of modafinil and escitalopram. *Case Report:* A 14 year-old female presented to an Emergency Department (ED) after ingesting 20 of her 200 mg Provigil® tablets and 10 of her 10 mg Lexapro® pills in a suicide attempt. Her father reported that the patient's other medications (Depakote® and amitriptyline) were fully accounted for. In the ED, the patient was tachycardic (HR 175/min), anxious and diaphoretic; she had 6mm pupils and 4-beat lower extremity clonus. Assays for

APAP, ASA, and TCA's were negative; a valproic acid level was 52 mg/L. She was given 50 grams of activated charcoal and transferred to a tertiary care center where she remained diaphoretic, and complained of a dry mouth and diarrhea. She was noted to be delirious, conversing with inanimate objects in her room. She remained tachycardic despite treatment with IV normal saline, metoprolol, and lorazepam. 33 hours after the ingestion, the patient's diarrhea resolved. She still remained tachycardic (HR 130/min) and hypervigilant, sleeping only 20 minutes at a time. 40 hours after the ingestion, the patient was unable to focus during short conversations. 62 hours after the ingestion, she was awake and coherent, with normal vital signs. She was transferred to a psychiatric facility the following day. Escitalopram and modafinil concentrations, drawn 24 hours after the ingestion, were 0.19 mcg/mL and 18 mcg/mL (therapeutic peaks of 0.03 mcg/mL at 5 hours and 4.8 mcg/mL at 2 hours; with $T_{1/2}$ of 30 and 11 hours, respectively). *Case Discussion:* The mechanism of action of modafinil is unknown, but may be related to that of sympathomimetic agents. In this case, coingestion of escitalopram may have contributed to the patient's CNS stimulation with serotonergic features such as clonus. *Conclusion:* Intentional modafinil overdose is rarely reported, this being the first pediatric case. Symptoms may be prolonged and include hypervigilance, delirium, and diarrhea.

189. Lessons to be Learned: A Poison Center's Use of Digital Call Recordings

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Background: We developed a program to increase proficiency of Specialists in Poison Information (SPIs) in managing poison exposure calls, utilizing self-review of digital recordings and checklists. *Methods:* Checklists of elements in two key call management areas were developed. A history-taking checklist addressed patient status, time since exposure, treatments prior to call, past medical history, name of toxin, magnitude of exposure, reason for exposure, acuity, and gender/ age of patient. Communication considerations, such as active versus passive information gathering and prioritization, were also addressed. A separate checklist addressed timeliness, wording, and thoroughness of the risk assessment and plan. Customer care considerations including courtesy and verification of plan comprehension were also reviewed. Digital recordings of calls were meanwhile isolated and stored in a retrievable format. SPIs were notified how to find their own recordings and were sent an electronic copy of a standardized checklist to use. Participation was voluntary, and time away from call center obligations was provided. Checklists were constructed to lead SPIs in dissecting call content followed by an opportunity to reflect on specific areas for future skill refinement. Copies of completed checklists were returned to a supervisor as record of participation. *Results:* 100% of SPIs (n= 15) participated in the program since 2006, reviewing 10 cases quarterly. Subjective feedback has been positive, with SPIs appreciating the opportunity to learn from their own experiences. *Discussion:* Providing tools for SPIs to self-critique their calls proved beneficial in several ways. Checklists focused SPIs attention on crucial elements of poison exposure call management in a realistic and applicable manner, well-suited for adult learning. Systematic deconstruction and critique of SPIscalls by a supervisor is resource-intensive and can be perceived as over-reaching. Self-scrutiny encourages personal responsibility for professional development. *Conclusion:* We developed tools to assist SPIs in performing self-evaluation of their history-taking, communication, and risk assessment skills. SPIs have responded favorably to this development tool.

190. Changes in Caller Type for Drug Identification Calls Reported to a Regional Poison Center over Time

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Background: Drug identification (ID) calls to poison centers are common. The purpose of this study was to evaluate the distribution of caller types for several commonly identified substances to the Maryland Poison Center (MPC) between 2005 and 2007. *Methods:* Calls to the MPC in 2005 to 2007 coded as being drug IDs were reviewed. Substances identified by imprint codes as amphetamines, buprenorphine, or oxycodone were tabulated by caller type by year (total and percentage). Caller types were coded as Health Professional, Law Enforcement, Public, or Other. *Results:* There was variability in the percentage of callers who self identified as law enforcement callers. Calls that were self identified as being from law enforcement increased for all drugs over the study period.

Caller type by substance by year

Substance	Year	Health Professional	Law Enforcement	Public	Other
Amphetamines (%)	2005	27 (16)	23 (14)	97 (59)	17 (10)
	2006	36 (19)	47 (25)	104 (55)	1 (1)
	2007	32 (18)	67 (38)	78 (44)	0 (0)
Buprenorphine (%)	2005	1 (2)	23 (40)	28 (48)	0 (0)
	2006	8 (5)	85 (57)	54 (36)	1 (1)
	2007	2 (1)	158 (79)	40 (20)	0 (0)
Oxycodone (%)	2005	59 (3)	262 (11)	1,843 (79)	161 (7)
	2006	102 (4)	480 (18)	2,095 (77)	42 (2)
	2007	97 (3)	639 (21)	2,333 (76)	5 (0)
Total (%)	2005	87 (3)	308 (12)	1,968 (77)	184 (7)
	2006	146 (5)	612 (20)	2,253 (74)	44 (1)
	2007	131 (4)	864 (25)	2,451 (71)	5 (0)

Discussion: Drug ID calls to the MPC increased during the study period. The caller type has changed over time with a greater percentage of calls originating from law enforcement personnel for all substances studied. The proportion of calls from law enforcement varies by substance. While the overall numbers for buprenorphine calls to the MPC were low, they overwhelmingly came from law enforcement. *Conclusion:* The caller type for drug ID calls to the MPC changed between 2005 and 2007. We have documented increaing numbers of calls from law enforcement personnel.

191. The Truth about AST and ALT in Severe Acetaminophen Overdose

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Background: It is often written that, in cases of acetaminophen (APAP) overdosage, the peak serum aspartate aminotransferase level (max-AST) exceeds the peak alanine aminotransferase level (max-ALT); based on this assumption, most APAP clinical trials have defined "severe hepatotoxicity" as max-AST > 1000 IU/L. We applied population pharmacokinetic analysis to data collected in a large, prospective human clinical trial of patients treated for APAP overdose to re-evaluate the relationship between AST and ALT in cases of APAP-induced hepatotoxicity. *Methods:* We entered data from the original study forms of the *National Multicenter Open Study of Oral N-acetylcysteine for the Treatment of Acetaminophen Overdose* (1976–1985) into a modern database. We then examined 5863 AST levels and 3492 ALT levels from 1142 patients who participated in this trial. We calculated the max-AST to max-ALT ratios at different degrees of liver injury. *Results:* The median [10^{th}, 90^{th} %-iles] for AST was 26 [12, 298], for ALT 21 [8, 561]. Both AST and ALT data were available for 848 of the 1142 patients. Although max-AST exceeded max-ALT in the patient population with less severe hepatotoxicity, this ratio was lower in the population with higher AST (p<0.001, Chi-square).

Max-AST	Patients (%)		Proportion with Max-AST > Max-ALT (%)		Max-AST to Max-ALT Ratio: Median [10^{th}, 90^{th} %-iles]	
Normal range (≤ 40 IU/L)	534	63.0%	396	74.2%	1.38	[0.714, 2.71]
41–1,000 IU/L	235	27.7%	159	67.7%	1.40	[0.610, 4.80]
> 1,000 IU/L	79	9.32%	35	44.3%	0.902	[0.568, 3.25]
All pts with AST & ALT data	848	100%	590	69.6%	1.33	[0.646, 3.00]

Discussion: Re-evaluating data from older trials using modern analytic methods can answer important clinical questions. *Conclusion:* Although the assumption that Max-AST exceeds Max-ALT is true among APAP overdose patients in general, the opposite is true in the population of patients who meet the traditional definition of severe liver injury.

192. Population Exposure Model of Patients Following Acetaminophen Overdose

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Background: Although acetaminophen (APAP) overdosage has been widely studied, no population exposure (PopE) analysis has been reported. *Methods:* We entered data from the study forms of the *National Multicenter Open Study of Oral N-acetylcysteine for the Treatment of Acetaminophen Overdose* (1976–1985) into a modern database. We then evaluated 3952 timed APAP levels from 956 patients who participated in this trial, modeling and then comparing several pharmacokinetic (PK) models using a nonlinear mixed-effects approach with S-ADAPT (v. 1.55). Since reliable dose data were often not available, the modeling assumed 1.0 L/kg volume of distribution. *Results:* Compared to traditional 1, 2, and 3-compartment linear PK models, a 1-compartment model with first order absorption/elimination processes (rate constants: k_a, k_e) and enterohepatic recirculation (fraction: F_{EH}, rate constant: k_t) best described the observed APAP values. The absorption rate constant (k_a) was 0.425 /hr ($t_{½a}$ = 1.63 hr). The elimination k_e was 0.357 /hr ($t_{½e}$ = 1.94 hr), and F_{EH}, 3.38%. Gender, age, and body weight did not have apparent relationship to k_e, but males had a 38% higher F_{EH} than females, suggesting that the fraction of APAP undergoing enterohepatic recirculation may be gender-dependent.

PK Parameter	Population Mean (%SE)[a]		Between-subject variability[b] (%SE)	
dka (hr^{-1})[c]	0.068	15.8%	47.1%	24.1%
k_e (hr^{-1})	0.357	1.7%	33.0%	6.7%
F_{EH} (%)	3.38	7.9%	116%	9.4%
k_t (hr^{-1})	0.339	7.3%	67.8%	14.4%

[a]Percent standard error of parameter estimate; [b]Percent coefficient of variation; [c]$k_a = k_e + dk_a$ to avoid flip-flop phenomenon.

Discussion: To our knowledge, this is the first PopE model developed to describe PK parameters in APAP overdose patients. *Conclusion:* Enterohepatic recirculation of APAP in overdose patients has not been previously described. This analysis represents the first step in developing a useful PK-toxicokinetic model of APAP overdose.

193. Expanding the Consumer Friendly and Culturally Relevant Line of California Poison Control System Education Products

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Background: • 158,693 square miles and 36.5 million residents yet few calls reflecting the multilingual population and infrequent requests for interpreter services in languages other than Spanish • 39.5% of Californian's speak a language other than English at home compared to 17.9% in the U.S. • Los Angeles County is the largest Korean metropolitan area outside Korea, the largest Vietnamese metropolitan area outside Vietnam, and the second largest Chinese

metropolitan area outside China • 26.2% of Armenian speakers and 27.9% of Russian speakers do not speak English very well • 23.5% of Asian and Pacific Island language speakers do not speak English very well • Of the 65,345 Hmong in California, 64% are considered linguistically isolated. *Methods:* • Identify community-based organizations (CBOs) and health care agencies serving the target populations-Armenian, Russian, Japanese, Tagalog, and Hmong • CBOs determined relevant benefits, tone of voice, content and messaging of poison center products based on consumer needs, attitudes, understanding of the issue, and lifestyle • Per the Hmong CBOs advice, photos of a Hmong family were shot in their traditional dress and selected for the materials • A professional translation firm formated the materials into one-page flyers for print and Web • A graphic designers refined the format and layout • A final review was performed by the CBOs and health care agencies before printing. *Results:* Poisoning is an unusual concept in many cultures and requires additional background information that would appear redundant in English and only community members can help manage this issue. *Discussion:* • While California is a large state serving diverse consumer populations, it is still difficult to find agencies and community workers with the necessary skill set to create culturally competent materials for these target groups • The process must stay open, flexible and free of preconceived notions about what consumers might want or need. *Conclusion:* Continue to develop education products that meet the needs of California consumers and build the necessary framework to identify and serve their changing requests over time.

194. Lithium Toxicity Reported over 8 Years to One US Poison Center

Martin TG. *Washington Poison Center, Seattle, WA, USA.*

Background: Lithium (Li) intoxication is commonly reported to poison centers (PC), with the most severe outcomes of prolonged or permanent congnitive sequella or death. Purpose: describe epidemiology of one PC's Li exposures and gather pilot data for multicenter study. *Methods:* Retrospective computerized record analysis with descriptive analysis performed of one PC's human Li (primary coded substance) exposures that resulted in some clinical effect and were evaluated at a health care facility. *Results:* In 557 study cases: Sex: 63% F; Age 35±17yr, 16% ≤18yr, 77% 19–64yr, Reason: 51% suicidal, 23% ADR; Med Outcome: 49.6% mild, 43.8% moderate, 6.5% major, 0.2% death; Clinical Effect Duration: 2% ≤2h, 17% ≤8h, 30% ≤24h, 26% ≤3d, 11% ≤1wk, 3% ≤1mo, 0.5%>1mo; Related Clinical Effects: 3% bradycardia, 10% tachycardia, 2% conduction disturbance, 5% hypotension, 40% drowsy, 9% slurred speech, 14% agitated, 19% confusion, 22% tremor, 0.9% muscle rigidity, 0.9% single seizure, 0.9% multiple seizures, 4.7% elevated Cr, 1.4% oliguria, 1.3% polyuria, 2% renal failure, 1.1% hyperthermia; Therapies Performed: 5.3% whole bowel irrigation, 2.9% vasopressor, hemodialysis 4.3% recommended by PC vs 6.8% not recommended, *Discussion:* Many importart parameters on Li toxicity are not collected in the fields of PC records and require tedious manual chart review. Many of the pertinent clinical effects and therapies were blank in the database. The accuracy of documentation of prolonged or permanent renal or cognitive sequella in PC records is unknown. Even if hospital records were reviewed, their accuracy is also unknown. *Conclusion:* While Li exposures are commonly reported to PC's, the numbers of severely poisoned patients are so few that multicenter studies are required to do meaningful outcome analysis. A prospective study would be the best way to capture essential data on this very common and important type of exposure.

195. A Case of Canine Ingestion of Buzz-Bites Chocolate Energy Chews

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Background: Dogs are attracted to chocolate and will easily eat toxic amounts. Buzz Bites are chocolate chews containing caffeine 100mg, ginseng, taurine, and B vitamins. *Case Report:* A 52.3kg golden retriever was originally reported to have ingested 72 Buzz Bites an hour before. The dog vomited many times and developed seizures before being brought to the veterinarian. At the vet clinic, the dog had tachycardia, panting and a temperature of 108F. The owners then thought the dog had only eaten about 30 Buzz Bites. The dog was soaked with cool water and given a cold water enema to cool the core body temperature. An IV was started, 2 doses of diazepam and IV steroids were given. The dog was too agitated to do an EKG. His temp had decreased to 101.4 F but his heart rate was 220 and he was panting hard. 2.5 hours later, the dog was still vomiting and had diarrhea. Despite supportive care, the dog died about 12 hours after the ingestion. *Case Discussion:* The LD50 for caffeine in dogs is 140 mg/kg. If the dog ate #72 Buzz Bite chews, he ingested 138mg/kg caffeine. If the dog ate only 30 chews, he ingested about 60mg/kg. A "therapeutic dose" of caffeine in dogs is 100–500 mg IM. The theobromine content in the chocolate also contributes to toxicity. Gingseng is usually toxic after chronic use. The other ingredients are not toxic. Symptoms expected from caffeine and theobromine include GI symptoms, diuresis, agitation, tachycardia, hyperthermia, PVCs, tachypnea, ataxia, tremors, seizures, weakness, coma, and hypertension. Hypokalemia develops and death results from cardiac arrhythmias or respiratory failure. This dog exhibited GI symptoms, tachycardia, tachypnea, hyperthermia, seizures and agitation. Treatment recommendations include cooling measures (normal dog temp 102F), benzodiazepines for seizures, antiemetics, IV fluids for hydration, cardiac monitoring if possible, and good supportive care. In this case, it is too late for activated charcoal as much of the product had either been vomited or absorbed. *Conclusion:* Chocolate energy supplements can be especially attractive to dogs. Unfortunately the combination of chocolate and caffeine can also be lethal.

196. Adverse Outcome with Bloodroot Salve Treatment

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Background: Bloodroot ***Sanguinaria canadendid*** is a perennial herbaceous flowering plant native to Eastern North America. Bloodroot liquid flows from the root when cut and coagulates into a thick paste. This paste as well as powdered root contains sanguinarine53 ye: a benzylisoquinoline alkaloid, that is a powerful escharotic. Herbal Practioners prescribe bloodroot for multiple medical conditions from skin lesions to sore throats. We report a case of a patient who treated an unknown skin lesion with bloodroot to untoward effect. *Case Report:* 53 year old male with unremarkable past medical history developped a 5 mm reddish brown papule on his chest, that gradually blackened. After one year and no resolution the patient searched the internet for "herbal cures". The patient obtained and applied Bloodroot Black Salve for 4 hours per day for 10 days until a scar formed. After 6 months the lesion increased in size. The patient resumed the bloodroot treatments, despite the intense pain they caused. After six weeks of treatment the lesion doubled in size and became ulcerated and purulenct, prompting the patient to present to the ED. An excision of the 10cm x 10 cm lesion revealed malignant melanoma. *Case Discussion:* Bloodroot is widely available on the internet and easily purchased. Websites discuss the efficacy of bloodroot in treating skin cancer. Even DrWeill.com recommends it for the removal of moles and skin tags. Our patient utilized internet information to guide management of his skin lesion. The alkaloid sanguinarine's escharotic effect is attributed to inhibition of trancription and nuclear factor K activation as well as through its action on the Na+-K+-ATPase. The ulcerations of the lesion and suprainfection were attributed to the bloodroot application. *Conclusion:* The case describes an attempt to self treat skin lesions with an unregulated internet acquired therapy. Greater awareness of such therapies is essential for the toxicologist and the use of such agents needs to be considered in presentation of skin lesion complications.

197. Pediatric Ziprasidone Ingestion Resulting in Respiratory Failure

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Background: Oral Ziprasidone (ZIP) is an atypical antipsychotic with action at dopamine D2, several serotonin (5-HT 2a/2cd, 5HT 1d, and 5HT 7) and alpha-1 receptors. Isolated pediatric ingestions resulting in the need for significant medical intervention has not been previously reported. We report a case of respiratory failure requiring intubation following ZIP ingestion with confirmatory serum levels. *Case Report:* A 15 month old male presented to the emergency department shortly after his father found him with approximately 5 partially dissolved 80mg ZIP tablets (fathers medication) in his mouth. He was listless and responsive to pain only. Vital signs were BP 103/61, HR 143, RR 20, SpO2 92% and a finger stick blood glucose of 121. The physical exam was unremarkable except for the decreased responsiveness. The ECG showed a sinus rhythm with a QRS of 62 ms and a QTc of 457 ms. Laboratory analysis including a basic metabolic panel, CBC, salicylate and APAP levels were sent and all returned with in normal limits. An EMIT urine drug screen was performed and it was negative for drugs of abuse including benzodiazepines. The patient progressed to respiratory failure and was orally intubated with midazolam and succinylcholine. A comprehensive urine drug screen by gas chromatography/ mass spectroscopy (GC/MS) with a thin layer chromatography confirmation was positive for midazolam only. A serum ZIP level by high performance liquid chromatography/ mass spectroscopy was reported at 330 ng/mL (reference range for 80mg/day is 118 ng/mL). He was extubated approximately 14 hours later and was discharged from the hospital shortly there after with no neurological sequelae. *Case Discussion:* Although sedation is a well known side-effect of ZIP, to our knowledge, this is the first case report of isolated accidental ingestion in a pediatric patient that resulted in CNS depression and respiratory failure requiring emergent intubation. The serum level was consistent with toxicity secondary to this agent and other causes were excluded by urine GC/MS. *Conclusion:* This case emphasizes the importance of close monitoring of pediatric ZIP ingestions as respiratory depression requiring intubation may occur.

198. Simulated Contaminants for Use in External Decontamination Training

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Background: Patients with gross external contamination by hazardous chemicals pose a significant challenge for first responders and emergency department staff. To facilitate training about how to deal with such patients, simulated contaminants are often used for training or evaluation purposes. A good training simulant will be visible for identification and monitoring, require effort to remove, and should not stain. Often training simulants are made using consumer products that are generally regarded as safe. Commercial simulants are costly and are better for advanced training or evaluations. The purpose of this study is to rate consumer products and mixtures that are commonly used as training simulants. *Methods:* A series of potential simulants were evaluated for use in decontamination training. A manikin was moulaged with each of the following simulated contaminants; chocolate syrup (CS), ketchup (K), hair conditioner (C), cooking oil and food coloring, 200:1 mixture (O-FC), or sweetened condensed milk and food coloring, 200:1 mixture (CM-FC) and underwent decontamination. Each simulant was rated by 4 reviewers using a 10 cm visual analog scale (VAS) for global effectiveness, visibility, and difficulty of removal, and yes or no observation was recorded for staining. *Results:* Results are summarized in Table 1.

Desirable simulant characteristic scores

	CM-FC	O-FC	CS	K	C
global*	9.25	6.38	7.30	6.93	3.80
visibility*	9.15	8.43	8.95	8.88	5.58
removal*	7.5	7.55	5.75	2.28	1.55
stain	n	y	n	n	n

*mean VAS score.

Discussion: All of the compounds except C were felt to be at least moderately effective training simulants. CM-FC had the highest global rating mean VAS (9.25 + 0.15 sem, $p<0.001$). CS was 2nd best overall. O-FC was desirable in terms of visibility and removal but had problems with staining. K and C were felt to be too easily removed. Reviewers also worried that K might be confused with simulated blood. *Conclusion:* Of the potential training simulants evaluated in this study the 200:1 mixture of sweetened condensed milk and food coloring seemed to provide the most desirable characteristics. Importantly, it did not lead to staining of manikins.

199. Use of Olanzapine for Emergency Management in the Agitated Pediatric Patient

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Background: Treatment of agitation(AG), posing a safety risk to the patient(pt) and caregiver, is problematic in pediatrics. Benzodiazepines are the mainstay of treatment in most emergency pts. Olanzapine(OL), is an alternative used in AG adult psych patients. This use is considered off-label in children. We present the first study describing the use of OL in pediatric pts presenting with AG, violence or psychosis to the emergency department(ED). *Methods:* A 3 year retrospective study of pts <18 yrs of age given OL for treatment of AG in a pediatric ED was performed. Data obtained included:age,race,PMH,PE,VS, medication(med) given, drug effect, adverse events, & disposition. *Results:* 63 pts were identified:aged 3–17 yrs. 67% were <13 yrs. 70% male, 57% Caucasian, 80% had psych diagnoses. Concurrent meds included:risperidone-18%, valproic acid-17%, quetiapine-16%. Chief complaints were: altered mental status (AMS) (6.3%), violent behavior/AG (85%), suicidal (9.5%). PE revealed: AMS (3.2%), AG (82%), violent (75%), combative (25%). 14% pts required physical restraints. 100% were given OL orally. 80% received ≤5mg of OL. 37% required a second med (OL-86%, haloperidol-13%, lorazepam-1%). 5 pts had minor alterations in VS. 71.5% reported decreased agitation with 1 dose of OL. 1pt developed hypotension, resolving with IVF. There were no statistical differences between pts with & without known psych disease or concurrent neuroleptic med use with respect to drug doses, efficacy, or adverse events. *Discussion:* Pt. calming & drug safety are desired outcomes in treating AG. All pts were given OL orally, a benefit in chidren. Our study revealed 71.5% had reported decreased AG with 1 dose,but not necessarily effective calming. 1pt developed hypotension, resolving with IVF. Limitations were: retrospective nature of the study, small pt. number,difficulty in determining drug effect, adverse events concisely & long term outcomes. *Conclusion:* OL appears to be a safe & effective orally administered med in the treatment of the AG/violent pediatric pt. No pt developed a serious adverse event. Prospective studies are needed to verify this result. We recommend caution in the use of OL in pts taking neuroleptic drugs & in those with undifferentiated AMS.

200. A Case of Atrial Fibrillation Associated with the Administration of Acetadote®

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Background: N-acetylcysteine (NAC) is widely used for acetaminophen (APAP) toxicity. Since the 2004 FDA approval of Acetadote®, the intravenous (IV) formulation of NAC, many physicians prefer IV administration due to the ease of use and decreased incidence of vomiting. Despite the growing popularity of Acetadote®, IV NAC administration is associated with an increased incidence of adverse events. The most commonly reported event is anaphylactoid reaction. Some have reported cases of sinus tachycardia, but these cases are associated with signs of allergic reaction. We report a case of Acetadote® administration causing new onset atrial fibrillation (AF) without signs of allergic reaction. *Case Report:* A 22 year-old female with no significant past medical history presented after a reported ingestion of APAP extended relief preparation in a suicide attempt. The patient was asymptomatic upon arrival. Acetaminophen levels at 4 and 9 hours post-ingestion were 21.9 and 73.5 mg/L respectively. An EKG demonstrated a normal sinus rhythm of 79 beats per minute. Acetadote® was administered at recommended doses. Shortly after initiating a loading dose of 150 mg/kg, the patient complained of palpitations. An EKG performed at that time revealed AF with a ventricular response of 93 beats per minute. The patient had no signs or symptoms of allergic reaction. Cardiac monitoring confirmed sustained AF for the next 10 hours while the infusion was continued. Within 40 minutes of discontinuing Acetadote®, cardiac monitoring demonstrated a return to normal sinus rhythm. *Case Discussion:* Anaphylactoid reactions occur in up to 20% of cases of Acetadote® administration. There are few reports of cardiac arrhythmias, and all of these cases are tachycardia (not otherwise specified). One report demonstrated resolution of tachycardia after Acetadote® administration with diphenhydramine. This suggests an underlying allergic pathophysiology. To our knowledge, there are no reported cases of Acetadote® causing cardiac arrhythmias other than tachycardia. *Conclusion:* We believe this is the first case report of Acetadote® associated with the induction of AF.

201. *Amanita smithiana* Mushroom Ingestion: A Case of Delayed Renal Failure

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Background: Amanita phalloides, which causes liver failure, causes 90% of deaths in the United States attributed to mushrooms. In the Pacific Northwest, we are seeing the emergence of a new pattern of mushroom ingestion, attributed to *Amanita smithiana,* in which isolated renal failure has been the predominant symptom. *Case Report:* A 55 year old male ate raw wild mushrooms in a salad and presented to the ER within 6 hours with severe nausea and vomiting. His vital signs were stable with a BP 133/92 mmHg, HR 84 bpm, RR 12, Temp 95.9 degrees F, O2 Saturation 98% on room air. His ED labs were significant for a normal a BUN of 14, and a creatinine of 1.0. Transaminases were elevated with an AST of 56 (nl 9–40) and an ALT of 131 (nl 14-72). Treatment was initiated on day #2 with N-Acetyl Cysteine, charcoal, penicillin, and milk thistle extract on the presumption that this was an amanitin-toxin containing mushroom and did not seem to inhibit the progression of his renal failure. He ultimately required dialysis that was started on Day #4 with a creatinine of 6.5 mg/dL, which ultimately peaking on day #7 at 10.2 mg/dL. We were able to obtain a positive mushroom identification by a mycologist. The patient was discharged from the hospital for outpatient dialysis on HD #10 and dialysis catheter was removed 39 days after ingestions with a creatinine at that time of 1.4 mg/dL. *Case Discussion: Amanita smithiana* has a specific toxicologic profile, which shows early GI toxicity and delayed onset of renal insufficiency. Renal injury was detected 1 day after presentation by BUN and Cr measurement. This pattern is unique compared with most commonly described toxic mushroom ingestions. *Conclusion:* We describe a case of *Amanita smithiana* poisoning with detailed lab data and clinical course. Clinicians should be aware of the increasing prevalence of this mushroom ingestion, and the need to monitor renal function in such an ingestion.

202. Significant Toxicity Due to Phentermine Ingestion by Young Children: A Case Series

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Background: Phentermine is a schedule IV amphetamine that is FDA approved as an appetite suppressant to treat obesity in adults. Phentermine exposures in children are thought to be benign in nature. This case series details 8 children who had significant toxicity due to unintentional phentermine ingestion. *Case Report:* PCC records for a 7 year period were filtered for pediatric phentermine exposures; there were 71 exposures in this age group (<6 yr) with follow up during this period. 8 patients (11.3%) had significant symptoms. The ages of the 8 patients ranged from 11 months to 3 yrs. There were no coingestants in any of the cases. Significant symptoms observed were HR above 180(2), hemetemesis(1), agitation/inconsolable(8), elevated CK(2), hallucinations(2), dystonic reaction(2), and insomnia(4). 5 children required treatment with benzodiazepines, 1 received activated charcoal. Duration of symptoms ranged from 9–35 hours. Doses reportedly ingested by history ranged from 30 mg to 225 mg. Severity of symptoms did not appear to be dose related. 2 patients were admitted to PICU, 1 was admitted to an intermediate care unit, 2 were admitted to a general pediatric floor, 2 were released from ED after observation, and disposition was unclear in 1 patient. *Case Discussion:* 11.3% of all phentermine exposures in children < 6 years of age reported to a PCC during a 7 year period had significant symptoms. 7% of children required treatment with benzodiazepines and an equal amount required admission to the hospital. *Conclusion:* This case series indicates that phentermine exposures may not be as benign as frequently thought. Young children ingesting phentermine, especially in doses ≥30mg should be monitored closely for toxicity. Phentermine ingestion may require hospital admission and/or treatment with benzodiazepines.

203. Treatment of Severe Pediatric Ethylene Glycol Intoxication with Fomepizole Alone

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Background: Fomepizole is routinely used in the treatment of ethylene glycol (EG) toxicity and may obviate the need for hemodialysis in selected cases. Recently, an EG level of >50 mg/dl (8 mmol/L) as an independent criterion for hemodialysis has been challenged. Clinical criteria, such as acid-base status, renal function, and hemodynamics, are more relevant in determining the need for hemodialysis. This is of particular significance in the pediatric population, for whom such invasive procedures are even less desirable than in adults. There is a paucity of published supporting data for this approach. We report a case of a large pediatric EG ingestion treated with fomepizole alone. *Case Report:* A 15 year-old male presented to the emergency department 90 minutes after intentional ingestion of ~500 mls of EG. The patient appeared mildly inebriated and vital signs were normal except for sinus tachycardia. Initial blood chemistry was normal with a venous pH of 7.35, HCO3 21.3, creatinine 1.1 mg/dL (95 umol/L) and an anion gap of 15.7. Peak EG level was 459 mg/dl (74mmol/L) and ethanol level was negative. Within 10 minutes of arrival, fomepizole was administered as per protocol. During hospital admission, acid-base status and blood chemistry remained within normal limits. No complications relating to renal dysfunction or hyperosmolar state developed. No adverse event from fomepizole was recorded. The patient was discharged 78 hours post ingestion with a negative EG level. *Case Discussion:* Due to the early presentation and rapid treatment with fomepizole, our patient did not develop any complications from the EG ingestion. To our knowledge, this patient had the highest published EG level in a pediatric case. The management and outcome of this case reinforces the general consensus that, in selected cases, fomepizole may reduce the need for hemodialysis, even in the context of extremely elevated EG levels. *Conclusion:* Avoidance of invasive procedures, such as hemodialysis, is especially important in the pediatric population. We report a case of successful treatment of intentional pediatric ingestion of EG with fomepizole alone, despite the high EG level of 459 mg/dL.

204. Recommendations Vary Dramatically on the Use of Sodium Bicarbonate for Aspirin and Tricyclic Anti-Depressant Toxicity

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Background: Sodium bicarbonate (NaHCO3) is commonly used for aspirin (ASA) & tricyclic antidepressant (TCA) toxicity. However, recommendations (recs) seem to vary on the details of its use. The study purpose was to compare recommendations from various medical sources on the use of NaHCO3. *Methods:* The 16 sources included texts from Medical Toxicology (MT), Emergency Medicine (EM), & Critical Care (CC); & the position paper on urine alkanization from AACT/EAPCCT. *Results:* We found significant variations in the treatment & monitoring regimens. For ASA - There were 10 different indications to use NaHCO3! The dose recommended by every text but one (7–45 mEq/hr) was not close to that proposed by the AACT/EAPCCT urine alkalinization position paper (225 mEq over 1st hr). 64% pertinent sources recommended a bolus before infusion. Only 4/9 MT sources provided indications to stop the infusion. 8/9 MT sources recommend monitoring serum pH; personal experience is that few do so. Recs on K monitoring and supplementation were quite variable. For TCA – There were 17 different indications to use NaHCO3! The indications to repeat a bolus were just as varied. Recommendations about doing a bolus after a bolus were very contradictory; of 8 MT sources, 4 supported, 3 did not, and 1 was unclear! 7/8 MT sources recommended serum pH monitoring. Relative to indications to stop an infusion; of the MT sources, 6 provided diverse recommendations and 2 gave no recommendations. *Discussion:* Our study demonstrates the wide variety of indications for use and monitoring of NaHCO3 from different medical informational texts. This contributes to the confusion regarding the optimum use of this antidote. *Conclusion:* There are significant variations in the recommendations from different textbooks & the urine alkalinization position paper on how to use NaHCO3 for ASA and TCA toxicity. This likely reflects the need for further research on the optimal use of NaHCO3 for treatment.

205. Use of Clinical Data-Sets in Mushroom Exposure Management

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Background: Clinical data-sets are used widely by poison centers for case management, documentation, and quality assurance. We examine the use of a poison center's mushroom clinical dataset over a three-year period. Our objective was to determine if the use of a data-set enhanced the data collected and improved consistency of case documentation by poison center phone staff. *Methods:* General clinical guidelines for the evaluation and management of mushroom ingestion were established. The clinical data-set arising from this guideline was used

to create a Toxicall® key-cut consisting of 9 questions. All mushroom cases occurring during May for a three-year period were reviewed to quantify documentation for each of the nine questions. *Results:*

3 year mushroom data-set analysis

	2005 (n = 28)	2006 (n = 9)	2007 (n = 15)
Annulus present?	64%	88%	93%
Cup present?	57%	88%	87%
Gill color?	71%	88%	87%
Gills attached?	43%	88%	80%
Patches on the cap?	11%	88%	87%
Digital photo possible?	0%	78%	60%
Time of Ingestion?	43%	56%	100%
S/Sx?	96%	100%	100%
Location found?	39%	44%	80%

Discussion: In 2005, a clinical data-set for the management of mushroom exposures was introduced. Data-set elements were tallied monthly for each study year to quantify data-set usage and completeness. At annual training sessions, phone staff were informed of the results and reminded to utilize the Toxicall® key-cut for all mushroom cases. In 2006, documentation of all nine data elements showed significant improvement from the baseline year. From 2006–2007, documentation of four of the nine data elements (44%) showed further improvement over the previous year, documentation of three data elements (33%) remained essentially unchanged, and documentation of two of the data elements (22%) declined. Monthly data analysis, staff education, and the Toxicall® key-cut were factors responsible for improvements seen in data-set documentation over the study period. *Conclusion:* The use of clinical data-sets improved data collection and facilitated consistent documentation by poison center phone staff. Ongoing staff education was important to improve and maintain the quality and consistency of data collection.

206. Clonazepam Induced AV Block

Arroyo AM, Kao LW. *Indiana University School of Medicine, Indianapolis, IN, USA.*

Background: Childhood arrhythmias are uncommon. We present a case of AV block with clonazepam exposure. *Case Report:* A 4 year old was found unresponsive with a near empty clonazepam bottle. He required bag mask ventilation for respiratory depression. In the emergency department, he was limp with shallow respirations and pinpoint pupils. He moaned in response to commands. His symptoms reversed with flumazenil. He was transferred to our PICU after developing 1st degree AV block (PR 206ms). On admit, heart rate was 137 beats/minute and blood pressure was 97/78mmHg. He was awake and playful but ataxic. Repeat EKG showed 1st degree AV block (PR 284ms). He followed commands and answered questions appropriately. Overnight, his rhythm changed to 2nd degree AV block (Mobitz type 1). By morning, EKG abnormalities resolved. Serum clonazepam was 478ng/mL (normal 30–60 ng/mL). A comprehensive urine drug panel (CDP) was sent to rule out coingestion. This was positive for caffeine but negative for cardiovascular agents, and the other medications available in the home. However, he did not demonstrate symptoms consistent with caffeine overdose (tachycardia, rritability, emesis, fever, and convulsions). His ataxia improved and he was discharged on day 4. *Case Discussion:* We report 1st and 2nd degree AV blocks with clonazepam exposure. Here, our patient demonstrated EKG changes despite symptom reversal with flumazenil administration. This may represent a unique effect of high dose clonazepam exposure not corrected by flumazenil. *Conclusion:* This case identifies the potential arrhythmogenicity of clonazepam.

207. CEN Standard (EN 15178) for Improvement of Product Identification in Poison Centers

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Background: Last data of the European Commission indicated that the European poison control centers handle at least 1,000,000 poison calls per year. Approximately 20–40 % of the inquiries addressed to poison centres cause problems with regard to the identification of products. Especially in emergency situations, it is of particular importance to find the exact composition of a product immediately to provide the patient with a tailor-made medical treatment in time. Since BfR investigations showed that the product name is inapplicable for distinct product identification, there is a need to find a clear-cut product identification area and elements on products. *Methods:* After first proposals for a product identification-area/-elements on product labels at the E.A.P.C.C.T Congress in Amsterdam (2000), a German standardization committee was founded in April 2001. The project was initiated by the BfR and supported by the German Ministry for the Environment, Nature Conservation and Nuclear Safety. Results: After the German DIN Standardization Draft in 2003, the document was submitted to the European Committee for Standardization (CEN). From November 2003 onwards, a CEN working group started to design a European standardized Product Identification Project. *Results:* The final document was published in November 2007 and provides the user with significant information for a fast identification of products in case of emergencies. A graphical symbol ("i") has been determined and standardized followed by an unambiguous element of product identification. This element may consist of the product/brand name, the corresponding number of product, registration number etc. *Discussion:* In any case, the identification element shall refer unambiguously to the registered formulation. The graphical symbol combined with the identification element will form the area of product identification, which should be located close to the barcode whenever possible, in order to facilitate identification. *Conclusion:* For an international harmonization, the BFR will give proposals for a simply and understandable identification element.

208. Clinical Course of Repeated Supratherapeutic Ingestion (RSTI) of Acetaminophen (APAP)

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Background: RSTI of APAP (APAP ingestion of > 4g/day over a period of > 8 hours in adults) is an important cause of APAP-related morbidity and mortality. The purpose of this study is to describe the characteristics and course of patients with RSTI. *Methods:* RSTI patients were identified from an ongoing multicenter retrospective study of the safety of N-acetylcysteine (NAC). Data collected included demographics, serum APAP, alanine aminotransferase (ALT), INR, coingestants, comorbidities and outcome. These factors were analyzed for any correlation with the development of hepatotoxicity (ALT>1000 IU/L) or transplant/death. All patients were treated with IV or oral NAC. *Results:* 100/433 (23%) patients enrolled were RSTI. The mean age was 40.7 (±15.4 SD), 61 patients (61%) were female, 64% were Caucasian, 31% were alcoholics, 5% were malnourished, 12% had viral hepatitis, and coingestants included ethanol, opioids, and antihistamines (19%, 48%, and 20%; respectively). 38 patients (38%) developed hepatotoxicity; there was 1 transplant and 4 deaths. Alcoholism was associated with increased risk for death or transplant (χ^2 test; p=0.002); all transplants or deaths occurred in alcoholics. The lowest baseline ALT level associated with hepatotoxicity was 131 IU/L. Risk of hepatotoxicity increased with history of ethanol coingestion (RR 1.7; 95% CI 1.1–2.8), alcoholism (RR 2.8; 95% CI 1.7–4.4), viral hepatitis (RR 1.7 95% CI 0.9–2.9), and presenting APAP < 20 (RR 1.4 95% CI 0.8–2.3). *Discussion:* No other demographic factors, coingestants or comorbidities were associated with risk of death, transplant, or hepatotoxicity. Presenting INR level did not predict risk of death, transplant or hepatotoxicity. Our presenting ALT of > 50 IU/L associated with hepatotoxicity was similar to prior published data. *Conclusion:* RSTI patients who developed hepatotoxicity presented with an abnormal ALT. Alcoholism was associated with increased risk of death. Clinicians should be aware of these risk factors to identify those patients at risk for poor outcomes and hepatotoxicity.

209. Colchicine Toxicity and Fatality among Hospital Patients

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Background: Colchicine (COLC) is commonly used for treatment of gout and less commonly for other indications. It has a narrow therapeutic index with potential for severe or fatal toxicity. Objectives: To a) review in-hospital deaths among patients who received COLC during the same admission for signs of COLC toxicity; b) determine the number of deaths related to COLC use; c) determine whether COLC dosing adhered to established guidelines. *Methods:* Setting: Urban, tertiary care, 900 bed, university hospital. Study design: IRB approved, retrospective chart review. Subjects: In-patients who received COLC and died during the same admission between 1 Jan 2000 and 28 Feb 2007. We recorded age, sex, weight, admission and peak serum creatinine, AST, ALT, total bilirubin, INR, and albumin, and concurrent use of other medications known to bind P-glycoprotein. We evaluated charts for signs of COLC toxicity including: nausea, diarrhea, leucopenia, thrombocytopenia, lactic acidosis, hypotension, peripheral neuropathy, and myopathy. We recorded negative stool studies for enteric pathogens as a surrogate marker for diarrhea. We recorded use of any anti-emetic as a surrogate for nausea. We calculated creatinine clearance for each patient. A rheumatologist, an infectious disease specialist, and a toxicologist reviewed each case. The panel classified the likelihood of COLC toxicity and the likelihood of a causal role of COLC in the death using the WHO classification system. *Results:* Thirty-six patients met inclusion criteria in the 86 month period. Toxicity was unlikely in 19/36, possible in 8/36, probable in 5/36, and certain in 4/36. A contributing role for COLC in causing death was unlikely in 23/36, possible in 7/36, probable in 3/36, and certain in 3/36. COLC doses exceeded the accepted range for 15/36 patients including 11/17 cases of toxicity and 10/13 cases of death classified as possible or higher. *Discussion:* Use of colchicine requires greater awareness of its potential for toxicity and death. *Conclusion:* Colchicine toxicity was frequent in this in-patient cohort and may have contributed to over one-third of the deaths in this cohort. Inappropriate dosing of colchicine occurred frequently and was related to toxicity and death.

210. Epidemiology of Stevens-Johnson Syndrome and Toxic Epidermal Necrolysis in a Regional Burn Center, 1983–2006

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Background: Adverse drug reactions are an important cause of morbidity and mortality. Stevens Johnson Syndrome (SJS) and Toxic Epidermal Necrolysis (TEN) are rare forms of a hypersensitivity reaction with a mortality rate of up to 35%. We looked at the epidemiology and outcomes of SJS/TEN in a regional burn center from 1983–2006. *Methods:* The patient database for a regional burn center was searched from 1983 to 2006 for cases of SJS/TEN and divided in two decades. All cases of suspected SJS/TEN admitted to this center during the study period were included. *Results:* During this period, there were a total of 128 reported cases of SJS/TEN. There were 34 cases in the 1983–1993 period and 94 cases in the 1994–2006 period. In the first period, there were 8 cases of SJS and 26 of TEN, with an average affected body surface area (BSA) of 56%. The drug categories causing the syndrome were: anticonvulsants (n=11), anti-infectives (n=6), hormonals (n=2), allopurinol (n=5), several agents involved (n=2), and unknown (n=8). The average length of stay (LOS) was 26 days. The mortality was 38%. In the second period, there were 20 cases of SJS and 74 of TEN, with an average affected BSA of 49%. The drug categories causing the syndrome were: anticonvulsants (n=17), anti-infectives (n=41), NSAIDs (n=6), allopurinol (n=6), antihypertensives (n=3), chemotherapeutic agents (n=2), and unknown (n=19). The average LOS was 13 days. The mortality was 30%. *Discussion:* The causative agents differ between periods, with anticonvulsants most common cause prior to 1994, and antibiotics after 1993. This may be due to a difference in frequency of antibiotic prescription rates or different safety profiles between older and newer drugs. In the later time period, there was lower mortality, shorter LOS, and less affected BSA. This probably reflects more awareness of the disease, earlier recognition, referral to specialized centers, and advances in care. *Conclusion:* SJS and

TEN continue to be relatively rare. The anti-infectives have become more common causes of the syndrome. The last decade has seen decreased mortality, decreased LOS, and less affected area of skin.

211. Serum Acetaminophen (APAP) Levels, Intravenous N-Acetylcysteine (IV NAC) Infusion Rate and Risk of Anaphylactoid Reactions (AR)

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Background: Studies report lower APAP levels and rapid IV NAC infusion predispose patients to AR; however, evidence for this is still inconclusive. We measured the rate of AR from IV NAC administered fast and slow in patients with various APAP serum concentrations. *Methods:* Patients were identified from a multi-center retrospective safety study of NAC. Chart reviews were double abstracted by trained abstractors using a standardized form. They were divided into four groups based upon initial APAP levels: 0, 1–20, 21–70, and ≥ 71 mcg/ml. AR were defined as any of the following: bronchospasm, stridor, angioedema, hypotension, pre-syncope or syncope, pruritus, flushing, urticaria, non-urticarial rash, tachycardia, chest tightness, or anxiety. Rates of related AR were compared among the APAP concentration groups and stratified by loading dose infusion time ≤ 59 minutes (fast) and ≥ 60 minutes (slow). *Results:* A total of 269 patients received IV NAC. Serum levels were not available for 9 patients and 35 patients did not have an infusion rate recorded. Fifty patients received the infusion ≤ 59 minutes and 184 ≥ 60 minutes. A total of 225 patients were included in the analysis. There were 28 related AR. Infusions ≥ 60 minutes had a higher rate of AR however the difference was not significant (χ^2 p=0.96).

Table 1:

Serum APAP mcg/ml	AR ≤ 59 min	AR ≥ 60 min
Overall	5/47 (10.6%)	23/178 (12.9%)
0	0/10 (0.0%)	2/34 (5.9%)
1–20	2/4 (50.0%)	4/26 (15.4%)
21–70	3/12 (25.0%)	10/50 (20.0%)
≥ 71	0/21 (0.0%)	7/68 (10.3%)

Discussion: Some literature suggests lower serum APAP levels and expeditious IV NAC infusion predisposes patients to AR. Our data challenge this paradigm. *Conclusion:* AR are uncommon during IV NAC infusion and do not appear to be related to APAP concentration or rapid infusion rate.

212. Declining Presence of Syrup of Ipecac in the Home: Analysis of Questionnaires Prior to and Following the 2003 Publication of the AAP Policy Statement on Poison Treatment in the Home

Judge BS, Trestrail III JH. *Helen DeVos Children's Hospital Regional Poison Center, Grand Rapids, MI, USA.*

Background: The Annual Report of the American Association of Poison Control Centers' National Poison Data System does not comment on the number of households in which syrup of ipecac is present. We sought to determine the percentage of households in which the emetic was present either before or after a toxic exposure. Our secondary aim was to uncover any trend regarding the presence of ipecac in the home since the American Academy of Pediatrics (AAP) placed a moratorium on its routine use as a home treatment strategy in 2003. *Methods:* A retrospective review of data from "Public Comment Cards" received by our poison center from 1/1/1999 to 12/31/2007 was performed. Data from calendar year 2000 was excluded since only 35 responses were received and no analysis of responses was completed that year. The cards were mailed to as many users as possible and included the following questions: 1) "Did you have ipecac syrup?" 2) "Do you have ipecac syrup now?" Responses were categorized as "Yes", "No", or "No answer" and entered into a database. *Results:* A total of 1865 responses were received from 1999 and 2001–2007. In 1999, 65% of respondents said they had ipecac prior to an exposure versus 68% after an exposure. In 2007, 15% of respondents said they had ipecac prior to an exposure versus 24% after an exposure. Every year studied, except 2003 (−2.9%), saw an increase (mean = 7.7%) in the percentage of respondents reporting the presence of ipecac after an exposure. From 1999–2003 the mean change in year-over-year percentage for the presence of ipecac prior to and after an exposure was −5.3% and −7.3%, respectively. From 2004–2007 the mean change in year-over-year percentage for the presence of ipecac prior to and after an exposure was −8.5% and −5.5%, respectively. *Conclusion:* The presence of ipecac within households serviced by our poison center has declined drastically since 1999. This decline was ongoing prior to the publication of the AAP Policy Statement on Poison Treatment in the Home. A number of individuals continue to purchase syrup of ipecac after a toxic exposure has occurred in their home.

213. Seizure Associated with Tramadol Use/Abuse

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Background: Tramadol as a centrally acting opioid-like analgesic with serotonine reuptake inhibition property is one of the most prescribed analgesic in the world.We assessed incidence of seizure as one of its important adverse effects in patients. *Methods:* In a cross sectional study, 215 cases of tramadol user/abusers were recruited and followed for occurrence of seizure in Loghman-Hakim Hospital Poisoning Center (LHHPC) in Tehran in a period of 5 months from Apr 2007 to Sep 2007.The demographic, clinical data were collected. In seizured patients brain CT scan and EEG were performed. Mean tramadol dose was compared between patients with/without seizure. *Results:* 169 patients with mean age of 22.5 years and M/F ratio of 72.1/37.9 percent were included.

Frequency of different age groups among patients with seizure

Age group	Number of patients
10–20 years old	77
21–30 years old	70
31–40 years old	11
41–50 years old	3
51–60 years old	1
>60 years old	7

Eligible patients=169.

Seizures occurred within 24 h after tramadol use in 62 (36.7%). 35 patients had generalized tonic-clonic seizure. Benzodiazepines were the most common drug used with tramadol. Frequency of seizure in males was higher than females. *Discussion:* The high frequency of seizure (36.7%) is remarkably different from others. Mean tramadol intake dose was 2322 mg which is much higher than usual overdose range.Most of the subjects showed seizure in the 24-hours period post consumption of tramadol while Marquardt et al reported that 84.6% of seizures occur within 6 hours. The minimum dose of tramadol-associated seizure was 100 mg while it has been reported 200 mg in other studies with a dose range of 250–2500 mg. *Conclusion:* Frequency of seizure in patients with tramadol use/abuse admitted at LHHPC was higher than literature data.

214. Assessing Health Insurance Coverage for Callers to a Regional Poison Center: Has the Time Come for Insurers To Foot the Bill?

Judge BS, Eisenga BH, Trestrail III JH. *Helen DeVos Children's Hospital Regional Poison Center, Grand Rapids, MI, USA.*

Background: Poison centers in the United States continuously face challenges in maintaining adequate funding to sustain operations despite significant savings imparted to the American health care system. One option to offset dwindling resources available to poison centers is to bill third-party payors. To date, no large scale study has been performed to gauge what type of health insurance coverage users of a poison center may have. Our aim was to determine the types of health insurance coverage for callers who utilized our poison center over a one-year period. *Methods:* We conducted a prospective survey of all callers to our regional poison center from 1/1/2000 to 12/31/2000. Specialists in Poison Information were instructed to ask for the caller's type of health insurance at the end of their call. Responses were entered into a database and categorized as follows: 1) type of insurance; 2) declined information; 3) not applicable; 4) missing or no information; 5) no insurance coverage; and 6) unknown type of insurance. *Results:* A total of 45,627 calls were received during the study period. Information was available for 89% of calls (n = 40,619) and missing or not available for 11% of calls (n = 5008). Of the calls for which information was available 39.1% (n = 15,901) had unknown type of insurance, 36.4% (n = 14,788) had insurance, 21.6% (n = 8764) were not applicable, 2.8% (n = 1123) had no insurance, and 0.1% (n = 43) declined information. Of the 14,788 callers with insurance 76.1 % (n = 11,251) had private insurance, 19.6% (n = 2898) had Medicaid, and 4.3% (n = 639) had Medicare. *Conclusion:* A substantial number of callers to our regional poison center reported having insurance or unknown type of insurance. Billing third-party payors for utilization of poison center services remains a feasible option but needs to be explored further. We plan on performing a follow-up survey to determine if there has been any significant change in the number of callers with health insurance coverage.

215. Evaluation of Completeness of Selected Poison Control Center Data Fields

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Background: Poison control center data are used extensively in research and surveillance. However, there is limited information on the completeness and accuracy of such data. *Methods:* In May 2007, investigators identified the most recent 1,000 records in a poison control center's database that involved human exposures where the medical outcome was moderate effect, major effect, or death. For each reported substance, investigators reviewed the PoisIndex code to determine if it was an exact match to the Verbatim text field. The investigators reviewed the Notes text fields and identified any mention of reportable clinical effects or treatments then determined whether these were also indicated in the clinical effects and treatments checkbox fields. *Results:* After 36 records were excluded from the study, 964 remained. Of 1,518 substances listed in these records, the PoisIndex code was considered an exact match to the Verbatim field for 91.4% of the substances, not an exact match for 8.2% of the substances, and missing for 5 substances. Of the 4,144 clinical effects identified in either the Notes field or the checkboxes, 27.4% were found in only the Notes field, ranging from 18.0% for dermal effects to 49.2% for renal effects. Of the 3,755 treatments identified in either the Notes field or the checkboxes, 17.6% were found in only the Notes field, being 10.5% for decontamination and 20.4% for other treatments. *Discussion:* A high proportion of PoisIndex codes were exact matches to the reported substances. Although the majority of reported clinical effects and treatments were recorded in the checkboxes, large proportions were not. *Conclusion:* Poison control centers need to determine the completeness and accuracy of data recorded in non-text fields. Unless the completeness and accuracy of such fields can be assured, researchers may need to also have access to text fields.

216. Impact Factors, H Indices, and Citation Analyses in Toxicology Journals

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Background: Academic departments and funding sources are increasingly interested in quantifying the academic productively of individual researchers. In doing so, the impact factors and h indices of journals in which a researcher has published have gained more attention. The aim of this study was to identify and analyze the mostly frequently cited journals in the field of medical toxicology, as well as to determine the trend of journal impact factors and h indices from 1999 to 2006. *Methods:* Journal Citation Reports was searched for category of Toxicology for years 1999 and 2006. For all Toxicology journals, the impact factors from 1999 and 2006, and the h indices were recorded. 27 of the journals most applicable to medical toxicology were included for further analyses. *Results:* In 1999 a total of 74 journals were listed in the Toxicology category of JCR; in 2006 the number increased to 76. There were 6 new Toxicology journals created between 1999 and 2006, and 10 journals ceased publication. Two journals were each split into 3 new journals. One journal was added to the Toxicology category between 1999 and 2006. Seven of the original 74 journals (10%) changed titles during the 7 years. The 27 journals deemed most relevant to clinical toxicology had a mean impact factor of 1.54 in 1999. By 2006 the mean had increased to 2.01. The entire JCR Toxicology category had a mean impact factor of 1.69 and 2.24 in 1999 and 2006, respectively. *Discussion:* Overall, toxicology journals have low impact factors and h indices. This fact is likely multfactorial. First, the number of medical toxicologists is small, leading to few researchers. Second, the subject matter of toxicology is enormous, overlapping with many other scientific specialties. Third, perhaps journals with low impact factors are destined to have low impact factors indefinitely, as researchers seek to publish their results in journals with high impact factors. *Conclusion:* Overall, toxicology journals have low impact factors. As academic promotion boards increasingly use semi-quantitative methods of determining productivity, it may be expected that Toxicology journals will see decreased submissions, as authors attempt to get work published in journals with higher impact factors.

217. Serious Toxicity in an Infant Due to Ingestion of 1 mg Risperidone

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Background: There is limited experience with acute unintentional risperidone overdose in patients < 6 years of age. We report a case of risperidone ingestion by an infant with confirmed serum levels that resulted in serious toxicity. *Case Report:* A 6-month-old, 3.9 kg girl with a history of caudal regression syndrome, sacral agenesis, and otitis media was given a 4 oz. bottle that contained 2 mg of risperidone instead of amoxicillin. The child drank 2 oz. (estimated dose 1 mg, 0.5 mg/kg) and within one hour presented to the ED lethargic with miotic pupils. Her vital signs were: heart rate 135 beats/min, blood pressure 90/40 mm Hg, temperature 98.9 F, and respiratory rate 30 breaths/min. Six hours after presentation her blood pressure decreased to 54/41 mm Hg, which increased to 90/48 mm Hg after a fluid bolus (20 ml/kg, NS). During this time she was listless with intermittent stiffening and shaking of extremities. EKG revealed sinus tachycardia (169 beats/min), QRS interval 60 ms and a prolonged QTc of 462 ms. A serum risperidone concentration obtained 7 hours post-ingestion was 13 ng/ml and active metabolite 9-hydroxyrisperidone was 158 ng/ml. 24 hours after presentation, she was alert, interactive with no muscle rigidity but continued to have constricted pupils. *Case Discussion:* Our patient demonstrated miosis, lethargy, hypotension, muscle rigidity, and prolonged QTc after ingestion of a borderline referral dose of risperdone according to the AAPCC atypical antipsychotic management guideline (>1mg). This is the first documented risperidone serum concentration after a pediatric ingestion and is consistent with the reported dose. *Conclusion:* This case demonstrates the potential for moderate to severe risperidone toxicity in infants near the guideline referral dose.

218. Retrospective Review of Modafinil Toxicity

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Background: Modafinil, a non-amphetamine stimulant, is used for narcolepsy, sleep apnea and shift work sleep disorder. There are no large case reports or case series on modafinil overdose. *Methods:* Retrospective multicenter case series from 11 States of all patients with a single substance ingestion of modafinil with follow up to a known outcome for the years 2000–2007. *Results:* There were 137 patients of which 85 (63%) were female. Ages ranged from 1 to 82 years with a mean and median of 22 years (+ 18) and 20 years respectively, with 43 patients (31%) < 6 years. Most frequently reported clinical effects were tachycardia (n=38), insomnia (n=33), agitation (n=23), dizziness (n=25) and anxiety (n=24). Forty-five patients were managed at home and 90 in a HCF, with only 23 (17%) requiring a medical admission. Medical outcomes vs dose ingested is provided in Table 1.

	No effect	Minor	Moderate	Major
All patients (n=108, 79% of total group)	51 (47%)	44 (40%)	13 (12%)	1 (1%)
Mean and median dose	528 mg, 200mg	1272 mg, 600 mg	1808 mg, 1200 mg	6000 mg
Patients < 6 years (n=32, 74% of age group)	27 (84%)	4 (13%)	1 (3%)	0
Mean and median dose	125mg, 100 mg	250 mg, 250 mg	400 mg	

Therapies included benzodiazepines (n=14), diphenhydramine (n=5), beta blockers (n=3), haloperidol (n=2), IV fluid hydration (n=2) and one each of nitroglycerin, epinephrine, benztropine, and promethazine. *Conclusion:* Clinical effects of modafinil overdoses were generally mild with predominantly tachycardia and CNS toxicity. However, clinical effects warranting specific therapy did occur in a minority of patients. Home management for ≤200 mg in children <6 may be appropriate.

219. Comparison of Toxicity of Overdoses with Citalopram and Escitalopram

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Background: Seizures and QTc prolongation are associated with citalopram poisoning; however overdose experience with escitalopram is more limited. The goals of this study were to compare clinical effects of these drugs in overdose, including the incidence of seizures, and to evaluate for dose-outcome relationships. *Methods:* A retrospective review was conducted for single-substance acute overdoses with citalopram and escitalopram, managed in hospitals, that were reported to 6 certified poison centers from 2002–2005. Data were analyzed for patient demographics, doses, clinical effects and outcomes. *Results:* There were 374 citalopram and 421 escitalopram cases that met inclusion criteria. Age and gender distribution were similar with 68–70% females and median age 20 years for citalopram and 18 years for escitalopram (range, 0.75–81 years for both drugs). Median dose ingested was 310 mg (range, 5–2400 mg) for citalopram and 130 mg (range, 5–1800 mg) for escitalopram. There were no symptoms for 167 (45%) citalopram cases and 214 (51%) escitalopram cases. The distribution of outcomes was significantly different with more serious outcomes following citalopram overdoses ($p<0.002$). In children < 6 years old, 12 of 66 (18%) citalopram and 5 of 57 (9%) escitalopram cases experienced toxicity, which included mostly drowsiness, nausea/vomiting, and tachycardia. There were no seizures in this age group. Most frequently reported clinical effects with citalopram and escitalopram were tachycardia, drowsiness, hypertension and vomiting. Seizures (30 vs 1, $p<0.001$) and tremor (32 vs 13, $p=0.001$) were more common with citalopram. Higher frequency of QTc prolongation with citalopram (14 vs 7) was not statistically different ($p=0.109$). There was an association between increasing dose and severity of outcome for citalopram ($p<0.001$) and escitalopram ($p=0.008$). *Discussion:* Seizures and tremors are more common with citalopram than with escitalopram. Higher doses were associated with more serious medical outcomes for both drugs. *Conclusion:* Escitalopram appears less toxic than citalopram following an acute overdose.

220. Intentional Intravenous Epinephrine Overdose from a Crash Cart

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Background: Intravenous overdose of epinephrine has been described to cause hypertension, hypotension, cardiac dysrhythmias, myocardial injury, and pulmonary edema. Most cases are accidental and occur through therapeutic error. This is the first known case of intentional intravenous self injection intended to produce harm with epinephrine taken from a hospital crash cart. It illustrates the course of intravenous epinephrine overdose and demonstrates the risk of uncontrolled access to crash cart contents. *Case Report:* A 29 year old female was brought to the Emergency Department by EMS after a suspected seizure. She had a history of pseudoseizures, Munchhausen syndrome, intravenous drug use, depression, and self-inflicted injuries. She was a registered nurse, but had recently become unemployed and homeless. While alone in the examination room, the patient opened a crash cart, drew up the contents of vials of diphenhydramine and epinephrine, and injected them into her external jugular intravenous line. She developed chest pain, tachycardia, hypotension, hypoxia, pulmonary edema, myocardial ischemia, and cardiac enzyme elevation. She survived the episode and was discharged to a shelter after four days of hospitalization. *Case Discussion:* This case illustrates the manifestations of intravenous epinephrine overdose. Stimulation of beta-1 receptors produces tachycardia. Hypotension may occur from peripheral beta-2 stimulation in excess of alpha stimulation. Elevation of cardiac enzymes is rare. Myocardial injury may have occurred due to prolonged hypotension and inadequate coronary perfusion. Toxicity may have been worsened by diphenhydramine. This case demonstrates the potential danger of patient access to crash cart contents. The crash cart commonly contains pressor agents, cardiac antiarrythmics, sedatives, needles, syringes, and scalpels; all potentially dangerous if used in an uncontrolled setting. Providers and administrators should consider crash cart security while preserving ready access for emergencies. *Conclusion:* Crash carts commonly contain potentially dangerous equipment and medications, like epinephrine. Intravenous self-administration of epinephrine from the crash cart produced life-threatening toxicity in this patient.

221. Inhalational Mercury Exposure from Attempted Creation of a Hydrogen Fuel Cell

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Background: Elemental mercury is used in many manufacturing and industrial processes, household, medical, and electrical devices and folk remedies. Exposures have been reported via an inhalational route after heating or physical volatilization. We report an exposure to volatilized mercury resulting in 19 victims which is the first report of a mass casualty pre-hospital exposure. *Case Report:* A 59 yo male was attempting to create a hydrogen fuel cell in an apartment complex garage. Using a pressure cooker, he attempted to combine aluminum pellets with elemental mercury in a nitrogen-rich environment. After opening the container, the contents spilled, and a vapor filled the garage. First responders to the scene did not wear personal protective equipment. A total of 8 firefighters, 2 fire investigators and 2 EMS personnel were exposed, along with 7 tenants of the apartment. The majority of exposed patients developed mucosal and respiratory symptoms. The average serum mercury level was as follows: firefighters, 24 µg/L (SD±11, reference range 0–11); fire investigators, 8 µg/L (SD±4); EMS personnel, 2 µg/L (SD±0); and, neighbors, 7 µg/L (SD±5). The tenant who was the chemist had his result obtained 6 days post-exposure and was 16.3µg/L. He was treated with a nineteen day course of succimer. All fire personnel were treated with a five day course of succimer while awaiting

serum levels. All mercury concentrations were <7 µg/L after 2 weeks. *Case Discussion:* We report a mass casualty exposure to volatized elemental mercury in which; 1)a large number of pre-hospital personnel were exposed, 2)significant exposure (as documented by serum concentrations) in several patients occurred but no clinical toxicity developed, and 3)exposure was due to unique source (creation of a hydrogen fuel cell). Serum concentrations confirmed acute exposure and were correlated with time of exposure and proximity to the spill. *Conclusion:* We report 19 patients who had inhalational exposure to volatilized elemental mercury. While the majority of patients had upper respiratory irritation, no patients developed significant mercury toxicity.

222. Ketamine-Related Toxicology Presentations to the ED

Wood DM, Bishop CR, Greene SL, Dargan PI. *Guy's and St Thomas' Poisons Unit, London, United Kingdom.*

Background: Ketamine is an anaesthetic drug, used recreationally for its dissociative psychedelic effects. Unwanted effects following recreational use include significant hallucinations, fear, dissociative features, aggression and agitation. However, there is limited data on the frequency of aggression and/or agitation following recreational use of ketamine. *Methods:* Data on all poisonings presenting to our inner-city teaching hospital ED are prospectively collected on a purpose designed clinical toxicology database. Data relating to all ketamine-related presentations in 2006 and 2007 was extracted, including basic demographic data, co-ingestants, disposition from the ED, length of hospital stay and clinical features on presentation, including the presence of agitation and/or aggression. *Results:* There were a total of 116 presentations where ketamine had been used recreationally prior to presentation (58 in 2006, 58 in 2007). Only 13(11.2%) presentations related to lone ketamine ingestion; co-ingested drugs included ethanol (45;38.7%), GHB/GBL (55;47.3%), cocaine (22;19%) and MDMA (61;52.6%). 84 (72.4%) were discharged directly from the ED, 26 (22.4%) admitted to an ED observation ward; the remainder were admitted to a general medicine or critical care facility. No lone ketamine ingestion required admission to critical care. Mean length of stay was 11.2 hours (range 0.3–61.5). Tachycardia (HR≥100) and hypertension (systolic BP≥140mmHg) occurred in 34(29.3%) and 45(38.8%) respectively. Agitation and/or aggression occurred in 29(25%) of ketamine-related presentations and 3(23.1%) of lone ketamine presentations. *Discussion:* Presentation to our large inner-city ED with toxicity following lone use of ketamine is not common, and ketamine presentations are more commonly associated with poly-drug use. Agitation and/or aggression occurred frequently, with a similar frequency in lone ketamine and poly-drug presentations. *Conclusion:* The numbers of lone ketamine-related toxicity presenting to our ED are relatively small, and therefore larger multicenter studies are required to determine the frequency and nature of ketamine-related toxicity, especially whether agitation and/or aggression is a clinically significant feature of ketamine-related toxicity.

223. Recreational Drug Toxicity in the Nightclub Environment

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Background: Toxicity associated with recreational drug use is common amongst clubbers, and recreational drug use is particularly common at men who have with sex with men (MSM) venues. Many large venues provide first aid rooms staffed by 'club first aiders' where unwell individuals are initially assessed and managed, prior to transfer to the ED if required. There is no published data on the individuals presenting to these first aid rooms, what drugs are responsible for toxicity and whether these individuals are first-time drug users or recurrent attenders to club first aid rooms. *Methods:* Data on clubbers who attended the first aid room at one large MSM nightclub venue was collected over a 5 month period. Information on the individual's sex and age, who brought them to the room and reason for attendance was collected. Where recreational drugs were involved, the drug(s) used, previous club first aid room attendance and individual's previous use of them were recorded. *Results:* Of the 173 presentations to a 'club first aid' room, 153 (88.4%) were male and the mean (SD) age was 27.7 ± 6.5 years. Individuals were predominately brought in by club staff (148, 85.5%) or 'friends' (16, 9.2%); only 8 (4.6%) self-presented. The majority of presentations involved recreational drug use (131, 75.7%) or recreational drugs and ethanol (30, 17.3%). The most commonly ingested drugs were GHB/GBL (107, 66.5%); other drugs in order of frequency were ketamine (61, 37.9%), MDMA (20, 12.4%) and cocaine (18, 11.2%). Most had previously used the drugs that had caused this attendance (124, 77%) and a significant minority had previously required 'club first aider' assistance following use of recreational drugs (44,27.3%). *Discussion:* This study demonstrates that clubbers require assistance following use of a variety of recreational drugs with GHB/GBL and ketamine being the most common drugs causing immediate problems within the club environment. The majority were not first-time users of these drugs, and a significant proportion have recurrent recreational drug toxicity within the club environment. *Conclusion:* A brief intervention tool should be developed to try and target recurrent drug users and individuals with recurrent drug toxicity and clinical toxicologists should help to develop these interventions.

224. Medical Student's Knowledge of Street Names for Recreational Drugs

Wood DM, Bishop CR, Dargan PI. *Guy's and St Thomas' Poisons Unit, London, United Kingdom.*

Background: Recreational drug toxicity is frequently seen in the ED, and these presentations are commonly reviewed by newly qualified junior medical staff. Medical students have variable knowledge of the 'proper' names of recreational drugs, especially drugs such as GBL, GHB and ketamine [Dargan et al Clin Tox 2007]. However, there is no data on their knowledge of 'street names' which may be more commonly used by individuals presenting to the ED. *Methods:* 115 final year medical students at an inner-city medical school were surveyed by questionnaire. The students were given a list of 23 common street names for cocaine (4), methamphetamine (7), GHB and its analogues (5), MDMA (4) and ketamine (3). All these names were derived solely from the internet site Erowid and are names commonly used by patients that we see clinically. They were asked for each street name to identify which of the 5 recreational drugs it was. Data was also collected on the student's age and sex. *Results:* 48% of the students were male and 50% female (2% did not specify sex) and mean age was 23.8±1.7years. No individual student correctly identified all the street names; in addition no-one knew all the street names for GHB, cocaine or methamphetamine and only 1 (0.9%) correctly identified all the street names for MDMA. However, 44 (38.2%) correctly identified all the street names for ketamine. *Discussion:* There was poor awareness amongst this group of final year medical students of the street names for cocaine, methamphetamine, GHB and MDMA that may be used by individuals presenting to the ED. The greater knowledge of ketamine street names was unexpected, but may reflect that the street names for it are more similar to its 'proper' name than the street names for other recreational drugs. *Conclusion:* Together with our previously published study looking at 'proper' names for recreational drugs, this demonstrates that there is a need for more focused education of medical students on both the 'street names' and 'proper' names for recreational drugs in order that they are prepared for assessing and managing patients presenting with recreational drug toxicity whilst working in the ED as newly qualified doctors.

225. An Electronic Document Management Program to Improve Preparedness for a Terrorism Incident

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Background: Access to evidence-based literature in a timely and efficient manner is critical in responding to a terrorism incident. The purpose of this project was to develop a method of providing access to key biological, chemical and radiological terrorism literature quickly for specialists in poison information (SPIs) who are working in the poison center or as remote agents during a terrorism incident. *Methods:* Various electronic document management programs were evaluated and compared based on the cost of implementation and maintenance, ease of use, capabilities, and efficiency. *Results:* After the evaluation process, it was determined that the Adobe Acrobat Professional software, fulfilled all requirements with minimal expense by purchasing through the university-licensed software agreement. The full software version was necessary for a minimal number of users, while the searching component for SPIs was available through Adobe Acrobat Reader. This free software, like the fully licensed version, enabled the SPIs to search for literature by the date created, author, title, subject, assigned keywords or free-text search. *Discussion:* The implementation process involved scanning selected biological, chemical and radiological terrorism literature via an HP Digital Sender 9250c. This device produces high quality documents that are scanned efficiently at high speed (50 pages per minute) into electronic folders. The Adobe Acrobat Professional software was used to enter the author, title, and keywords for searching. Once the information was entered, the documents were organized into a hierarchy of folders for improved search times. *Conclusion:* Key papers are accessible rapidly to all specialists whether they are working in the center or remotely. This improves efficiency when surge capacity is compromised, such as in a terrorism incident. In addition to serving as a reservoir for terrorism-related references, the system is also used to store other key toxicology and medical literature and eliminates manual searching of hard copy files.

226. Do Most Pediatric Poisonings Occur While a Product is in Use?

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Background: Pediatric self-poisoning may be due to many factors (e.g., curiosity, hand-to-mouth activity, behavior, improper storage). A common perception is that pediatric exposures occur while products are in actual use, making them accessible. To determine the validity of this perception, a RPIC attempted to determine how frequently pediatric exposures occurred while the substance was in use at the time of the poisoning. *Methods:* Over a 3 week period calls to a RPIC involving children less than 48 months of age who were self-exposed to a substance were studied. The caller was asked to detail the specific circumstances of the exposure. Plant exposures and calls received from out of the region or from someone other than the caretaker (e.g., MD office, HCF's) were excluded from analysis. Data collected included age, gender, substance and site. The cases were reviewed by one researcher and based on the history a determination was made as to whether the product was in use, not in use or if it was unknown if the product was in use. These data were then analyzed using descriptive statistics. *Results:* One thousand eighty eight exposures in children less than 48 months of age were reported during the study period. Of these, 848 (77.9%) cases met the criteria, 263 (31%) occurred while the product was in use, 473 (56%) occurred while the product was not in use and in 112 (13%) exposures a determination could not be made based on the history provided. Of those exposed while the substance was in use, 117 (44.5%) were females and 146 (55.5%) were males. Ages ranged from 5 months to 3 years with a mean of 20 months and a median of 21 months of age. The substances most frequently involved included diaper care/rash products 21, air fresheners 20, foreign bodies 11, ibuprofen 10, and automatic dishwasher products 9. *Discussion:* Twenty month old children are particularly at risk while a product is in use. A profile of substances involved includes those commonly used for skin care as well one that is readily available–air fresheners. *Conclusion:* Contrary to popular consensus, the majority of pediatric poisoning exposures did not occur while a product was in use.

227. Crotalidae Polyvalent Immune Fab (CroFab) Therapy for *Crotalus durissus terrificus* Envenomation

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Background: Crotalus durissus subspecies account for ~10% of snake envenomations in Brazil. However, no cases of envenomation by these species have been reported in North America. No human data exists regarding its treatment with crotalidae polyvalent immune Fab (CroFab), the most widely used and available commercial antivenin in the United States. A case of envenomation of moderate severity by C*rotalus durissus terrificus* treated with CroFab is presented. *Case Report:* A 36 year old man presented within 1 hour of a bite to his left index finger by his *C. d. terrificus*. He described progressive pain and swelling to his midforearm,

mild diplopia and perioral paresthesias without objective neurologic deficits. Due to his progressive local and systemic neurologic symptoms, antivenin therapy with CroFab was instituted. Serum fibrinogen was 249 mg/dl on presentation. His PT was 14.2s. Following 6 vials of IV CroFab, he had no progression of symptoms, but repeat fibrinogen was 104 mg/dl and PT was 15.9s. An additional 6 vials were administered. The next fibrinogen was 153 mg/dl. Maintenance therapy with 2 vials every 6 hours for 3 doses was given. Repeat fibrinogen was 267 mg/dl and PT/INR normalized prior to discharge. CBC and platelets were normal throughout. His CPK peaked at 1085IU/L. Labs drawn 7 days after envenomation, 5 days after discharge, showed a PT of 17.8s and fibrinogen 53 mg/dl. CBC was unremarkable. His pain had slowly improved. 3 days later PT was 14.1s and fibrinogen 156 mg/dl. The patient's symptoms continued to improve over the following weeks. *Case Discussion:* Crotoxin, crotamine, and thrombin-like toxin are the primary constituents of *C. durissus spp* venom. The specific antivenin to *C. d. terrificus* is not available in the U.S., but CroFab is partially derived from Mojave toxin, antigenically similar to crotoxin. CroFab administration in this patient led to a halt in symptomatic progression and improvement in hemotoxicity with recurrence following cessation of therapy indicating a beneficial therapeutic effect. *Conclusion:* CroFab attenuated the moderate toxicity of *Crotalus durissus terrificus* envenomation in this human case.

228. Lack of Utility of X-Ray Compared to CT in Diagnosing Crack Lung

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Background: Crack lung (hemorrhagic alveolitis) results from inhalation of pyrolyzed cocaine. The diagnosis is elusive as symptoms are often attributed to infectious causes. We describe 2 cases of crack lung presenting as undifferentiated dyspnea and hypoxia not evident on plain x-rays, but clearly revealed on CT. *Case Report:* A 19 yo M complained of 3 hours of palpitations. He had no PMH, did not smoke or use drugs. Vitals: HR 214; BP 135/78; RR 26; T 96.9; SAO2 83% on RA. He was anxious, diaphoretic and had decreased bilateral breath sounds. 100% O2 (NRB) increased his SA02 to 90%. ECG revealed SVT, which converted to NSR after adenosine. X-ray was clear. ABG revealed pH 7.38/PCO2 36 mmHg/PO2 67 mmHg. WBC was 10,800 and SMA6 WNL. CT showed diffuse patchy consolidations, greater in the lower lobes. Antibiotics were given and he was admitted to the MICU. After his U-Tox found cocaine he admitted to smoking crack prior to admission. Antibiotics were discontinued, and no supplemental O2 was needed by 36 hours. He was discharged on day 3. A 28 yo M complained of dyspnea and pleuritic pain for 36 hours prior to admission. 48 hours earlier he smoked crack and developed cough with black sputum. He had a 10 pack year smoking history and depression. Vitals: HR 102; BP 116/74; RR 40; T 98.5; SA02 87%. Breath sounds were decreased bilaterally and cardiac exam was normal. ECG showed sinus tachycardia. WBC was 24,400 (24% bands). SMA6 was WNL. Nasal O2 (2L) increased his SAO2 to 96%. X-ray identified a questionable density in the L mid lung field, and a CT showed diffuse bilateral alveolar ground-glass opacities. He was discharged one day later with an SAO2 of 93% on RA. *Case Discussion:* Crack lung is a spectrum of injury that occurs following cocaine smoking. Symptoms may include cough, dyspnea, fever, hypoxemia, and hemoptysis. Injury may include a combination of alveolar hemorrhage and interstitial edema and may be clinically significant with minimal or no abnormalities detected on x-ray. CT appears to have a better diagnostic utility. *Conclusion:* Young patients with unexplained pulmonary symptoms and unremarkable x-rays should be asked about cocaine use. A contrast CT may be desirable to help confirm or exclude crack lung.

229. Massive Clonidine Suspension Overdose

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Background: Clonidine is frequently prescribed for ADHD, autism, and anxiety, and is the second most commonly prescribed medication for sleep disturbances in children. Clonidine overdose in children has been associated with major clinical effects, including deaths. Compounding- and liquid dosing-errors are common in children and may result in order-of-magnitude overdoses. *Case Report:* A 19kg, 3.5-year-old male with a history of a seizure disorder and developmental delay presented following difficulty walking, excessive sleeping, difficulty arousing, agitation when awake, and possible seizure activity. Chronic meds were valproic acid (VPA) and clonidine. On presentation, he was intermittently responsive and irritable, with initial vitals BP 144/76 mmHg; P 65 bpm; RR 18 bpm; T 99.5°F; and pO2 96% (RA). BMP, CBC, CXR, and LP were wnl. VPA level was 35 mcg/mL (therap.=50–100). Urine toxicology was negative. He received 2 mg of lorazepam and 20 mcg of fentanyl IV. During the night, O2 saturation decreased to 84% and he had borderline sinus bradycardia but maintained a normal BP. He was given O2 by nasal cannula, and VPA, IV and PO. EEG suggested drug effect. A toxicology consult the next day noted a dry mouth, 2mm pupils, intermittent gasping, and CNS depression, with a diagnostic impression of clonidine overdose. The caregiver had been giving 1 ml (0.1 mg) qd of clonidine as a pharmacy-compounded suspension by a provided syringe. The pharmacy procedure record agreed with the physician's order. The amount dispensed was a 30-day supply but the bottle was empty on day 19. The concentration could thus not be confirmed. The child slowly returned to his baseline state and was discharged on hospital day 3. A serum clonidine level drawn approximately 18 hrs after his last dose, later returned at 300 ng/mL (therap.=0.5–4.5). *Case Discussion:* The serum level is the highest reported to date. In the absence of hypotension and bradycardia, despite other suggestive findings, the diagnosis was not initially suspected. There was a dosing error, but whether a compounding or suspension error occurred as well, is unknown. *Conclusion:* The need for compounding and liquid formulations, plus a low therapeutic index, make clonidine a poor drug choice in children.

230. "Vitamin" B17 Toxicity Treated with Hydroxocobalamin

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Background: The Poison Control Center was consulted about a vitamin B_{17} ingestion. Vitamin B_{17}, also called laetrile is a purified form of amygdalin, a cyanogenic glycoside found in the pits of some fruits, raw nuts and other plants. It has been used as an anticancer agent, but is not approved in the US for this purpose. *Case Report:* A 51 year old woman presented to the ED complaining of tremor, nausea, vomiting, diarrhea and diplopia after inadvertently taking five vitamin B_{17} 500 mg tablets she had intented to pack for a trip. She underwent lumpectomy in 2006 for breast carcinoma, and both her parents died of cancer. She declined adjunct chemotherapy and tamoxifen, choosing to take B_{17} and grapeseed suppements. She considers herself a "nutritional expert" and is aware of the effects of excess vitamin B_{17}, so she went to the ED when symptoms developed. In the ED, she was given activated charcoal, IV fluids and oxygen, but four hours post-ingestion, she developed diaphoresis, apnea with bradycardia, leading to asystole and 40-second generalized seizure activity which resolved spontaneously. ABG ph7.29, pCO2 30, pO2 139, HCO3 8.2 on 98% non re-breather mask. Serum lactate was 14.8 mmol/L [ref 0.7–2.1]. She was given lorazepam and 5 g hydroxocobalamin and developed flushing and orange-brown urine, but remained otherwise asymptomatic. Whole blood cyanide level subsequently reported from reference laboratory was 0.4 µg/ml [ref 0–0.05]. *Case Discussion:* Serious effects are noted from an unintentional overdose of laetrile. The patient had documented symptoms and elevated lactic acid levels consistent with cyanide toxicity. Hydroxocobalamin approved as an antidote by the FDA in 2006 for the treatment of cyanide poisoning was successfully administered. The patient developed only minimal effects from the Hydroxocobalamin. Hydroxocobalamin binds with the cyanide ion to form cyanocobalamin. Post treatment with antidote, the patient's symptoms resolved and lactic acid level 24 hrs later was 1.6 mmol/L. *Conclusion:* Use of vitamin B_{17} (Laetrile) a highly questionable anticancer agent can result in cyanide toxicity. Hydroxocobalamin, a recently approved antidote for cyanide poisoning was effective with minimal side effects in treating this patient.

231. Cognitive Impairment in Chronic Occupational Exposure to Organophosphates: Psychophysiological Evidence

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Background: Cognitive effects of chronic exposure to organophosphates (OP) have been studied previously, but neurobehavioral outcomes show numerous inconsistencies. Event-related potentials (ERPs) reflect the neural activity underlying cognitive processes and assess cognitive functions more objectively and quantitatively. Our objective was to determine whether chronic occupational exposure to OP pesticides leads to cognitive impairment using ERPs. *Methods:* ERPs of 38 farmers applying OP pesticides and 38 matched controls were recorded over Cz and Pz scalp locations using auditory oddball paradigm. The P300 ERP component that reflects attention and updating of working memory in stumulus evaluation, and the components related to early perceptual processing (N100, P200, N200) were compared in the two groups. *Results:* The farmers showed a highly significant delay in P300 latency and no difference in P300 amplitudes. N100 latency was similar between the groups, but the farmers had increasingly significant delays in subsequent processing components (P200 and N200).

Table 1: Comparison of the farmers and the control group

	farmers (n=38) Mean(SD)	controls (n=38) mean(SD)	significance (p)	mean difference (95% CI)
age (years)	49.5 (7.7)	48.9 (7.3)	0.714	0.6 (–2.8–4.1)
N100 latency (ms)	103.5 (15.9)	99.4 (10.7)	0.197	4.1 (–2.1–10.3)
P200 latency (ms)	188.2 (18.3)	178.8 (21.4)	0.046	4.6 (0.2–18.6)
N200 latency (ms)	243.0 (26.4)	226.3 (24.3)	0.006	16.7 (5.0–28.4)
P300 latency (ms)	399.6 (45.5)	368.6 (29.1)	0.0007	31.0 (13.5–48.4)
P300 amplitude: Cz (µV)	14.80 (8.83)	12.95 (9.03)	0.371	1.85 (–2.25–5.92)
P300 amplitude: Pz (µV)	10.77 (4.7)	11.37 (5.04)	0.590	0.60 (–2.83–1.62)

Discussion: These ERP findings are similar to those of two previous studies on acute OP intoxication. *Conclusion:* Chronic occupational exposure to OP pesticides may impair the attentional and working memory systems of brain leading to delayed stimulus evaluation.

232. Factors Associated with Adverse Cardiovascular Events among Patients with Suspected Acute Poisoning

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Background: Prediction of adverse cardiovascular events (ACVE) among ED patients with suspected acute poisoning (SAP) is difficult. *Methods:* This case-control study evaluated referrals to one Poison Center over 12-months in whom an admission ECG was available. Patients with ACVE (cases) were compared with control patients from 3 hospitals without ACVE who had bedside medical toxicology consultation for SAP. Data included clinical factors (demographics, history, vital signs) and elements of the initial ECG (rhythm, intervals, QT dispersion, ischemia, infarction). ACVE was defined as shock, MI, VT/VF or cardiac arrest. ECGs were interpreted by a blinded cardiologist. T-test, chi^2, and multivariable logistic regression analyses were performed. *Results:* 34 cases (19 shock, 16 MI, 24 cardiac arrests) from 18 hospitals were compared with 101 controls. Subjects were 48% male with a mean age of 42±19. Exposure was confirmed in 77%, most commonly benzodiazepines, opioids, and acetaminophen. Initial vital signs, gender, diabetes, or suicidal intent were not significant. The multivariable model included significant factors from univariate analysis (see Table).

Factors associated with ACVE in ED patients with SAP

Factors:	Univariate p Value:	Adjusted OR (95% CI):
Clinical Factors:		
Age ≥ 55	<0.001	4.2 (1.4–12.6)
Multi-drug OD	0.02	3.4 (1.4–8.4)
HTN	<0.001	2.1 (0.7–6.5)
ECG Factors:		
Non-sinus rhythm	0.001	3.6 (1.2–10.6)
Ectopy	0.001	3.3 (0.8–14.1)
QTc ≥ 500 ms	0.02	3.0 (1.1–8.4)
Ischemia	0.002	2.9 (1.0–8.2)
QTD ≥ 50 ms	0.02	2.0 (0.7–5.7)
Exposures:		
CV Meds	0.045	3.3 (1.0–10.9)
Opioids	0.025	3.0 (1.1–8.0)

Discussion: In patients with SAP, we found significant associations between several presenting clinical features, including QT dispersion (QTD), and the occurrence of ACVE. *Conclusion:* Clinical factors, high-risk exposures, and the admission ECG may be useful to identify patients with SAP who are at risk for ACVE.

233. Highest Reported Salicylate Level with Survival

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Background: Early treatment for salicylate (SAL) toxicity is imperative to reduce morbidity and mortality. SAL's dynamic volume of distribution mandates aggressive alkalinization to prevent distribution into the brain, where concentrations best predict death. We report the highest documented serum SAL level associated with survival. *Case Report:* A 49 year old woman presented to an ED after a suspected SAL ingestion. Her presenting vital signs revealed: BP 138/82 mmHg, HR 98 bpm, RR 16 bpm, Temp 37°C; her examination was normal but she reported auditory hallucinations. Her initial SAL level was 7.1 mg/dl; drug screen and acetaminophen level were negative while electrolytes, BUN and creatinine were normal. She received activated charcoal, IV fluids, 50 mL of 8.4% sodium bicarbonate IV bolus, and due to agitation, multiple doses of lorazepam and haloperidol. Ten hours later she had increased agitation, tachypnea (RR 40 bpm) and hyperthermia (41.1 C) for which she received additional lorazepam and haloperidol and was started on a bicarbonate infusion. Her repeat SAL level was 101.9 mg/dl. Over the next 2 hours, her pH had decreased from 7.46 to 7.38 and pCO_2 had increased from 18.4 to 35.3 despite IV bicarbonate administration. The patient was then intubated and transferred to our facility. We administered additional sodium bicarbonate, continued norepinephrine, phenylephrine and vasopressin for persistent hypotension (BP = 87/57) and initiated hemodialysis; peak SAL level was 176 mg/dl immediately prior to dialysis. She made a complete recovery and was subsequently transferred to a psychiatric facility. *Case Discussion:* The use of chemical sedation for drug-induced agitation may worsen underlying metabolic acidosis by decreasing ventilation as well as blunt evolving signs of drug toxicity. *Conclusion:* Severe SAL toxicity is associated with agitation, metabolic acidosis and compensatory respiratory alkalosis. Optimal therapy for SAL toxicity involves serum alkalinization to minimize SAL's volume of distribution. One must consider intubation with hyperventilation for all SAL toxic patients who require chemical sedation. With aggressive treatment, severely elevated SAL levels are survivable.

234. Graying of Poison Centers

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Background: Most of the staff in our poison center are 40 years of age or older. We wondered if other poison centers have similar age ranges, and whether there is the potential for many specialists in poison information and certified specialists in poison information (SPIs), poison information providers (PIPs), primary managing directors (Man. Directors) and primary medical directors (Med. Directors) to retire at similar times. *Methods:* We sent out a total of 61 surveys to U.S. poison centers. We asked for the number of SPIs and PIPs in the age ranges of 21–30 years, 31–40 years, 41–50 years, 51–60 years, 61–70 years and 71–80 years. We also asked age ranges of the Man. Directors and Med. Directors. Individual responses were kept confidential. A review of the United States (U.S.) Bureau of Labor Statistics was performed for current and projected shortages of nurses, pharmacists, and physicians. *Results:* 37 out of 61 (60.6%) poison centers responded to the survey. There were 597 SPIs and PIPs, 37 Man. Directors and 37 Med. Directors from the 37 centers.

Age	21–30 yrs	31–41 yrs	41–50 yrs	51–60 yrs	61–70 yrs	71–80 yrs
SPIs/PIPs	76	116	222	170	13	0
Man.Directors	0	7	14	12	4	0
Med.Directors	1	7	14	11	4	0

As per the U.S. Bureau of Labor Statistics, from 2006–2016 the number of nurses needed is expected to increase by 23.5%, pharmacists by 21.7% and physicians by 14.2%. The number of total job openings due to growth and net replacements is projected to be 1,001,000 for nurses, 95,000 for pharmacists and 204,000 for physicians. *Conclusion:* 67.8% of SPIs and PIPs, 81.1% of Man. Directors and 78.4% of Med. Directors are currently 41 years of age or older. The U.S. will continue to experience a healthcare professional shortage and this will intensify as baby boomers age and retire. These staffing challenges will affect all healthcare providers, including poison centers.

235. A Model for Calculating the Dispersion Distance of Radioiodines in Case of an Accidental Release from a Nuclear Power Plant

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Background: Almost all nuclear power plant (NPP) disaster scenarios involve the release of radioiodines. From the Chernobyl incident it was learned that the incidence of thyroid carcinoma after a radioiodine release is most increased in people younger than 19 years during the incident. Taking a surplus of stable iodine shortly before or within 6 hours after exposure to radioiodine provides a significant reduction in the incidence of thyroid carcinoma. The Netherlands have one NPP, two foreign facilities are situated near its borders. For its national nuclear response plan the Dutch government wanted validation for the area of distribution of iodine tablets. *Methods:* A threat analysis was carried out with the atmospheric dispersion model NPK-Puff to calculate the distances from the different NPPs where, in case of a release of a radioactive cloud, the radioiodine dose would warrant iodine prophylaxis. In the analysis the accident release scenarios formulated by the NPPs themselves were used. To account for all possible weather conditions throughout almost 3 emissions per day were simulated. Several reduction factors were incorporated. For sheltering a reduction in dose by 50 % (indoors versus outdoors) was included. We stated that 1% of the airborne radionuclide-mixture would be iodine. As an intervention level for iodine supply a thyroid dose of 100mSv (IAEA advised) for a one year old child who would be sheltering during the accident was taken. This provided us with several hundred dispersion distances per NPP. *Results:* To obtain a suitable area in need of iodine prophylaxis, we left the most extreme distances out and set our distribution plan at the distance where in 95% of all calculated releases the dose of 100 mSv would be reached. *Discussion:* Certain reduction factors were estimated and can be set differently for other NPPs, resulting in other dispersion distances. *Conclusion:* We managed to set up a validated circular zone around each NPP, based on calculations taking into account all possible weather conditions, in which the inhabitants would benefit from stable iodine in case of an accidental release.

236. Analysis of Causes of Therapeutic Errors in Older Adults

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Background: Studies using poison center data have identified unintentional therapeutic errors in older adults as a significant cause of morbidity and mortality. These studies conclude that understanding how therapeutic errors occur is necessary to develop prevention strategies. The goal of this study was to evaluate the case scenario details associated with unintentional therapeutic errors in older adults in order to provide data to support future prevention efforts. *Methods:* A retrospective review of unintentional therapeutic errors reported to the AAPCC in 2002 to 2006 for adults ≥ 65 years old was performed. Only cases with known medical outcomes were included. Data were analyzed for reasons for the medication error (case scenario details) and medical outcomes. *Results:* There were 151,588 therapeutic errors in 143,901 older adults of which 49,317 had known medical outcomes. In the cases with known medical outcome, 486 had major effects and 107 resulted in death. The most frequent reasons were inadvertently took/given medication twice (17,505), wrong medication taken/given (8,068), other incorrect dose (6,237), inadvertently took/given someone else's medication (5,180), other/unknown therapeutic error (3,775), medication doses too close together (3,626), incorrect route (2,830), and iatrogenic error (1,402). The distribution of reasons was significantly different for the cases resulting in major effect or death compared to less serious outcomes ($p<0.001$). Major effects or death were more frequent for patients with drug interactions, iatrogenic errors, more than one product containing same ingredient, other/unknown therapeutic error, 10-fold dosing error, and patient confused or mentally incompetent. *Discussion:* Although double-dosing and wrong medication were the most common case scenario reasons for unintentional therapeutic errors in this age group, more serious outcomes were associated with errors that occur less commonly. *Conclusion:* These data should be used to develop strategies for decreasing unintentional errors in older adults. While strategies to address the most frequently occurring errors are important, attention to minimizing less frequently occurring errors that cause serious morbidity and death is imperative.

237. Transient Alanine Aminotransferase Elevations in Alcohol Abstaining Subjects with 10 Consecutive Days of Therapeutic Acetaminophen (APAP) Use

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Background: Studies have demonstrated that taking recommended doses of APAP may lead to transient ALT elevations above upper limit of normal (ULN). The purpose of this study was to describe frequency, magnitude and course of ALT changes in non-drinkers taking therapeutic APAP doses for 10 days. *Methods:* We enrolled "non-drinkers," subjects with a history of alcohol consumption <1 drink/day average, who agreed to abstain from alcohol during the study, in an open–label trial. Exclusion criteria: ALT >50 IU/L at the start of the run-in period or at baseline. Subjects were enrolled on day −10, ALT level was obtained with a finger stick via LDX machine. Dosing regimen was 1g of APAP every 4 hours, 4 doses per day for 10 consecutive days. Laboratory testing was done on study days −10, 0, 4, 7, 9, 11 and 14. Telephone calls were made between visits and subjects interviewed during visits to identify any adverse events. Subjects with elevated ALT levels at day 14 were reevaluated following study completion. *Results:* 35 subjects were consented (11 male, 24 female). 6 subjects were excluded. 5 subjects withdrew during dosing period. 24 subjects completed the trial. The highest number of subjects with ALT levels >ULN (56%) was on Day 7 and highest mean ALT increase (10.9 IU/L) on Day 9.

	Day 0	Day 4	Day 7	Day 9	Day 11	Day 14	Follow-up
n	29	25	25	25	25	24	8
Mean ALT U/L	25.4	25.9	41.3	46.3	41.8	36.1	20
ALT Range	12–45	14–52	15–136	16–124	18–120	14–77	11–34
n with ALT>ULN (%)	1(3)	4(16)	14(56)	13(52)	12(48)	11(46)	0
Total Mean Bilirubin	0.52	0.46	0.45	0.51	0.48	0.52	ND
Total Bilirubin Range	0.2–1.8	0.1–1.2	0.1–1.3	0.1–1.2	0.2–1.1	0.2–1.4	ND

Discussion: Similar to previous studies, mean ALT increased at Day 7, peaked at Day 9 and decreased after APAP discontinuation. Synthetic hepatic function was not impaired. It is unclear if underlying mechanism is the same as in acute APAP overdose. *Conclusion:* Maximum therapeutic dosing with APAP is associated with asymptomatic elevations of ALT in some alcohol abstaining individuals. Patients did not develop symptoms or signs of liver synthetic impairment.

238. Pediatric Ingestions of Hand Sanitizers – Debunking the Myth

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Background: In 2007 the use of ethanol-containing hand sanitizers in the pediatric population came under media scrutiny due to an internet 'urban legend". Although the tales of a two and four-year-old who were severely poisoned were later proven to be exaggerated, a greater awareness of the potential toxicity of these sanitizers based on their high ethanol content was created. *Methods:* A retrospective review of all exposures to hand sanitizers in children less than 6 years of age reported to a RPIC from 01/01/2000 – 03/30/2007 was performed. Data reviewed included substance, age, gender and outcome. The data were analyzed using descriptive statistics. *Results:* 647 cases were identified including 324 females and 323 males. Ages ranged from 1 month to 5 years with a mean of 1.89 years and a median of 2 years of age. Outcome data included 31(4.8%) patients with no effect, 26 (4%) with a minor effect, 372 (57.5%) cases coded as non-toxic expect no effect, 208 (32.1%) cases with minimal clinical effects possible and 10 (1.6%) cases where the symptoms were judged to be unrelated to the exposure. There were no moderate or major outcomes and no fatalities. *Discussion:* Children in this age group have frequent hand-to-mouth activity making the application of a hand sanitizer the perfect situation for an exposure to occur. This fact is illustrated by the large number of cases with no follow-up (91.2%). This occurs when the specialist in poison information deems the exposure to be non-toxic or of minimal toxicity, but does instruct the caretaker to contact the poison center if they have any questions. *Conclusion:* Although ethanol-based hand sanitizers have the potential to cause toxicity, the benefits of prevention of illness outweigh the hazards when used in a supervised situation.

239. Substance Abuse Related Mortality, Iran 2004

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Background: According to the UN statistics in 1999, Iran has had the highest rate of opiate abusers in the world with 2.8% of population among 15–64 years old. The high mortality rate among drug users presents a major public health problem. To evaluate the incidence of substance abuse related mortality (SARM) this study was conducted in 2004 and covered the entire country. *Methods:* Death registration systems of Iranian ministry of health and national organization for civil registration were used to retrieve available data among 15–69 years residents of Iran. Latest national population census (2006, Statistical Center of Iran) was used to adjust estimated completeness population in 2004 based on growth rate from 1996 census. *Results:* There was 2260 (5.59 per 10^5 population) SARM among 15–59 years Iranian residents. The mortality had higher rate in men while showed 20 folds increase compare to women.

Substance abuse related mortality among 15–69 years residents of Iran, 2004

Age (population %)	Sex	Num	Per 10^5
15–49 year (54.4)	M	1936	10.28
	F	79	0.44
	M & F	2015	5.48
50–69 year (5.5)	M	222	11.65
	F	23	1.27
	M & F	245	6.60
Total (59.9)	M	2158	10.40
	F	102	0.52
	M & F	2260	5.59

Discussion: These results are in accordance with UN statistics which shows high prevalence of opioid and other illicit drugs exposures in Iran compare to the global average. The higher mortality rate in males is in agreement with the previous national reports in which the most cause of death was found to be related to narcotics. Spreading opium poppy cultivation and increase production of the opium in neighbor countries of Iran from 2719 Tons in 1998 to 3652 Tons in 2003 might be a logical concept to interpret our data. Meanwhile opium and its derivatives prices were declining. Although this study was focused on SARM but knowing relation between substance abuse and suicide is a major concern. Understandably all people who are dealing with abusers including their families, work place and society are affected, and therefore, deliberate self harm as well as accidental with illegal substances is expected. *Conclusion:* It seems that national polices for drug control was not efficient and urgent intervention especially for high risk groups is needed.

240. Severe Paralytic Ileus Following Lithium Overdose

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Background: Lithium is used medically as a mood stabilizing drug, primarily in the treatment of bipolar disorder, both acutely and in the long term.Lithium intoxication was frequent due to its narrow therapeutic index. Lithium overdose may be fatal and toxic effects include tremor, ataxia, dysarthria, nystagmus, renal impairment, and convulsions. In literature there were rare reports about pseudo intestinal obstruction induced by lithium. Here we reported a case of lithium overdose complicated with severe paralytic ileus and hard to be differentiated from the possible surgical condition. *Case Report:* A 31-year-old male, with the history of bipolar disease for 5 years, presented to the emergency department due to acute drug overdoses with 120 tables of Lithium Carbonate 300mg. The serum level was 6.3 mEq/L eight hours after intoxication. The serum lithium level was dropped gradually under continuous venous-venous hemodialysis (CVVHD). The next night after admission, the patient's abdomen distended progressively with tympanic percussion and sluggish bowel sounds. A plain X-ray showed gaseous distension of the small and large intestines. The diagnostic peritoneal larvage were performed for two times and showed to be negative findings. The abdominal distention got improved by nasogastric tube decompression. *Case Discussion:* Severe paralytic ileus induced by lithium maybe due to the inhibitory effect of Li+ on the smooth muscle contractions and the antisecretory effect of Li+ by inhibiting the synthesis of cyclic adenosine monophosphate in animal model. *Conclusion:* It is a rare clinical complication in lithium therapy and overdose, and the definite mechanism needs more investigation.

241. Acute Renal Failure Following Injections of Silicone Dermal Filler by an Unlicensed Practitioner

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Background: Medical guidelines regarding the practice of soft tissue augmentation vary by state. These procedures can have severe complications. We report 3 patients who developed acute renal failure (ARF) following gluteal injections by an unlicensed practitioner. *Case Report:* All three cases underwent the same procedures at the same location on the same 2 dates, 14 days apart. *Case A*. A 42 y/o female who received a total of 900 mL of "dermal silicone and saline" presented in ARF 3 days after her last injection. Her serum creatinine (Cr) peaked at 4.6 mg/dL and returned to baseline 13 days later. She did not require hemodialysis (HD). *Case B*. A 26 y/o female received a total 1800 mL of the same product and presented in ARF 2 days after her last injection. Her serum Cr peaked at 11.6 mg/dL and she required HD for 5 weeks before normal renal function returned. Renal biopsy demonstrated acute tubular necrosis. *Case C*. A 26 y/o female received an unknown volume of the same product and presented in ARF 4 days after the second administration. Her serum Cr peaked at 12.3 mg/dL and she required HD for 20 days before normal renal function returned. Renal biopsy demonstrated acute interstitial nephritis. Extensive evaluation of all cases, including renal ultrasonography, hematology, chemistry, autoimmune, toxic alcohols, heavy metals, infectious, and enzyme deficiencies, did not identify an etiology for ARF. Neither biopsy revealed intra-renal silicone vacuoles. *Case Discussion:* Three patients without pre-existing renal conditions presented in ARF of unknown etiology with a temporal relationship to soft tissue augmentation. Despite an extensive epidemiological investigation, no additional cases were identified. The suspected product could not be found for testing. *Conclusion:* These are the first reports of ARF in patients given "dermal silicone and saline" for soft tissue augmentation. These cases emphasize the need for improved regulation of these procedures and the importance of considering adulterants when evaluating unexplained clinical findings. Better standardization among medical and public health guidelines regarding the practice of medicine and medical procedures is warranted.

242. IPCS INTOX DMS as a Flexible Tool for Management of Data on Toxic Exposures and Multi-Centre Use: The Experience from Brazil

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Background: INTOX DMS has been developed by WHO/IPCS /CCOHS for the use in Poison Centres, with the aim of recording and maintaining an electronic collection of cases, using an international harmonized terminology to allow the exchange of information and experiences on poisonings and toxic agents among Poison Centres, different countries or regions, and across languages. INTOX DMS is available in Portuguese, Spanish, English, French and Chinese. *Methods:* Adaptation and implementation of IPCS INTOX Data Management System (DMS) in three Poison Centres in Brazil is presented. *Results:* Results observed with this experience are as follow. *Discussion:* Adaptation of INTOX DMS for the use by Poison Centres in Brazil has considered and included all National requirements previously established for registering poisoning cases, besides regional and local aspects for each Centre. It has been achieved successfully using the own tools of the System for the creation of Customized Local Forms for data entry. The implementation phases of the System followed similar but independent schedule for each of these Centres, counting with technical support from CCOHS. At beginning, the development of Local Customized Forms and training of a data entry group; the following step was the training for generating the several Reports types provided by the System, and for further developments on the Agents databases in INTOX. *Conclusion:* INTOX DMS is currently in use by three Poison Centres in Brazil. Another very strong aspect for the Brazilian Poison Centres using the system was the establishment of the SINITOX Reports into INTOX DMS, which can be automatically generated for any date range requested. Several other Reports are possible using INTOX, including reports on cases of specific toxic agents, which are of major interest for Toxicovigilance.

243. Frequency and Timing of Physostigmine Redosing in Anticholinergic Toxidrome

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Background: Physostigmine is more effective than benzodiazepines in treating agitation and delirium in anticholinergic toxicity (Burns et al, Ann Em Med, 2000). The need for, and timing of, repeated physostigmine doses are unknown. *Methods:* We queried hospital records for ICD9 coded anticholinergic toxicity from January 1997 to December 2007 (n=45) & pharmacy records for patients given physostigmine over the last 30 months (n=49); 10 records overlapped both queries. A total of 84 records were obtained. Multiple doses of physostigmine were defined as greater than 2 mg OR doses given greater than 30 minutes apart. Data abstraction followed established chart review methods (Gilbert et al, Ann Em Med, 1996). *Results:* Forty-seven of 84 (55.9%) patients received physostigmine (1 dose n=33, 2 doses n=9, 3 doses n=3, and 4 doses n=2). Patients were predominantly male (n=54, 64.3%) and young (median age 33 years, range 18–63). Median and maximum times (minutes) between repeated physostigmine doses were: 1st to 2nd dose (n=14) 71.5' and 315'; 2nd to 3rd dose (n=5) 100' and 165', and 3rd to 4th dose (n=2) 150' and 200'. Disposition from arrival for all patients receiving physostigmine was: discharge (n=19/47, 40.4%), floor admission (n=15/47, 31.9%), and admitted to ICU (n=13/47 27.7%). The most common anticholinergic agents present when treated with one dose of physostigmine were diphenhydramine (n=7), amitriptyline (n=6), and quetiapine (n=5). When treated with greater than one dose of physostigmine, the common agents were diphenhydramine (n=4) and quetiapine (n=4). *Discussion:* Physostigmine is the preferred pharmacotherapy for anticholinergic delirium. How often patients require repeated dosing of physostigmine, and the time to recurrence of anticholinergic delirium necessitating repeated physostigmine dosing has not been previously studied. We found that when it recurred, anticholinergic delirium recurred quickly after a physostigmine dose. *Conclusion:* Repeated physostigmine dosing was necessary for only 29.8% of patients with anticholinergic toxicity. No patients required physostigmine more than 315 minutes after the first dose. Diphenhydramine and new atypical antipsychotics are the most frequently involved anticholinergic agents.

244. OTC Product Confusion and Unintentional Salicylism in an Infant

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Background: Maalox® is a common over-the-counter (OTC) gastrointestinal product. We present a case of salicylism in a 12-month-old from the use of a bismuth subsalicylate-containing Maalox® product given in error. *Case Report:* A 12-month-old child presented to a pediatric emergency department with poor feeding, abdominal distension, irritability and decreased urinary output. His past medical history is significant for pyloric stenosis, failure to thrive and developmental delays. He was afebrile, tachycardic at 180, respirations at 56 and hypertensive. Labs indicated an anion gap metabolic acidosis (pH 7.291, bicarbonate 12, anion gap 23). He was admitted to the Pediatric Intensive Care Unit (PICU). A toxicology screen revealed a salicylate level of 77 mg/dL. The poison center was consulted and recommended alkalinization, potassium replacement, dialysis and a head CT. Sodium bicarbonate was initiated. The patient developed pulmonary edema requiring intubation. The salicylate concentration decreased without dialysis to < 5 mg/dL by day 2. The child was extubated on day 3; deep vein thrombosis from line placement complicated his course but it was treated and resolved. He was transferred from the PICU on day 4 and was discharged to home on day 6 with plans to follow up with his pediatrician. *Case Discussion:* This case highlights the potential for significant morbidity from OTC medications and the confusion created by multiple formulations of a brand name. The child's mother reported that she was instructed to give Maalox® but inadvertently substituted Maalox Total Stomach Relief Maximum Strength Liquid®, containing bismuth subsalicylate, 525 mg per 15 ml. The child received 1 teaspoon four times daily, for two months. *Conclusion:* Health care professionals need to be specific in their recommendation of OTC products, highlighting the active ingredients. Consumers need to be educated on the importance of checking labels. Companies need to understand the risk from consumer choice of the wrong formulation due to marketing pitfalls of brand recognition and package familiarity.

245. Efficacy and Safety of Intravenous Lipid Therapy in a β-Blocker Overdose

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Background: The utilization of intravenous fat emulsions for the treatment of toxicity from β-blocker overdose has been postulated. The literature to date has discussed the efficacy of lipid emulsions for the treatment of toxicity from local anesthetics and calcium channel blockers. We report a case of a 46 year old female who presented after an intentional overdose of atenolol, and was treated successfully with an intravenous fat emulsion. *Case Report:* This 46 year old female, with history of hypertension, was transferred to our center about six hours after massive ingestion of her atenolol, in addition to acetaminophen and ethyl alcohol. Pulse was 32/minute (in a sinus bradycardia) and systolic B.P. was 62 mmHg at presentation; after treatment with atropine(2 mg), glucagon(5 mg) and NS(2 litre), her pulse had increased to 43/minute with B.P. of 96/53. She was awake and alert with a pulse ox of 100% on 4L/minute of O_2. She was orthostatically symptomatic. Her initial alcohol level was 208 mg/dl and her six hour acetaminophen level was 42 mcg/ml. She was treated with 1 litre of a 20% fat emulsion via peripheral intravenous line over 2 hours. At the completion of the infusion her B.P. was 110/72 with a pulse of 70/minute in NSR. Over the ensuing 24 hours she remained normotensive without further episodes of bradycardia. No significant hypoxic episodes occurred. *Case Discussion:* Human studies and animal research have shown benefit to the utilization of fat emulsions for the treatment of cardiovascular collapse following local anesthetic or calcium channel blocker toxicity. Theoretically, such treatment could be beneficial for the treatment of β-blocker toxicity. In this single case report there appears to have been a temporal association between the fat emulsion infusion and the patient's cardiovascular improvement. Likewise, there was no evidence of significant toxicity from the treatment, such as the reported concerns of fat emboli. *Conclusion:* This is the first case report of fat emulsion successfully treating a β-blocker overdose after conventional treatment demonstrated little effect. Further studies should be initiated to better determine the spectrum of efficacy and safety of this antidote.

246. Office-Based Opioid Addiction Treatment, and the Rise in Unintentional Pediatric Buprenorphine Ingestions Reported to a Regional Poison Center – A New Challenge for Poison Educators

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Background: Buprenorphine, approved in 2002 for office-based opioid addiction treatment, is documented to reduce the use and cravings of opioids among addicted individuals. Case reports have since recognized major effects, including respiratory depression, after children have ingested or "mouthed" this sublingual tablet. This study examines whether a recent increase in unintentional pediatric buprenorphine ingestions reported to a regional poison center occured within the context of a state wide increase in patients prescribed buprenorphine. *Methods:* Data analysis was conducted using a state's Medicaid data regarding the number of patients prescribed buprenorphine or buprenorphine/naloxone combination tablets, and the cases reported to a regional poison center involving children under 12 from the same state, between 2003–2007. *Results:* From 2003–2007, 51 cases of unintentional pediatric buprenorphine ingestions were reported to the poison center, representing a 25-fold increase. During the same time period, the state's Medicaid program reported a 23.8-fold increase in the number of patients prescribed buprenorphine. Analysis determined statistical significance, (p-value 0.01), and a Spearman Correlation Coefficient of 95.8, indicating a strong linear relationship.

Buprenorphine exposures, 2003–2007

Year	Reported Ingestions, Children Under 12	State Medicaid Patients Prescribed Buprenorphine
2003	0	195
2004	4	1,522
2005	9	2,988
2006	14	3,284
2007	25	4,642

Discussion: The rise in exposures reported to a regional poison center did occur within the context of an increase in patients prescribed buprenorphine in the sample population. A study limitation is that the prescription data analyzed is limited to state Medicaid patients and it is not known whether these are the same patients who later reported exposures to the poison center. *Conclusion:* Educators should monitor state trends concerning opioid addiction treatment and recognize the potential for pediatric poisonings. Future research should identify best practices for educating at-risk populations about buprenorphine poisoning risks.

247. Validity of the AAPCC Selective Serotonin Reuptake Inhibitor Poisoning Guideline for Escitalopram

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Background: In 2004, escitalopram (Lexapro®) became the latest selective serotonin reuptake inhibitor (SSRI) approved by the FDA for major depression. In 2007, the AAPCC published the SSRI guideline that stated patients who ingest 50 milligrams or less may be safely observed at home rather than at a health care facility (HCF). Because there were no published studies of escitalopram ingestion by young children, the expert consensus panel used 5 times the initial adult dose (10 mg) as the triage amount. We wanted to validate this guideline using actual pediatric patients. *Methods:* Retrospective study of cases from poison centers in one state for single substance ingestion of escitalopram from 2003 to 2007. Only children under the age of 7 years with a documented ingested amount and a follow-up call with a known outcome were included. *Results:* There were a total of 122 children. There ages ranged from 7 months to 6 years, and the dosages ranged from 5 to 120 mg. There were no deaths, no severe symptoms, and no moderate symptoms noted (0%, 95%CI: 0 to 3.1%). Fifteen children (12.3%) ingested more than 50 mg. None of these children had any clinical effects. Of the 107 children who ingested 50 mg or less, only 9(8.4%) had any symptoms and these were mild. Four had drowsiness, 3 had vomiting, nausea, 1 had dizziness, and 1 had abdominal pain. Eighty-nine children received no treatment (73.0%). However, 33 received activated charcoal (27.0%) and 4 received gastric lavage (3.3%). Forty-three children (35.2%) were treated in HCF, and 3 (2.6%) were admitted for observation. *Discussion:* If the guideline had been used, 28 fewer children would have been treated at an HCF (23.0% of total). Since there were no moderate or severe symptoms, the negative predictive value for these is 100% (95%CI: 96.5 to 100%). *Conclusion:* This is the first study of the adverse effects of escitalopram ingestion by children under 7 years of age. Based on this small study, the new guideline appears safe and it may be advantageous and prudent to increase the triage dose.

248. Effect of the AAPCC Iron Management Guideline on Triage and Outcome of Children's Multivitamin with Iron Ingestions Reported to a Poison Control Center

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Background: In 2005, AAPCC published an evidence-based consensus management guideline to aid in the triage of patients exposed to pharmaceutical iron. The poison center staff were encouraged to use the new guideline at one staff meeting and the algorithm was posted. The objective of this study was to examine the impact of guideline adaptation on referral rates and medical outcomes of unintentional ingestion of children's multivitamins (MVI) with iron at a poison center. *Methods:* This was an observational cohort study of unintentional ingestion of children's multivitamins with iron from a poison center database for years 2003–2007. Cases were identified retrospectively using substance codes for multivitamins plus iron, pediatric formulation only, and no fluoride. Inclusion criteria were age < 6 years, route was ingestion, call originated at home, and an outcome recorded. Health care referrals with coingestants were excluded. Case records for patients referred to a health care facility (HCF) after adoption of the guideline (2006–2007) were reviewed for compliance with the guideline and outcome. *Results:* A total of 1,901 cases were identified. Number of cases and referral rates by year are listed in the Table.

Year	2003	2004	2005	2006	2007
Total Cases	342	416	378	386	363
HCF Referral Rate (%)	8.2	5.5	3.2	0.8	1.7

Medical outcomes: "No effect" decreased from 43.7% of cases in 2003 to 23.9% in 2007. "No follow-up/minimal toxicity" increased from 6.7% in 2003 to 26.4% in 2007. "Minor effect" was consistent yearly (5.7–11%). There was one moderate and no major or death outcomes. Nine patients were referred to a HCF after guideline implementation. Of theses, 8 did not follow guideline recommendations. These 9 HCF outcomes were 4 "no effect" and 5 "minor effect". *Discussion:* Prior to the AAPC guideline (2003–2004), the center's referral of children's MVI with iron ingestions was based on an iron toxic dose calculation. After implementation (2006–2007), referrals to a HCF decreased more than 5-fold. *Conclusion:* The AAPCC iron guideline was easily implemented and impacted patient triage.

249. Observational Study of Spider Bites in Oregon

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Background: Introduced to the Pacific Northwest in the 1930's, the Hobo spider has been cited as a cause of dermo-necrotic lesion. There is little scientific evidence that Hobo spiders, or any other spider endemic to Oregon, bite humans or that bites lead to envenomation or necrosis. Unfortunately, unsubstantiated bites are often reported and have been mistaken for serious medical conditions (abscesses, Lyme disease, etc). The goal of this study was to identify and describe witnessed spider bites in the state of Oregon, where Hobo spiders are endemic. *Methods:* An extensive media campaign was used to alert the public of our interest in spider bites and to increase spider-related call volume. Patients who reported a spider bite to the Poison Center were identified and invited to participate. Inclusion criteria were any person who saw or felt themselves get bitten by a spider and physically had the spider. Patients were clinically followed by phone for 1 and 3 weeks after the bite, or until symptoms resolved in symptomatic patients. Spiders were sent via mail and identified by an arachnologist. *Results:* A total of 16 patients and spiders were included in the preliminary results. The average age was 42.2 (SD±14.4) years. Half of the human patients were male. Symptoms included: redness (87%), swelling (81%), pain (81%), itching (43%), and tingling (12%). The majority of symptoms resolved in 3 days. The spiders responsible for the bites were: funnel web spiders (5/16), cross spiders (5/16), yellow sac spiders (4/16), Mygalomorph type (1/16), Callobius species (no common name 1/16). *Discussion:* We identified several species of spiders that bit humans and produced mild transient symptoms. No hobo spiders were identified and no patients developed a dermo-necrotic lesion. The majority of patients had symptoms consistent with either mild envenomation or local irritant symptoms. *Conclusion:* We report the preliminary results of 16 patients who had identified spider bites in Oregon. This study confirms that several spiders in the Pacific Northwest are capable of biting humans and causing mild transient symptoms. Additional study is needed to further identify species responsible for envenomation and clinical outcomes.

250. Medication Identification Requests: A Challenge and an Opportunity

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Background: In 2007 our poison center responded to 83,549 information inquiries that were unrelated to actual poisoning exposures; a large number were medication identification requests (MIR). Traditionally, poison center staffing has been based upon the number of human exposure calls, not including information calls. An analysis was undertaken to determine the impact of MIR on poison center call volume and staffing. *Methods:* Data from a certified regional poison center for the years 2003–2007 were analyzed to identify MIR. The subset of MIR were extracted and analyzed by year to identify the number of calls and the time of day, day of the week and month of the year of the calls. Descriptive statistics were used to characterize the data. *Results:* Over the five year period there were 189,961 MIR. This increased from 12,401 calls in 2003 to 58,967 in 2007-a 476% increase. MIR call volume was highest from 12:00–23:00, representing 77.95% of all MIR (mean 6.50%/hour; range 4.96–7.73%/hour). MIR volume was slightly higher Monday-Friday (mean 14.64%; 14.23–14.85%) than on weekends (mean 13.40%; range 12.92–13.97%). During the months of March-December the mean MIR was 8.52% (range 8.12–8.83%). Volume was slightly lower in January (7.15%) and February (7.67%). *Discussion:* Our documentation policy for MIR helps to minimize staff time; only the medication identification code and the caller's zip code are requested. However, the large volume of MIR represents a staffing challenge since all calls are answered 'live' without the assistance of technology facilitated triage. The MIR volume shadows poison exposure calls with regard to hour of the day, day of the week and month of the year. Therefore, nothing in these analyses identified trends that suggested unusual calling patterns and the need for staffing pattern changes. *Conclusion:* If MIR are to be answered, either additional staffing or innovative technology are necessary so as not to compromise traditional poison information services. These data have the potential to be of assistance to state and federal agencies that monitor substance abuse and may be sources of funding for additional human or technology resources.

251. A Significant Xyrem® Overdose Managed Conservatively Despite High GHB Concentrations

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Background: Sodium Oxybate (Xyrem®) is licenced for use in the management of narcolepsy. The active ingredient is gamma-hydroxybutyrate (GHB). Whilst there are numerous reports of toxicity associated with recreational use of GHB, there have been few reports of overdoses of sodium oxybate. *Case Report:* A 29 year old lady presented to ED 4 hours after ingestion of 600mg/kg of a 500mg/ml preparation of sodium oxybate, which had been prescribed to her husband for the treatment of narcolepsy. On arrival she had a GCS 3/15, HR 48/min, respiratory rate 8/min, BP 85/40mmHg. Arterial blood gas showed a respiratory acidosis - pO_2 27kPa, pCO_2 7.0kPa, pH 7.17, bicarbonate 30 mmol/L on 15L/min F_iO_2. She was treated with a nasopharyngeal airway and high flow oxygen, 1L IV crystalloid and had a trial of naloxone. One hour later her GCS remained 3/15 but her BP had improved to 110/60 mmHg; her respiratory rate was 12/min and her respiratory acidosis was settling with a pH of 7.22, pCO_2 6.4kPa. In view of the improvement in her respiratory function she was managed conservatively in a critical care facility. She improved gradually and 12 hours after admission she was alert and orientated, her respiratory acidosis had resolved and she was reviewed by the psychiatrists prior to discharge from hospital. *Case Discussion:* Serum samples were analysed by gas chromatography with mass spectrometry, GHB concentrations were 569 mg/L at 7 hours post-ingestion, 377 mg/L at 8.5 hours post-ingestion and non-detectable at 24 hours post-ingestion. A urine toxicology screen was negative for recreational drugs and common sedatives. *Conclusion:* This case highlights the potential for significant GHB toxicity associated with overdose of sodium oxybate. There is controversy amongst emergency physicians on the indications for intubation and assisted ventilation in GHB poisoned patients. Further studies are required by clinical toxicologists to determine optimum management of patients with GHB toxicity and in particular, those which require more aggressive airway intervention.

252. Age-Specific Decreases in Penetrance: Evidence for Success in Preventing Pediatric Poisoning?

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Background: Statistics show a reduction in pediatric poisoning mortality rate. Hospitalization statistics also show a decline. Some poison control centers have noticed a decline in calls. The population served by the poison center has been growing very rapidly in the past decade. To ascertain whether changes in penetrance (calls per 1000 population) occurred, we compared population estimates and calls reported in 1999 and to those in 2007. *Case Report:* Population estimates were obtained from the state Department of Health for 1999 and 2007 for the coverage area. A search function allowed selection of custom age ranges for estimates. Age ranges were selected to match the age ranges in annual reports (0–5, 6–12, 13–19, adult and total). The age range 20 – 99 was selected in the represent adults. The range 0–99 was used for the total. Poison Center statistics are published on the internet. Reports are available from 1999 to 2007. Penetrance was calculated for each age range in 1999 and 2007. A percent change was calculated for each penetrance. *Case Discussion:* Penetrance for the age ranges 0–5, 6–12 and 13–19 declined, with the largest decline in the 6–12 age range.

Age-specific penetrance

	0–5	6–12	13–19	adult	0–99
1999	45.19	5.14	5.68	3.42	6.76
2007	40.33	4.39	5.5	3.48	6.47

However, penetrance for adults actually increased slightly over the nine-year period. Traditionally, poison control centers have focused on preventing poisoning in children. The poison center has had a very active outreach program, aimed at young children who comprise about 40% of the population. Both the state's population and the number of exposure calls have continued to rise, except for a one-time decrease due to reallocation of call coverage area. If outreach is effective, at some point the number or exposures would be expected to decrease. The expected result would lower penetrance. *Conclusion:* Further efforts need to be undertaken to elucidate if falling age-specific penetrance represents a measure of effective reduction in the number of poisonings occurring or a result of decreased awareness or utilization of poison control centers.

253. Gastric Bypass as a Risk Factor for 3% Hydrogen Peroxide Toxicity

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Background: Most 3 % hydrogen peroxide (3%H2O2) ingestions have few consequences. However some cases involving large pediatric ingestions or surgical irrigations have resulted in gas embolization, bowel necrosis and death. *Case Report:* This Poison Center's Toxicall data from 2000–2008 was found to have 4482 cases of ingested 3%H2O2. Twenty-one cases (16 adults > 12 years, 5 children ≤12 years) had significant gastrointestinal (GI) effects (e.g. hematemesis, dysphagia, burns or necrosis) or had prolonged symptoms (≥8 hours). Of these 21 cases, 4 cases were identified as having a history of gastric bypass (GBP).

Cases with GBP: 3% hydrogen peroxide ingestion with significant or prolonged symptoms

Years Old and Gender	Quantity (mL)	Symptoms	Symptom Duration	Treatment
45 F	120	GI pain, emesis, fever, leukocytosis, infection, computed tomography-imaged bowel wall thickening, localized perforation, ischemic bowel	6 days	IV fluids, antibiotics, IV analgesic
42 M	30–45	Emesis, epigastric pain	2–3 days	Oral fluids
63 F	15	Nausea, abdominal pain	1.5 days	Antacids, antiemetics
44 F	30	GI pain, gastric burns, emesis, necrotizing mucosal gastritis, endoscopic-visualized severe mucosal abnormalities with hemorrhagic appearance, ulceration of the jejunum	5 days	Oral fluids, GI cocktail, IV protonix, IV analgesic

The 17 cases without GBP had the following characteristics (mean and range): amount ingested 143 mL (5 - 480), and duration of symptoms 31 hours (1–120). All 4 patients with GBP required hospitalization whereas 7 of 17 (41%) of the patients without GBP were seen at hospital. *Case Discussion:* These results illustrate that 3%H_2O_2 ingestion may sometimes result in significant or prolonged symptoms. Campared to the patients with no GBP, the patients with GBP tended to ingest on average a smaller amount (50 mL versus 143 mL) and tended on average have more prolonged symptoms (90 hours versus 31 hours). Because the sample sizes were very small and the data highly variable these results did not reach statistical significance. *Conclusion:* These 4 cases are the first reports that gastric bypass may be a risk factor for significant toxicity after ingestion of 3%H_2O_2.

254. A Fatal Case of Transdermal Fentanyl (TDF) Overdose Discovered Serendipidously

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Background: Fatal cases of fentanyl OD via excessive transdermal application, ingestion, inhalation and injection have been reported. We are reporting a fatal case of TDF exposure. Serendipitously, on autopsy it was discovered that 5 fentanyl patches had been removed from the patient by a paramedic but not communicated to hospital medical personnel. *Case Report:* A 47 year old woman was found comatose and transported by EMS to an ED. Upon presentation, she was comatose with miotic pupils and had a GCS of 5. VS: BP 110/50, HR 50, RR 5/min, O_2 sat 97 % on nasal O_2. Initial abnormal lab tests: Na 130, K 5.9, Cl 94, CO_2 19, glucose 62, BUN 81, Cr 4.5, PT 51.7, PTT 43.4, INR 5.8, bilirubin 5.8, AST 8,412 and ALT 8069. PMH: + HIV. Initial management consisted of 2mg IV naloxone, which increased the RR from 5 to 10/min, although no improvement was noted in her mental status; D50 and IV NAC were given. Thirty minutes later, her BP dropped to 80/30, O_2 sat decreased to 49% and her pupils became fixed and dilated. She was intubated, placed on AV and started on IV norepinephrine to support her BP. Over the next few hours she was made a DNR by family. She rapidly deteriorated and succumbed to a CPA. The post mortem fentanyl blood level was 15 ug/L with tissues concentrations of 25 ug/kg in the brain and 66 ug/kg in the liver. On autopsy it was discovered that 5 fentanyl patches had been removed from the skin of the patient by EMS in transport, unbeknownst to medical personnel. *Case Discussion:* This case illustrates the catastrophic consequences that can result from dermal OD of fentanyl. Additional boluses of IV naloxone and infusion may have been beneficial for this patient. EMS personnel need to be informed of the significance of finding transdermal patches on patients which are commonly available for many potent medications. Significant respiratory depression has been reported at fentanyl plasma levels of 1–3 nanograms/ml. In another fatal overdose case published involving a fentanyl patch, the postmortem fentanyl level was 4 ug/L compared to 15 ug/L in this case. *Conclusion:* We report a fatal case of transdermal fentanyl overdose discovered serendipitously on autopsy. Aggressive management is required in these cases.

255. Prolonged Sedation Following a Pediatric Ingestion of Aripiprazole

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Background: Limited data exists regarding the acute adverse effects of aripiprazole in the pediatric population. We describe a case of prolonged sedation following an ingestion of aripiprazole. *Case Report:* A 2-year-old boy was found with his grandmother's aripiprazole 30 mg tablet in his mouth the night prior to arrival in the emergency department (ED). The day after ingestion, the child spent the day at daycare with abnormally increased drowsiness and lack of PO intake. He was evaluated post ingestion day 1, with a heart rate of 147 bpm, a blood pressure of 134/91 mmHg, a temperature of 98.4° F, a respiratory rate of 26, and a bedside glucose was 123 mg/dL. His physical examination was unremarkable. EKG showed a sinus tachycardia at 130 bpm and a QTC interval of 460. Serum electrolytes, liver function tests, urine drug screen, and complete blood count were all within normal limits. A serum ammonia level was found to be elevated at 75 micrograms/dL. CT scan of the head and EEG were normal. The child remained drowsy for 72 hours post-ingestion before finally returning to his baseline mental status. A repeat ammonia level was within normal limits. An aripiprazole level at 24 hours post–ingestion was 150 ng/mL, which is in the therapeutic range. *Case Discussion:* Aripiprazole has a half-life of 75 hours in CYP2D6 rapid metabolizers which may be prolonged to 146 hours in poor metabolizers. The long half-life of aripiprazole may be problematic in pediatric exposures due to prolonged sedation. Hyperammonemia has not been reported with aripiprazole in prior ingestions, but may play a role in its effects. Previous reports have not described sedation more than 30 hours post-ingestion. Prolonged sedation in the pediatric population may result in excessive invasive and non-invasive testing as well as risks for aspiration and possibly intubation. *Conclusion:* Symptomatic pediatric ingestions of aripiprazole may produce prolonged sedation.

256. Fatal Accidental Ingestion of Glyphosate in an Adult

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Background: Suicidal ingestion of glyphosate has resulted in several reported fatalities. Accidental ingestions of glyphosate have not been reported to cause death in adults. *Case Report:* A 70 year old male, forgetting that he had stored concentrated glyphosate in a soda bottle, accidentally ingested an estimated 2 to 3 ounces. The patient arrived in the emergency department with nausea, diarrhea, abdominal pain and emesis of a blue liquid similar in appearance to the product. Vital signs were normal and the patient was otherwise asymptomatic. Gastrointestinal symptoms subsided over several hours and the patient was admitted to a medical floor. Over the next 36 hours, the patient became febrile with a productive cough. About 48 hours after admission, the patient was found in respiratory distress with his airway partially obstructed by secretions and mucous. He was transferred to the ICU, and over the next 8 hours developed confusion, progressive respiratory insufficiency, acidosis, hypotension and bradycardia. The patient was intubated, ventilated, and started on blood pressure support with multiple vasopressors (norepinephrine, dopamine, vasopressin). Antibiotics were started for possible sepsis. The patient expired about 72 hours after admission. Blood cultures showed no growth of organisms. *Case Discussion:* This case is unique as a fatality in an adult after a small (<90mL) accidental ingestion. A review of Washington Poison Center data from 2000 through 2007 revealed 25 patients seen at Health Care Facilities after ingestion of glyphosate. Eight patients intended suicide and 1 resulting in death. The 17 cases of unintentional glyphosate ingestion resulted in death only in the described case only. No deaths occurred in the remaining cases. Search of the medical literature revealed no similar fatalities with small, unintended ingestions of glyphosate in adults. *Conclusion:* We report the first fatal accidental ingestion of glyphosate in an adult. Providers should be aware of this possible outcome in similar ingestions.

257. Psychosis Temporally Related to Supratherapeutic Manganese Supplementation

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Background: Manganese(Mn)-induced psychosis has been well described in the occupational setting, to our knowledge it has not been described due to supplement use. We describe a suspected case. *Case Report:* A 44 yo male with no past medical history, on no medications, presented with a first psychotic episode to an Emergency Department. Symptoms included flat affect, insomnia, depressed mood, persecuting delusions, racing thoughts, disorganized speech and behavior, and diminished insight. Physical exam, lab, and neuroimaging were unremarkable. Symptoms resolved while on risperidone within 2 days. He had been taking excessive amounts of the "brain nutritional supplement" Focus Smart, resulting in ingestion of 4mg Mn daily for 2 weeks until 3 days prior to presentation. The patients serum Mn level was 1.3 ng/mL 5 weeks post presentation and 0.8 ng/mL at 8 weeks (reference range 0.4 to .85 ng/mL). Urine Mn was 0ug/L and 0.4 ug/L at 5 and 8 weeks. Hair Mn was 0.13 mcg/gm (0.3–2.7 mcg/gm). Blood, urine and hair levels of mercury, lead, arsenic, copper and chromium were normal. The patient was asymptomatic at 8 weeks. *Case Discussion:* The RDA for Mn is 2.3 mg/day for men. The tolerable upper limit intake is 11mg/day based on a no observed adverse effect level for western diets. The neuropsychiatric effects of Mn toxicity are well documented for significant chronic toxicity, and are less likely in acute exposures. Our patient had ingested twice the RDA for two weeks, and had a serum Mn level at five weeks that was close to the upper limit of normal. His exposure was sub-acute, and resolved promptly both with removal of Mn supplementation and addition of risperidone. *Conclusion:* This patients neuropsychiatric disorder was temporally related to a supratherapeutic ingestion of Mn. Association between Mn dietary supplementation and neuropsychiatric disorders has not been reported in the literature. It is suspected that excessive Mn intake was a contributing factor to this patients psychosis. Future documentation of Mn exposure in patients with new onset psychosis would clarify if there is an association.

258. Prolonged Acidosis and Coma after Acetazolamide Overdose

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Background: There currently exists little literature on massive acetazolamide (AZA) overdoses. *Case Report:* A 56-year-old female was found unresponsive after ingesting approximately 100 tablets of AZA (250 mg) and 60 tablets of phenobarbital (15 mg). The patient was intubated and admitted to an intensive care unit (ICU). Initially, the phenobarbital (PB) level was 32 mcg/ml. The bicarbonate (HCO3) and potassium (K) were 21 and 3.1 (with a low of 2.6 mEq/L), respectively. The hypokalemia was refractory to supplemental therapy. On hospital day 2, the HCO3 was 14 mEq/L. A NaHCO3 infusion was started with minimal response. See table:

The values of PB, HCO3 and K

Days	2	3	4	5	6
PB (mcg/ml)	32	29.6	28.1	22.9	11.2
HCO3(meq/L)	14	14	12	16	17
K (meq/L)	3.8	3.6	2.6	3.4	3.1

The patient's mental status progressively deteriorated. Her EEG showed slow waves over the left temporal region. She remained intubated but did not require sedatives until day 6 and was subsequently extubated on hospital day 7. The NaHCO3 therapy was discontinued on day 6 and the anion gaps were less than 12. The patient was then transferred to the medical ward for psychiatric placement. *Case Discussion:* Acetazolamide causes electrolyte abnormalities that include non-anion gap metabolic acidosis and hypokalemia secondary to renal wasting. However, a Japanese study revealed that chronic anticonvulsant therapy could lead to acidosis secondary to carbonic anhydrase inhibition (1). We hypothesize that the acidosis may have resulted from the combined effects of PB and AZA. Also, several animal studies, revealing elevated brain PB levels in mice pretreated with AZA, suggest that AZA prolongs the barbiturate-induced sleeping time (2). *Conclusion:* Acetazolamide may potentiate the sedative effect of barbiturates. References: 1. Nagai B. Studies on the mechanism of metabolic acidosis observed in the children treated with anticonvulasants. *Hokkaido Igaku Zasshi*. 1982;57(6):706–21 2. Sato J et al. Effect of AZA on Barbiturate-induced sleeping time n mice.iii.Pharmacokinetics of serum elimination and brain distribution. *J Pharmacobiodyn.* 1983; 6(6): 381–90.

259. Octreotide-Induced Bradycardia in the Treatment of Hypoglycemia Due to Oral Sulfonylurea Overdose

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Background: Oral Sulfonylureas are widely prescribed agents used for the treatment of diabetes mellitus that act by stimulating insulin release from pancreatic cells. Overdose of this agent is a common problem confronting Emergency Physicians and Toxicologists. Octreotide inhibits the secretion of insulin from pancreatic cells, and is considered to be a safe and effective

antidote for recurrent sulfonylurea-induced hypoglycemia. There are few adverse reactions associated with the use octreotide aside from mild gastrointestinal symptoms. We report a rare case of bradycardia assoicated with IV administration. *Case Report:* A 26 year old woman ingested approximately thirty 10 mg tablets of glipizide ER during a suicide attempt. She continued to be hypoglycemic despite multiple feedings, glucose boluses, and IV dextrose. Octreotide was initiated IV at the dose of 100 mcg every 6 hours. However, after the second dose she developed respiratory distress, nausea and bradycardia with a heart rate of 42. She also had several episodes of dry heaves, but no change in blood pressure was documented. Pacer pads were placed on the patient, but did not require use. Her bradycardia resolved after a period of observation. She recovered from the overdose. *Case Discussion:* Octreotide is generally considered to be a safe antidote. It has rarely been associated with bradycardia in the treatment of diarrhea, acromegaly and other endocrine disorders. It is hypothesized that the mechanism of bradycardia is that octreotide changes liver hemodynamics by rapidly decreasing superior mesenteric artery blood flow. This results in a reduction in cardiac output with subsequent slowing of the heart along with an elevation of blood pressure. In the current case we observed a brief episode of bradycardia ocurring immediately after a dose of 100mcg of octreotide IV. *Conclusion:* We believe that this the first reported case of octreotide-induced bradycardia in the treatment setting of oral sufonylurea overdose.

260. A Pilot Study Utilizing a Novel Point of Care Test for Serum Acetaminophen Quantitation

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Background: Serum acetaminophen (APAP) determinations are not available in a number of rural health care facilities, yet APAP poisonings are common overdoses in these communities because of its over-the-counter availability and the potential for patient transportation to larger communities. *Methods:* A new point-of-care test (POCT) has been developed with a detection limit of 200µ mol/L. In a pilot study, to validate this novel POCT for APAP, we used it to determine significant APAP concentrations in real sera from patients. Seventeen samples with known APAP concentrations as determined by Abbott were also analyzed by POCT. Ten patient samples known to be negative for acetaminophen by standard testing were also tested. The testing technician was blinded to the standard results. A second study is underway using a convenience sample of consecutive overdose patients presenting to an emergency department comparing results obtained by fingerprick POCT and those obtained from standard serum APAP concentrations done on the Abbott analyzer drawn simultaneously. *Results:* All 17 patient and 10 quality control samples were in concordance with the standard test results. Emergency patient recruitment is ongoing. *Discussion:* In the health care facility where quantitative serum levels are not available, a reliable, reproducible point of care bedside test for acetaminophen could be used as a triage tool. In the appropriate clinical setting, of a presentation within 8–10 hours of a one-time ingestion of APAP, a significant positive level requires treatment with n-acetylcysteine (NAC). A level below the sensitivity of the POCT eliminates the necessity to treat with prolonged oral or shortened intravenous NAC or the expensive transportation to another facility for this treatment. *Conclusion:* Preliminary testing of a new POCT for acetaminophen shows this to be a reliable method of determining significant APAP concentrations. Ongoing studies aim to answer the question as to its role in the triage of patients for treatment decisions.

261. Radioactive Products – The Next Category of Toy? Will Parents Be Happy with a Visit from HAZMAT? A Case of Uranium Marbles Purchased over the Internet by Teens

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Background: Teenagers often seek unusual, risky products; the Internet is an easy, underregulated source of potentially dangerous products such as home GHB kits as well as instructions on making/obtaining illicit drugs. We report the first case in the medical literature involving uranium marbles purchased on the Internet resulting in HAZMAT evaluation. *Case Report:* The mother of a 16 year old discovered her son obtained glass products he said contained uranium and called PCC. The glass marbles were purchased from United Nuclear on the Internet by a classmate, and broken in transit; shards of the glass were intermixed with a yellow powder-like substance. PCC advised do not touch or inhale product and contacted The Radiation Emergency Assist Center (REAC TS) at Oak Ridge. The products contained 3% uranium. Though low risk, the uranium posed a possible environmental hazard. HAZMAT sent to site; Geiger counter revealed gamma radiation yielding a 600 counts/minute reading – low risk/barely above background. None of the involved parties have suffered from radiation toxicity. *Case Discussion:* Uranium is an alpha, beta and gamma emitter, more dense than lead. Uranium doped marbles are sold because the uranium encased in the glass glows under black light. A Google search revealed numerous sites for uranium doped marbles and other radioactive items, including Chinese radioactive gas mantles. While the uranium content was low risk, especially if not ingested, inhaled or injected, the potential for trafficking dangerous items, especially through the Internet remains high. *Conclusion:* This is the first case reported of an environmental hazard related to uranium doped marbles and demonstrates how easy radiation sources, even low dose uranium can be purchased. Radiation threats are the least emphasized in medical training. The epidemiology and sales of radioactive items via the Internet remains undetermined. Fortunately PCC, HAZMAT and REAC TS are available resources. Today the risk was low; the ubiquitous nature of radioactive sources warrants greater training and vigilance. PCC are in a unique position to provide public outreach and education.

262. A Case of Inhalational Exposure to Palytoxin

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Background: Exposure to palytoxin (PTX), described as "the most potent biological toxin on Earth", is rarely reported. To our knowledge, we present the first reported case of an inhalational exposure to PTX. *Case Report:* A 32-year-old man presented to the emergency department with shortness of breath and chest pain. The patient states that prior to arrival, he attempted to kill a Palythoa coral which was decimating the other life in his aquarium. He noted the coral secreted a mucous-like substance, and doused it with boiling water to kill it. He noted that the liberated steam had a foul odor, and that his symptoms began after inhalation. The patient denies any previous medical history including asthma or other respiratory disease. His presenting vital signs were heart rate of 120 bpm, blood pressure of 140/80 mmHg, afebrile, respiratory rate of 24 and oxygen saturation of 100% on room air. On physical examination, he was noted to have wheezing in all lung fields. A 12-lead electrocardiogram showed sinus tachycardia at 110 bpm with no ST-T wave changes and normal QRS and QTc intervals. A chest radiograph showed no infiltrates or pneumothorax. Comprehensive metabolic panel and cardiac enzymes were all normal. Complete blood count was significant for a white blood cell count of 21,000 with a normal manual differential. His repiratory symptoms improved with 3 doses of nebulized albuterol, however, his chest pain persisted. The patient was admitted for observation and was discharged after 24 hours without elevation in cardiac enzymes, dysrhythmia or other sequelae. *Case Discussion:* PTX has been well-studied, both in vitro and in animal models, and appears to be a variant of ciguatoxin. The mechanisms of action described include nonselective opening of fast sodium channels in smooth, striated and cardiac muscles resulting in depolarization and calcium influx. PTX is described to inhibit the sodium/potassium ATPase similar to cardiac glycosides without structural similarity. *Conclusion:* We describe the first human inhalational exposure to PTX, resulting in bronchospasm and chest pain. Further investigation is needed to elucidate the mechanism of these symptoms.

263. Thyroid Storm after Pediatric Ingestion of Levothyroxine

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Background: Several case series of pediatric levothyroxine (LVT) ingestions have been reported, resulting in minimal symptoms or sequelae. We report a pediatric LVT ingestion which resulted in thyroid storm. *Case Report:* A 2-year-old girl was found with an empty bottle of LVT. The mother realized that 40 tablets of her 150 mcg LVT tablets were missing. The child was referred to the emergency department (ED) by the regional poison control center where she was found to be asymptomatic with normal vital signs and physcial examination. A 6 hour post-ingestion total T4 level was 68.1 mcg/dL (5–12 mcg/dL) and a total triiodothyronine (T3) level was 472 ng/dL (40–130 ng/dL). The patient received 1 gram/kg of activated charcoal and was discharged home with daily follow up with her pediatrician and parental education on signs and symptoms of thyrotoxicosis. Serum levels of TSH, T3 and T4 were then checked on days 3, 5, 7, and 10. On day post-ingestion 5, the child presented for follow-up with a temperature of 101° F, vomiting and irritability. She was referred to the ED where she had a heart rate of 220 bpm, a BP of 130/80 mmHg, and a temperature of 101°F. She also had multiple episodes of diarrhea. The patient was treated with oral propranolol (0.8 mg/kg) every 6 hours, IV NS and ibuprofen with improvement in all her vital signs. Serial T3, T4 and TSH serum levels were performed. Total T3 levels were >800 ng/dL, 798 ng/dL, 445 ng/dL, 446 ng/dL, and 98 ng/dL on days 3, 5, 6, 9, and 13 respectively. Total T4 levels were repeated on day 13 and found to be 11.9 mcg/dL. TSH levels remained undetectable throughout. The patient was discharged home after a 4 day PICU stay on oral propranolol 0.8 mg/kg every 8 hours in good condition. Propranolol administration was discontinued 8 days after initiation with no further tachycardia, hypertension or hyperthermia. The child tolerated the recommended regimen. *Case Discussion:* Though previous reports of pediatric LVT ingestions have been relatively benign, to our knowledge, this is the first case of a child that developed iatrogenic thyrotoxicosis requiring propranolol administration for 8 days. *Conclusion:* Thyrotoxicosis is a possible consequence of pediatric LVT overdose.

264. Evaluation of "Spike's" Poison Prevention Curriculum as Implemented in the Child Care Center Environment

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Background: In 2003, the American Association of Poison Control Centers developed a poison awareness curriculum for preschoolers, "Spike's Poison Prevention Adventure" (SPPA). We evaluated the effectiveness of this curriculum as implemented in a child care center (CCC) setting. *Methods:* Forty study CCC sites were assigned randomly to be control (N=20) or intervention (N=20) groups. All parents received educational materials, and were administered a pre- and post- test survey to evaluate awareness of the PoisonHelp number and planned response to an exposure. At all study CCC sites, staff implemented the curriculum with preschoolers and performed pre- and post- child assessments to evaluate the children's intent to touch, smell, or ingest various substances. Control group children and parents received SPPA programs and materials *after* the study was completed. *Results:* The pre-test was completed by 1,006 parents, and 625 parents completed the post-test. Results from parent assessments showed a knowledge increase for both control and intervention groups. The pre-test was administered to 603 children, and 513 children participated in the post-test.

Percent of children answering "No" to each question; C =control, I = intervention

	Touch it? C	Touch it? I	Smell it? C	Smell it? I	Drink or eat it? C	Drink or eat it? I
Mouthwash	57.4	75.7	53.1	78.9	73.3	75.9
Pills	73.5	74	71.7	80.8	86.2	85.1
Fruit	15.6	28.9	23.3	36.1	27.9	37.3
Holly	60.3	77.7	57.9	76	75.5	83.9
Cleaner	70.3	78.4	69.4	82.2	86.2	86.8

Post intervention comparison of control and intervention groups (n=513).

Discussion: Parents in both control and intervention groups showed an increase in knowledge and awareness.Child assessment results indicated that control and intervention groups increased their poison knowledge, but the intervention group had a significantly greater increase in correct recognition of poisons to avoid. *Conclusion:* Implementation of the "Spike's Poison Prevention Adventure" curriculum in the child care setting produced measurable increases in knowledge among preschoolers and their parents.

265. Acetaminophen Induced Hepatotoxicity Despite Early Individualized Treatment

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Background: Experience with acetaminophen (APAP) ingestions has shown that prompt administration (within 8–10 hours) of N-acetylcysteine (NAC) prevents hepatotoxicity. Treatment is intravenous NAC for a 21-hour protocol. Some advocate continuing therapy until APAP concentration is undetectable and liver enzymes are less then 1000 IU/L. We report a patient with a massive ingestion of APAP, who developed hepatotoxicity after receiving NAC until serum APAP levels were undetectable and having normal liver enzymes during the infusion. *Case Report:* A 32-year-old female presented to an ED between 6 and 9 hours following a single acute ingestion of 1384 mg/kg of APAP. Initial serum APAP level was 534.2 mcg/ml. Oral activated charcoal was followed by intravenous NAC starting at 150 mg/kg over 1 hour, then 50 mg/kg over 4 hours, then 100 mg/kg over 16 hours. Serial APAP levels demonstrated an elimination half-life of 3.33 hours. NAC was continued at 6.25 mg/kg/hr after the initial 21-hour protocol for an additional 3 hours until serum APAP levels were less than 10 mcg/ml. Therapy was stopped 33–36 hours post ingestion. AST and ALT were 48 and 31 IU/L respectively. 5 and 11 hours later AST and ALT were 229 and 99 IU/L, then 1082 and 424 IU/L. Acetaminophen concentration was again undetectable 6 hours after the completion of infusion. NAC was restarted at 6.25 mg/kg/hr, 45–48 hours post ingestion. 75–78 hours post ingestion, AST and ALT peaked at 2289 and 948 IU/L. NAC continued an additional 56 hours until 91–94 hours post ingestion. AST and ALT were 131 and 378 IU/L. AST and ALT remained downtrending and she was discharged 200 hours post ingestion. *Case Discussion:* Patients with massive ingestion of acetaminophen may not follow typical patterns during and following treatment with NAC. Our patient developed hepatotoxicity 36 hours post ingestion, after treatment with NAC following standard protocols despite therapy continuing until serum APAP was undetectable and AST and ALT remaining normal. Further work to examine treatment in massive APAP ingestions is warranted. *Conclusion:* Further work to examine treatment in massive APAP ingestions is warranted.

266. Should No Bowel Irrigation Be a Higher Priority Than Whole Bowel Irrigation in the Treatment of Sustained-Release Product Ingestions?

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Background: Current guidelines recommend considering whole bowel irrigation (WBI) to decontaminate patients who have ingested sustained-release (SR) products. While there is theoretical benefit in this procedure, the completion of WBI is often difficult for outlying hospitals to follow poison center (PC) recommendations. Our aim is to describe the demographics & limitations with WBI in this patient population. *Methods:* All cases of SR product ingestion treated with WBI were reviewed from 7/1/2001 through 12/31/2007. Demographics, type of SR product, and events surrounding the decontamination were recorded. Endpoints of WBI were noted including whether or not the procedure was completed (ie. clear rectal effluent and/or a nasogastric tube (NG) was utilized with 2 L/hour of polyethylene glycol (PEG) solution). Descriptive statistics were used to report the data. *Results:* A total of 270 cases were managed over 6.5 years. Average age of the patients was 32 years. SR agents decontaminated were bupropion (87;32%), venlafaxine (42;16%), calcium channel antagonists (41;15%), lithium (30;11%), miscellaneous products (30;11%), beta antagonists (24;9%), and multiple coingestions (16;6%). 57 cases (21%) were noted to complete WBI while 99 (37%) did not complete the procedure. 114 cases (42%) were indeterminate. 68 cases (25%) had associated problems with WBI (ie. patients refusing to complete the procedure, no use of NG tube, no clear rectal effluent, abdominal distension, vomiting, or hypotension). 230 cases (85%) were decontaminated with activated charcoal (AC) in addition to WBI. One death occurred in a patient with abdominal distension and hypotension after ingesting diltiazem. *Discussion:* Although these data are limited by the retrospective nature of this study, some points are clear. 21% acheived complete WBI, while 37% did not. One quarter of the patients had either treatment failure or treatment related morbidity. In addition, the large majority were decontaminated concomitantly with AC. *Conclusion:* We question the utility of WBI as a routine mode of decontamination for SR products.

267. Cross-Reactivity of *Veratrum viride* Steroid Alkaloid Compounds with a Digoxin Clinical Chemistry Assay

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Background: A patient presented with nausea, vomiting, bradycardia, hypotension, and paresthesias after ingesting *Veratrum viride* (False Hellebore). The digoxin assay was positive (level 0.38 ng/mL) and the serum potassium was normal. We hypothesize that steroidal alkaloid compounds contained in *Veratrum viride* cross-react with a digoxin turbidimetric immunoassay. *Methods: Veratrum viride* extracts were obtained from two sources. Extract 1 was obtained from Washington Homeopathic Products (Burkley Springs, WV). This extract was obtained by soaking dried ground plant root material in 85% ethanol, pressed and concentrated. Extract 2 was isolated in our laboratory from *Veratrum viride* plants. Briefly, alkaloid compounds were extracted from 77.5 g plant root material with benzene-5% NH_4OH, then liquid/liquid partition from chloroform into acid then evaporated. The residues of these extracts were resuspended in one milliliter of ethanol. Ethanol samples were diluted in balanced salt solution-5% fetal bovine serum and analyzed using the Multigent® Digoxin assay on the Architect® c8000™ chemistry analyzer (Abbott Park, Abbott Laboratories). *Results:* We found that the Multigent® Digoxin detected 0.9 ng/mL "digoxin" in Extract 1, and 3.2 ng/mL "digoxin" in Extract 2. Serial dilutions of the extracts confirmed the reported digoxin concentrations were specific to compounds present in the extracts and not due to solvent interferences. *Discussion:* The results indicate that compounds contained in *Veratrum viride* extracts react positively in the Multigent® Digoxin turbidimetric immunoassay. We are currently investigating the binding affinity of the compounds isolated from *Veratrum viride* extracts to Digoxin Immune Fab. Given the similarities in clinical presentation between poisoning with *Veratrum* alkaloids and plants containing cardiac glycosides, a positive digoxin assay could result in an incorrect clinical diagnosis and prompt inappropriate treatment with digoxin immune Fab. *Conclusion:* This study indicates that extracts from *Veratrum viride* contain compounds that cross react with the digoxin turbidimetric immunoassay.

268. Perceived Severity of Clinical Effects from Toxic Exposures Reported to a Poison Control Center

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Background: Electronic data describing the nature and severity of clinical effects from human exposures reported to poison control centers (PCCs) could be used to inform resource allocation in disasters and aid referral of patients to appropriate care facilities. There are few studies on phone triage, and the accuracy of initial clinical effect severity assessments made by SPIs is unclear. The purpose of this study was to characterize the ability of SPIs to predict the severity of clinical effects on the basis of the initial PCC call. *Methods:* A PCC medical record database was modified to include tables of perceived clinical effect severity at the time of the initial call (No, Minor, Moderate, Major, Death), and the medical record's required field pop-up was changed to prompt perceived severity ratings. During a one year period, both the severity ratings for each exposure call and the medical outcome were examined. *Results:* 21,206 calls were analyzed. 8% of calls were assigned a final severity rating of moderate, major, or death. Most exposures were assigned a final rating of no or minor effect (92%). The area under the ROC curve value indicated overall SPI discrimination of severity was beyond random chance (Az=0.94 with asymmetric 95% confidence intervals (0.87, 0.97)). However, other measures indicated poor discrimination of major clinical effects from less severe effects (false negative rate=0.49, sensitivity=0.51), and poor discrimination of moderate or major effects from less severe effects (false negative rate=0.34, sensitivity=0.66). *Discussion:* The overall ability of the SPIs to predict exposure severity is strong. However, for discrimination of less frequently encountered major and moderate effects, the sensitivity decreases and the false negative rate approaches 50%. *Conclusion:* These results may reflect SPI´s cognitive bias related to the high volume of routine, less severe exposures.

269. Cardiac Toxicity Following Hydroxychloroquine Overdose Despite Early Intervention

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Background: Reported overdoses with hydroxychloroquine (HCQ) are uncommon. Cardiac conduction abnormalities following overdose may occur quickly, leading to life-threatening events. Toxic levels are unknown in humans and data regarding optimal management is limited. *Case Report:* A 32 year-old woman with asthma, seizure disorder, bipolar disorder, and lupus was evaluated in the emergency department (ED) 30 minutes after ingesting approximately 7.6 grams of HCQ, 5 mg of clonazepam, 4.5 grams of pregabalin, and 16 mg of methylprednisolone. Initial vitals were: T 99, BP 116/76, HR 96, RR 20. Mild drowsiness was noted on physical exam. Labs showed: K+ 3.0 mEq/L. Patient was given 2 doses of activated charcoal, 3 hours apart. EKGs were performed every 15 minutes. Initial EKG demonstrated a widened QRS (118ms) and prolonged QTc (524ms). Four amps of 44 mEq NaHCO3 were given in divided boluses. An epinephrine drip was initiated at 10 mcg/min for hypotension. The patient was intubated due to deterioration in mental status. In the ICU, her HR was 122 with a BP of 114/60. A repeat EKG showed a QRS of 128ms and QTc 415ms. Diazepam 80mg total was given intravenously, in addition to potassium for hypokalemia (1.9 mEq/L). The QRS (90ms) and QT (449ms) intervals subsequently stabilized, epinephrine drip was weaned off, and the patient was successfully extubated. HCQ levels were 2.4 mcg/mL on admission and 9.6 mcg/mL (range 0.1–1.0 mcg/mL) 6 hours later. Pregabalin levels were 33 mcg/mL on admission and 18 mcg/mL 6 hours later (no range). *Case Discussion:* Despite activated charcoal and prompt intervention, the HCQ level had increased dramatically 6 hours post-ingestion. Early development of QRS and QTc interval prolongation was treated successfully with NaHCO3 boluses, epinephrine, and diazepam. HCQ levels are very rarely noted, with 11 mcg/mL and 9.87 mcg/mL being the highest found. Our level (9.6mcg/mL) is among the highest reported. *Conclusion:* This HCQ overdose, confirmed by toxic levels, resulted in cardiac toxicity which was successfully treated with epinephrine, diazepam, and potassium supplementation.

270. Acute Pneumonitis and Diffuse Alveolar Hemorrhage after Cosmetic Silicone Injections

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Background: Cases of severe pneumonitis, diffuse alveolar hemorrhage (DAH), and ARDS following silicone (Si) injections have been sporadically reported, mostly in the pulmonology and pathology literature, with few in the toxicology literature. We present a case of prolonged respiratory failure following Si injections by an unknown practitioner. *Case Report:* A previously healthy 29 year-old female presented to the emergency department with dyspnea and hemoptysis 10 days after receiving gluteal Si injections. She had received similar injections 5 weeks prior as well, with about 20 injections per session. The patient was tachypneic and hypoxic, requiring intubation for respiratory failure. CT chest showed diffuse peripheral infiltrates with central sparing and bronchoalveolar lavage demonstrated DAH without eosinophilia. Workup for autoimmune etiologies of DAH was negative. Examination of the injection site did not reveal any infectious process, and biopsy confirmed Si globules. Labs showed normal

chemistries, except for a transitory elevation in liver transaminases and a persistent elevation in LDH (600–800 IU/L). Due to suspicion for an allergic pneumonitis, plasmapheresis was initiated 6 days after admission and continued over a 7 day course. Repeat CT chest 8 days after admission showed worsening infiltrates and edema. At this point, furosemide diuresis was added to ongoing empiric antibiotic coverage. Despite improvements in oxygen requirement, the patient remained ventilator dependent 3 weeks after presentation. *Case Discussion:* Si embolism resulting from large volume or improper injections is thought to underlie such cases. Previous cases have confirmed the presence of Si globules in lung biopsies and within alveolar macrophages after DAH. Given the serious morbidity and potential for other exposed persons, our case was reported to state public health officials. *Conclusion:* Our patient's clinical course of respiratory failure, acute pneumonitis, and DAH highlights the features of "Silicone Embolism Syndrome" (SES) for the toxicology community. SES detected following the unlicensed usage of Si should be reported to appropriate public health agencies.

271. Safety Profile of Oral Versus Intravenous N-acetylcysteine for Acute Ingestion of Acetaminophen

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Background: N-acetylcysteine (NAC) is widely accepted as the standard of care for APAP overdose; however, the route remains controversial. This study compared the safety of oral (PO) and intravenous (IV) forms of NAC in acute APAP ingestion (within ≤ 8-hour period), using data systematically collected by a multicenter research network of toxicology treatment centers. *Methods:* Patients treated at 11 U.S. hospitals between Jun 2006 and Dec 2007 with suspected or known APAP overdose and NAC treatment were included. Medical records were double abstracted by trained investigators. Data collected included demographics, exposure history, NAC treatment course(s), medical outcome and adverse events. Safety was characterized by the rate of adverse events (AEs). Relatedness to NAC was determined by site abstractors. *Results:* 211 patients with acute APAP ingestion and a single route of NAC exposure were included, those patients who switched between either PO or IV routes were excluded. 131 (62.1%) patients received IV NAC and 80 (37.9%) received PO NAC. Age, gender, ethnicity, weight, time to start of NAC treatment from APAP ingestion, baseline labs before NAC (ALT, AST, INR, creatinine) as well as time of baseline labs from APAP ingestion were similar between groups (p>0.05). Those receiving IV NAC had a significantly higher serum APAP level (p=0.003) and rate of vomiting after ingestion and prior to the start of NAC (p=0.015). A total of 226 AEs were reported, 63 in PO and 163 in IV. Of these, 62 AEs in 42 patients were considered drug related; 35 reported in 25 (31.3%) PO patients (mean 1.48/pt) and 27 in 17 (13.0%) IV patients (mean 1.59/pt) (p<0.001). A total of 8 serious adverse events were reported (1 PO, 7 IV) and 3 deaths (1 in PO and 2 in IV) however, none were considered NAC related. *Discussion:* Altough there were no differences in patients, IV NAC was used more frequently and there were fewer drug related AEs than PO NAC. *Conclusion:* Patients with acute APAP overdose who receive IV versus oral NAC had fewer AEs associated with NAC administration.

272. Gelcap Med Error: IV Administration of Oral 60 mg Nimodipine in an Adult with Aneurysmal Subarachnoid Hemorrhage: Resuscitation from near Arrest

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Background: Calcium antagonists reduce the risk of poor outcome and secondary ischemia after aneurysmal subarachnoid hemorrhage (aSAH). Oral nimodipine (NDP) at 60 mg p.o. q 4 hr is currently indicated for aSAH based upon the potential benefits and modest risks but is not without controversy. IV protocols for NDP exist but the dose is quite small. We could find no previous reports of an IV overdose of oral NDP of this magnitude. *Case Report:* A 70 y.o. woman with aneurysmal SAH was receiving NDP per NG in a Neuro ICU. Routine meds included two 30-mg nimodipine gelcaps which were aspirated of their contents at bedside and the liquid given per NG tube q 4 hr. An RN inadvertently injected a 60 mg dose in the patient's central line. Within less than a minute she developed severe bradycardia and hypotension. Resuscitation was performed immediately and she was tracheally intubated. The ICU contacted the MRPC for consultation. IV epinephrine, $CaCl_2$, 3 mg glucagon, high-dose dopamine (> 20 mcg/kg/min) and norepinephrine (NE) drips were given. BP rose to 90's systolic. Toxicology advised high dose insulin drip and higher doses of calcium and glucagon. At 2 hrs post arrest her Ca_i was 1.40 mmol/L (nl 1.19– 1.34). By 4 hrs post she had a BP of 110/60 mm Hg, HR 90 bpm and was stable on a ventilator. By 9 hrs NE was discontinued. Her HR was in the mid 90s with no conduction defects. She was successfully weaned off all pressors ~40 hrs post and at 65 hrs post was extubated. *Case Discussion:* Some centers have used a continuous IV NDP infusions at 0.5 mg/hr then gradually increase dose q 6 hr as tolerated until maintenance dose of 2 mg/hr. In one series of 87 patients with aSAH, 31 patients (36%) developed hypotension (<75 mm Hg) requiring reduction in NDP dosing. *Conclusion:* NDP can cause significant hypotension and could lead to cardiac arrest if given IV in high dose. Precautions should be instituted in the use of oral gelcaps of any medication at the bedside in critically ill patients who have IV and/or central venous access to prevent similar medication errors.

273. How Opioid-Acetaminophen Overdose Patients Die

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Background: In the US, more people die from opioid/acetaminophen coingestion (OAC) overdoses than from pure acetaminophen (APAP) toxicity. The physiology of APAP-induced mortality is well described, yet no reports have studied features of OAC deaths. *Methods:* We queried the Researched Abuse, Diversion and Addiction-Related Surveillance (RADARS®) System database for all deaths (2003–2007) involving hydrocodone, oxycodone, and tramadol products with a detectable serum APAP level. Cases came from 43 of 60 US poison centers. Common elements were defined by a structured chart review. *Results:* 169 reports met inclusion criteria. Ingestion time was rarely evident (7.1%), and 13.6% presented only after cardiac or respiratory arrest. The most commonly reported clinical features were metabolic acidosis, severe hepatotoxicity, and hypotension. Rhabdomyolysis and fever, uncommon features of pure APAP overdose, were common in OAC deaths. Associations between APAP, CK, and AST were not significant (p > 0.05, Kendall's tau).

Manifestations (cases with data)	Definition	Cases meeting criteria	
Metabolic acidosis (n=102)	pH ≤ 7.20	74	72.5%
Hepatotoxicity (n=135)	AST > 1,000 IU/L	95	70.3%
Hypotension (n=155)	SBP < 90 mmHg, or vasopressors used	107	69.0%
Rhabdomyolysis (n=42)	CK > 1,000 IU/L	27	64%
Fever (n=61)	T ≥ 101°F	27	44%

Poison centers recommended fomepizole and/or toxic alcohol levels in 13 cases (8%), with no positive results. Brain CT was done in 54 patients (32%); 29 scans (54%) were abnormal. No patient had a neurosurgical intervention other than ICP monitoring. *Discussion:* Patients who died prior to hospital admission rarely had APAP levels performed, and were therefore excluded. Effects of other coingestants cannot be separated from effects of OACs. Few patients had comprehensive toxicological testing. *Conclusion:* Typically, OAC deaths manifest profound acidosis, rhabdomyolysis, refractory hypotension, and shock complicated by multisystem organ failure. Brain CT scans and toxic alcohol measurements did not lead to interventions in this population. OAC overdose deaths differ strikingly from pure APAP overdose death.

274. Analysis of Accidental Acute-on-Chronic Clonidine Ingestions in Children Less Than 12 Years of Age

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Background: The outcome of acute-on-chronic clonidine ingestions in children taking clonidine therapeutically is poorly understood. Due to the potential development of tolerance to clonidine's therapeutic and adverse effects, these ingestions, may have a different clinical course than single acute ingestions. *Methods:* We retrospectively reviewed all cases of acute-on-chronic ingestions of clonidine in children under the age of 12 years reported to a large regional poison center from Jan 1, 2000 through Jan 31, 2008. Variables analyzed included the patient's weight, age, amount ingested, regular dose, and outcome. Acute-on-chronic ingestions were defined as any doses above the patient's normal daily dose. We classified effects into no effect, minimal effects (drowsiness), moderate effects (lethargy, hypotension or bradycardia) and major effects (obtundation requiring ventilatory support or profound hypotension requiring vasopressors). *Results:* 158 cases were analyzed. All patients with moderate effects had an acute ingestion of 2 times more than their regular dose. The highest acute ingestion with a lesser effect was less than 2 times more than their regular dose.

Clonidine dose-effect relationship

Clinical Effect	n	Usual dose (mcg/kg)	Added Dose (x usual dose)
All Cases	158	4.44 (0.917–15.2)	0.2–10
No Effect	32	4.37 (1.12–12.6)	0.5–2
Minimal Effect	120	4.55 (0.917–15.2)	0.2–6
Moderate Effect	6	3.53 (1.96–5.5)	2–10
Major Effect	0		

Discussion: The data suggests, given the absence of moderate or major effects in patients acutely ingesting less than 2 times their regular dose, that children may be safely left at home if the additional amount ingested is twice their regular daily dose. However, given the sample size, validation with a larger sample is desirable. *Conclusion:* Accidental acute-on-chronic clonidine ingestions of more than twice a patient's usual daily dose on a mcg/kg basis in otherwise asymptomatic children appears to be an appropriate triage value for referral to a health care facility. Validation of this work with a larger sample is desirable.

275. Puppet's Playful Role in Home Education

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Background: Teachers often use puppets to help promote learning and social interactions. The purpose of this pilot project is to evaluate the effectiveness of finger puppets in engaging parents in poison prevention discussions with their first grader. *Methods:* A convenience sample of 9 urban and rural schools (17 first grade classes and 284 students) was divided into 3 study groups (ABC). Teachers were sent 1) Spike video packet, 2) take home education materials (ed. packet), 3) parent surveys, and 4) hand puppets. Group A (86 students, 5 classes, 2 schools) received the cloth finger puppets; Group B, the control group, (101 students, 7 classes, 5 schools) did not receive puppets; Group C (97 students, 5 classes, 2 schools) received materials and instructions to make their own finger puppets in class. The teachers were asked to conduct a lesson on poison prevention and send free ed. packets, puppets (if received or made) and parent surveys home with the students. Each student received a puppet at the end of the project. The parent survey data was compared using chi-square analysis. *Results:* The parent response rate was 26% (n = 67) and similar across the 3 research groups. 100% of the respondents found the materials very or somewhat useful; however, 90% did not think they learned "anything new" from their child or the ed. packet. The percent of households with the Poison Center number posted increased in all the groups: Group A increased 171%, Group B 42% and Group C 47%.

The majority of parents spent at least 5 minutes discussing poison prevention with their child. The amount did not differ statistically among the groups (Group A = 74%, Group B = 55% and Group C = 50%). *Discussion:* This pilot study had limited participants and a larger survey needs to be done to assess the effectiveness of the finger puppets. There were also limitations at the school level with proper implementation of the lesson and program steps. *Conclusion:* Due to the low response rate, it is difficult to assess if the puppets increased poison prevention discussion in the home. However, the ed. packet appeared to stimulate conversation and increase the posting of the Poison Center phone number in all 3 groups.

276. Hymenoptera Envenomation in Vietnam

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Background: Hymenoptera stings are a common envenomation in Southeast Asia. We characterized envenomations in our local region by the type of hymenoptera, including clinical course, lab abnormalities, and outcome. *Methods:* This retrospective chart review of patients treated for Hymenoptera envenomation in the 20-bed clinical toxicology unit at the National Poison Center of Vietnam in 2002 was conducted by trained investigators. Data collected included demographics, insect identification, sting characteristics, clinical features, lab findings, treatment, and outcomes. *Results:* There were 70 patients, ages 4 to 85 yrs and 47 (67.1%) were male. Species could be identified in 60 patients: hornet 38 (54.3%), wasp 3 (4.3%), honeybee 8 (11.4%) and yellow jacket 11 (15.7%). Mean number of stings per patient was 50.5 (range 1–270).

Clinical signs & symptoms

	Hornet	Yellow jacket	Honey bee	Wasp
Clinical Features		**N=60 (%)**		
Local pain	38 (63.3)	11 (1.3)	8 (13.3)	3 (5)
Local necrosis	23 (38.3)	2 (3.3)	1 (1.6)	2 (3.3)
Rhabdomyolysis	19 (31.6)	2 (3.3)	0	0
Acute renal failure (ARF)	13 (21.6)	0	0	2 (3.3)
Urticaria	6 (10)	3 (5)	3 (5)	1 (1.6)
Hypertension	5 (8.3)	1 (1.6)	0	1 (1.6)
Coma	1 (1.6)	1 (1.6)	0	0
Anaphylaxis	1 (1.6)	1 (1.6)	0	0
Acute pulmonary edema	1 (1.6)	0	0	0
Death	1 (1.6)	0	0	2 (3.3)

Among the 15 patients with ARF, 13 required hemodialysis, which ranged from 4–13 runs (mean 7.5). Death occurred in 3 patients (4.3%); 1 died of refractory shock after hornet sting, 2 died of pulmonary complications after wasp envenomation. *Discussion:* Hymenoptera envenomations in the north of Vietnam tend to have multiple stings and can result in marked morbidity and mortality. ARF and rhabdomyolysis are common features following envenomation by the hornet requiring repeated hemodialysis. Clinical effects are mostly due to direct toxicity of the venom. Urticaria and anaphylaxis occur but are not common findings. *Conclusion:* Hymenoptera envenomations are commonly encountered in Vietnam and may result in significant renal, liver, pulmonary, and skeletal muscle damage from the venom.

277. Propoxyphene: A Drug with Unfavorable Risk-Benefit Characteristics

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Background: Propoxyphene is an opioid analgesic (OA) used to treat mild to moderate pain and approximately equivalent to ibuprofen or acetaminophen in efficacy. Exposures to propoxyphene can result in a major medical outcome or death due to cardiac dysrhythmia. It has been withdrawn from the market in the United Kingdom. *Methods:* The study aim was to assess the safety of propoxyphene in adults and children by examining the proportions of associated death relative to other known medical outcomes (KMOs) after exposure to propoxyphene and compare them to those of other schedule 2 and 3 OAs, using National Poison Data System (NPDS) data 2002–2006. Number of deaths and other KMOs, including no effect, minor, moderate and major effects were abstracted from NPDS database for propoxyphene and other OAs (buprenorphine, hydrocodone, hydromorphone, methadone, morphine, and oxycodone). Chi-squared two-tail analysis was performed using VassarStats statistics software. *Results:* Among the schedule 2 and 3 opioids, methadone had the highest proportion of deaths and hydrocodone the lowest. Propoxyphene had a higher proportion of deaths than hydrocodone.

Opioid analgesics listed in order of highest proportion of deaths

Opioid	DEA Schedule	Proportion of deaths to all KMOs	P value (compared to propoxyphene)	% of deaths in children <5 yr
Methadone	2	0.0435	<0.0002	1.4%
Morphine	2	0.0225	<0.0002	0.4%
Hydromorphone	2	0.0133	0.04	0
Oxycodone	2	0.0126	<0.0002	0.6%
Buprenorphine	2	0.0114	0.24	0
Propoxyphene	4	0.0103	----------	0
Hydrocodone	3	0.0075	<0.0002	1.5%

Discussion: Propoxyphene had fewer deaths relative to other KMOs compared to oxycodone, hydromorphone, morphine and methadone which are all schedule 2 controlled substances but more deaths relative to hydrocodone, which is schedule 3. *Conclusion:* Because propoxyphene has similar efficacy in the treatment of acute pain relative to non-opioid analgesics such as ibuprofen and acetaminophen, the risk of severe adverse outcomes seems unwarranted.

278. Persistent Cerebral Edema and Death after Hemodialysis for Chronic Salicylism

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Background: Chronic salicylate overdose results in life-threatening toxicity, including CNS, pulmonary and renal injury. It is generally assumed that outcome is improved by rapid removal of salicylate, but no good data show benefit from "standard therapy." We present a case of recurrent chronic salicicylism complicated by refractory cerebral edema and death following hemodialysis (HD). *Case Report:* A 47-year-old black female presented to hospital stating she'd ingested multiple doses of aspirin for migraine over 3–4 days. Studies revealed metabolic acidosis with primary respiratory alkalosis. Serum salicylate was 55 mg/dl. Brain CT revealed cerebral edema. Her mental status rapidly deteriorated to coma. She was intubated and ventilated, started on bicarbonate infusion and on systemic hypothermia. She underwent hemodialysis (HD), after which her intracranial pressure (ICP) normalized and she had a full recovery. Six months later she presented to the same facility with nearly identical symptoms and physical findings. Her serum salicylate was 46mg/dl. She had similar acid/base findings, and CT again revealed cerebral edema. She was again intubated and ventilated, started on bicarbonate and therapeutic hypothermia. She underwent HD with complete removal of serum salicylate, but her ICP remained elevated (>100mmHg). Her course was complicated by intracerebral hemorrhage and myocardial infarction. Care was withdrawn two weeks after HD, and she expired. Autopsy revealed diffuse cerebral edema with herniation. The cause of death was determined to be chronic salicylate poisoning. No structural or other etiology for cerebral edema was found. *Case Discussion:* Cerebral edema is rarely reported in salicylate overdose. It is unclear whether this condition is exacerbated by the sodium load in the bicarbonate infusion or by fluid shifts from HD. Was a "kindling effect" responsible for worsening the outcome of her second poisoning? *Conclusion:* This is the first documented fatality from salicylate-induced cerebral edema, occurring after rapid removal of salicylate. This case presents more questions than answers, but elucidates management considerations in this relatively rare scenario.

279. Severe Rattlesnake Envenomation in a Patient with Idiopathic Thrombocytopenia Purpura (ITP)

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Background: North American (NA) pit vipers are known to cause thrombocytopenia (TCP). We report a case of severe TCP and rapid airway loss (RAL) after rattlesnake bite in a patient with a history of ITP. *Case Report:* A 52 year-old male with a history of ITP (baseline platelets 30–50,000 uL) presented after a rattlesnake bite to the ankle while golfing. Initial BP 208/142, HR 132, and RR 12. He rapidly developed altered mentation, slurred speech with facial and oropharyngeal edema. In the field he was treated with diphenhydramine, epinephrine, and methylprednisolone. Attempted nasotracheal intubation was unsuccessful. Upon hospital arrival he was emergently intubated for severe oropharyngeal edema. The bite site had a moderate amount of swelling and ecchymosis with 2 sets of fang marks. Six vials of CroFab were initially administered. His initial platelet count was 6000 uL with normal D-Dimer and fibrinogen. He received platelets and steroids. Propofol was used for sedation but he had a short run of ventricular tachycardia and it was changed to lorazepam. His EKG had inferior S waves with diffuse ST elevation in the inferior, anterior and lateral leads. Troponin I was normal. He received 6 additional vials of CroFab and remained hemodynamically stable. Platelets improved to 80,000 uL after treatment and were 200,000 uL by discharge. INR peaked at 1.2. Swelling extended to the knee of the evenomated leg. He was extubated day 3 and discharged home on day 6 on a steroid taper. *Case Discussion:* NA rattlesnakes are known to cause coagulation abnormalities. This patient's significant TCP was likely caused by underlying ITP. The etiology of his RAL was unclear as this is an uncommon finding associated with the local snake population. While CroFab is the usual treatment for TCP from venom effect, platelets and parenteral steroids were utilized because of his history of ITP in the setting of severe TCP. *Conclusion:* We present a case of severe TCP and RAL after rattlesnake envenomation. It is important to recognize the different etiology of laboratory and clinical findings as this may dictate a change in treatment.

280. Rapid Airway Loss (RAL) after Rattlesnake (RS) Envenomation

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Background: North American RS envenomation can cause airway compromise. In Colorado, tissue injury and coagulopathy are usual findings from the most common local RS, the prairie RS (*Crotalus viridis*). RAL is uncommon. We report 3 patients bitten during a 6-week period within a limited geographic area that developed RAL. *Case Report:* Pt 1:A 46yo male was bitten by a prairie RS while hiking. He had perioral edema and shortness of breath (SOB) 50 min later. In the ED he received antivenom, epinephrine, and steroids and was intubated for significant airway swelling. There was moderate tissue swelling to bite site extending to midthigh. Extubated day 5 and discharged on day 10. Pt 2: A 52yo male was bitten by an unknown RS while golfing. He had rapid onset altered mental status with SOB. He was intubated in the ED for significant airway swelling and received antivenom, epinephrine and steroids without change. His course was complicated by severe thrombocytopenia. There was moderate tissue swelling to bite area. Extubated on day 3 and discharged on day 5. Pt 3: A 16yo female was bitten by unknown RS while hiking. She had rapid onset SOB, urticaria and hypotension. In the ED she received antivenom, epinephrine, diphenhydramine, and steroids without change. Intubated for significant airway swelling. She was stabilized and self-extubated day 3. There was moderate tissue swelling to the bite area. Discharged on day 5. *Case Discussion:* These cases represent a change in the usual local RS envenomation presentation. All required early

intubation despite moderate local swelling and mild elevations in INR. Only Pt 3 had other findings potentially consistent with an anaphylactoid reaction. None had any prior snake exposure. It is unclear if this represents a coincidence, a change in venom, or a change in local snake population. *Conclusion:* We present 3 cases of RAL in a limited geographic region and timeframe that represent a change in the usual pattern of local RS envenomation. It is important to recognize changes in patterns of presentations to anticipate patient need as well as potential changes in snake population or venom.

281. The MALAdy of Metformin Overdose. Is CVVH the Cure?

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Background: Metformin poisoning can cause lactic acidosis and multiorgan failure. Effective therapies are limited and mortality is high with significant exposure. We report the use of continuous veno-venous hemofiltration (CVVH) with severe metformin poisoning. *Case Report:* A diabetic hypertensive 49 year old presented one hour post ingestion (PI) of 60 tabs of 500mg Metformin. She was nauseated, had emesis, and developed profuse watery diarrhea. On arrival, she was awake and alert. Blood pressure was 155/88mmHg, heart rate 118 beats/minute, and respiratory rate 30 breaths/minute. Room air O2 saturation was 99%, and blood glucose was 579mg/dL. She had lactic acidosis and mild renal insufficiency (ABG 7.18/15/127/6, lactate 9.6mmol/L, creatinine 1.2mg/dL). Aspirin, ethanol, and acetaminophen were negative. She received 3L normal saline and was placed on a bicarbonate drip (3amps $NaHCO_3$ in 1L D5W) with an insulin drip (10units/hour). She was obtunded on ICU arrival (5 hours PI), with a blood pressure of 40/25mmHg, worsening acidosis and poor oxygenation (ABG 6.79/55/57/8.4/–25 on 100% FIO2). She was intubated and received additional fluid, $NaHCO_3$, and norepinephrine (titrated to 40mcg/min). CVVH on a PRISMA AN69 M100 filter (flow rate 3500ml/hour) was started 6hours PI. Metformin was 380mcg/mL 6.5hours PI (therapeutic 1–2mcg/mL). Norepinephrine was increased and phenylephrine added 12hours PI. She developed PEA requiring chest compressions and epinephrine 30hours PI. PEA recurred 20minutes later. She received atropine, epinephrine, $NaHCO_3$ and compressions. Because of worsening acidosis and refractory hypotension, her family withdrew support. She expired 31hours PI. Peak venous lactate was 39.1mmol/L 28hours PI and metformin was 97mcg/mL 28.5hours PI. Metformin T½ was 11.3hours (r^2 0.99) and clearance was 56.2mL/minute on CVVH. *Case Discussion:* Extracorporeal elimination is often recommended for metformin associated lactic acidosis (MALA) but hemodynamic instability may preclude hemodialysis. We present the calculated CVVH metformin clearance in a critically ill patient. *Conclusion:* Patients with MALA who cannot tolerate hemodialysis may benefit from prompt CVVH.

282. Effectiveness of a Poison Center Intervention on Product Coding

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Background: Countless pharmaceutical products are available on the market. Poison Centers (PC) face the challenge of correctly identifying new and similar products immediately after release. An example of this challenge involves the identification and coding of fentanyl (FT) patches after the introduction of the Mylan (MY) patch in February 2005. We assessed the impact of an educational intervention on the coding accuracy of FT patches using the RADARS System PC Signal Detection System, which is comprised of 43 US PC. *Methods:* All data from participating PC undergo a quality assurance review at the coordinating center; one aspect involves reading case notes to verify the coding for exposure reasons and specific drug products. Product coding can be altered if the case notes provide more detailed information. During this review, the coordinating center noticed a considerable percentage of fentanyl cases coded as "unknown FT patch" (UK). A memo was issued in January 2006 notifying participating PC about the differences between the three FT patches. The physical appearance of different drug delivery systems can be helpful in distinguishing between Duragesic® (DR), the "authorized generic" by Sandoz (SZ) (both use a liquid-filled drug reservoir) and MY (matrix delivery system where FT is infused throughout the adhesive layer of the patch). Cases coded for DR, SZ, MY and UK exposures during the 6 months prior to and the 9 months following the memo were identified. *Results:* The mean percentage of total FT patch cases coded as MY significantly increased from 0.5 in the 6 months prior to the memo to 21.2 in the 9 months immediately following ($p < 0.05$). The mean percentage of cases coded as UK increased from 32.0 to 41.1; however, this was not a significant change ($p > 0.05$). The mean percentage of cases coded as SZ increased from 0.2 to 7.5 ($p < 0.05$) and DR dropped dramatically from 67.2 to 30.1 ($p < 0.05$). *Discussion:* Our results indicate that educational interventions can be effective in improving coding accuracy. *Conclusion:* Alerting PC to new product differences is helpful in ensuring accurate coding.

283. Utilization of Poison Center Services in State CHEMPACK Response Plan

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Background: CHEMPACK is a federal program designed to forward deploy antidotes to be used in the event of a nerve agent release. *Case Report:* The poison center has been tasked to play an important role in the statewide response plan to a nerve agent incident. *Case Discussion:* The poison center is the determining authority in deciding to deploy CHEMPACK assets. An incident commander or health care professional must contact the poison center if a nerve agent or other organophosphate incident is suspected and request aid. If it is determined that CHEMPACK is to be deployed, the poison center contacts a host site and instructs them to open the container(s) and activate their internal CHEMPACK response plan. The poison center also acts as the allocation authority, deciding how much of each of the contents should be sent and to what locations, instructing the host site to prepare an appropriate amount of supplies to deploy. Re-allocation requests are made to the poison center, and instructions are given to host sites to prepare additional supplies for deployment. These functions are in addition to our providing information and treatment guidance to those exposed in the incident. Center staff have received additional specialized training to be able to perform these duties at any time. *Conclusion:* Poison centers have unique expertise and can play an important and valuable part of a state response plan. Poison centers should offer their services and become an integral part of emergency response plans.

284. Persistent Unilateral Blindness Following Methanol Poisoning

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Background: Methanol (MeOH) toxicity usually produces bilateral visual deficits. This is the first detailed report of unilateral blindness following methanol poisoning. *Case Report:* A 47 year-old man with history of alcoholism presented to the emergency department with dyspnea, altered mentation, and "blurry vision." On arrival, the patient was tachypneic and minimally responsive to external stimuli, requiring intubation. Vitals: T 97.8 BP 216/139 P 140 RR 22 SaO2 98% RA. The pre-intubation VBG was 6.79/31.5/59.4/4. Toxic alcohol poisoning was suspected immediately. Notable initial labs were: Na 135, K 3.7, Cl 95, HCO3 4, BUN 11, Cr 1.7, anion gap 36, serum osmolality 361, and ethanol <10 mg/dL. An ethanol infusion and a NaHCO3 drip were initiated, along with intravenous folic acid, thiamine, and pyridoxine. The patient was dialyzed until resolution of anion and osmolar gaps. Initial MeOH level was 123 mg/dL with a post-dialysis level of 17 mg/dL. Ethylene glycol was undetectable. Following extubation, the patient, who had no prior ophthalmologic history, was evaluated by ophthalmology for visual complaints. On formal exam, the patient had 20/20 acuity in the left eye but only hand motion detection from the right eye. Due to the unusual unilateral visual deficit, MRI of the brain and orbits was obtained, showing bilateral putaminal necrosis and right-sided optic neuritis. The patient was ultimately discharged on corticosteroids but, at five month follow up, had no visual recovery. Additionally, he remained persistently ataxic and dysarthric. *Case Discussion:* While our patient displayed neurologic and radiographic findings consistent with methanol-induced basal ganglia injury, the unilateral nature of his optic neuritis and vision loss is highly uncommon. MRI findings and CSF analysis did not reveal alternative causes of these visual symptoms. *Conclusion:* This is a unique case of isolated unilateral vision loss secondary to methanol poisoning, which has not been described in detail previously.

285. The Dangers Associated with Fondaparinux (FDX) and Reversal with Recombinant Factor VIIa

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Background: FDX is a synthetic selective inhibitor of Factor Xa. Elimination is primarily renal and renal impairment is an absolute contraindication. The FDA also has a boxed warning about use of epidural catheters and anticoagulants. *Case Report:* A 54 year-old woman with end stage renal disease requiring hemodialysis underwent ankle surgery for Charcot Joint. An epidural catheter was placed for post-operative pain control. Following surgery, the admission orders included FDX, the standard agent used at the hospital for DVT prophylaxis. The next day the physician recognized the contraindications in this patient and consulted hematology. Even though the patient was asymptomatic, the decision was made to reverse the FDX with recombinant Factor VIIa and remove the catheter. Hemodialysis was performed in an attempt to the increase the drug's clearance. Removal of the epidural catheter was uneventful. However, the patient's AV shunt thrombosed, resulting in the need to perform a thrombectomy, and the patient's length of stay increased by nearly 2 weeks. *Case Discussion:* A root cause analysis revealed multiple cognitive errors in that the physician involved was unaware of the FDA boxed warning, as well as the contraindication of FDX in a patient with renal failure. Additionally, the aggressive management of reversal with a procoagulant in a patient who was not bleeding was likely contributory. The hospital is now trying to address ways to decrease medication errors related to anticoagulation such as implemention of protocols that advise physicians on anticoagulation. The computer order entry system now includes a warning stating the contraindication of anticoagulation in a patient with an epidural catheter. *Conclusion:* A series of errors resulted in significant morbidity in this patient. Proactive educational and management strategies regarding inappropriate anticoagulation with FDX and other anticoagulants are needed.

286. Using GIS Tools To Evaluate Common Drugs of Abuse Trends over Time and Location

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Background: Drug identification (ID) calls to poison centers are frequent. The purpose of this study was to evaluate trends in geographic distribution of drug ID calls regarding select substances to the Maryland Poison Center (MPC) between 2005 and 2007 using geographic information systems (GIS) tools. *Methods:* Calls to the MPC in 2005–2007 coded as drug IDs were reviewed. Drugs identified by imprint codes as oxycodone, hydrocodone, methadone, or a benzodiazepine were tabulated by zip code by year. Total call volume by county and call volume normalized by population for each substance was plotted using ArcMap version 9.2. Calls were normalized using 2000–2001 census data obtained from www.census.gov. Trends in identification of these specific drugs were analyzed visually. *Results:*

Count of common substance ID'd by year

Substance	Year	Count
Oxycodone	2005	2,325
	2006	2,719
	2007	3,074
Hydrocodone	2005	1,117
	2006	1,122
	2007	1,176
Methadone	2005	275
	2006	478
	2007	464
Benzodiazepines	2005	2,092
	2006	2,213
	2007	2,448

Distribution of normalized oxycodone and hydrocodone calls appear to show trends towards following major roadways in Maryland (US Route 95, US Route 70, Maryland Route 97). In addition, identification of methadone products seems to have become more widespread across the state over time. In 2005, there were four counties with no products identified as methadone; in 2006, there were two counties with no methadone products identified; and all Maryland counties had at least one product identified as methadone during 2007. *Discussion:* Mapping specific substances identified by the MPC provides a unique visual method of evaluating trends by location and time. *Conclusion:* Use of GIS tools can be used to visually demonstrate patterns over time that might not otherwise be noted.

287. A Case Series of Pseudohyperchloremia and Negative Anion Gap Associated with Acute Salicylate Intoxication

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Background: A negative serum anion gap is rare, resulting from pseudohyperchloremia or from an increased concentration in unmeasured ions. We report three patients with acute salicylate toxicity with pseudohyperchloremia noted to be from the interaction between salicylate and the ion-selective electrode (ISE) measuring chloride. *Case Report:* All patients had signs and symptoms of acute salicylism. Only Case 1 required hemodialysis. *Case 1:* 57 year old female with salicylate level of 81 mg/dl, and chloride of 174. *Case 2:* 20 year old female with salicylate level of 45 mg/dl, and chloride of 146. Case 3: 58 year old female with salicylate level of 33 mg/dl, and chloride level of 127.

Table I

CASE	Cl 1	ASA 1	Cl 2	ASA 2	Cl 3	ASA 3
1	174	81	186	89	131	34
2	146	45	138	42	120	28
3	127	33	125	30	108	18

All were treated with gut decontamination and intravenous bicarbonate. None had other etiologies of hyperchloremia. The electrolytes were performed on the Roche Integra 800 ISE, and were verified on sequential exams. *Case Discussion:* Salicylates may represent another cause for falsely elevated chloride levels, and thus an extremely negative anion gap. The Integra ion-selective electrode module is designed for the quantitative determination of sodium, potassium, and chloride in diluted serum and plasma. Falsely high levels of chloride have been caused by the general low selectivity of the chloride electrode, which can respond to other ions such as iodide, thiocyanate, nitrate, and bromide. The potential interference of salicylate with the Roche Integra chloride electrode had been reported in vitro, but not previosly in clinical experience. This potential interaction appears to be dependent on the age of the electrode itself. The data from our patients demonstrates a fairly linear relationship between salicylate concentrations and chloride values. *Conclusion:* Perceived hyperchloremia may be related to the interaction of salicylate on the Roche Integra 800 ISE. This may prevent an anion gap from being diagnosed.

288. Multiple Intentional Snake Envenomations as Novel Drug-Seeking Behavior

Ryan ML, Arnold TC. *Louisiana Poison Center, Shreveport, LA, USA.*

Background: Snake envenomation is a relatively uncommon occurrence which has a significant risk of morbidity. Treatment often consists of narcotic pain medications along with antivenom where appropriate. *Case Report:* A review of poison center data from our State revealed 9 cases of crotalidae and 1 elapidae envenomation involving the same individual over a period of seventeen months. *Case Discussion:* Examination of case records revealed an individual who sought medical care in 8 different hospital ED's over a significant region of our State subsequent to snake envenomations. The Poison Control Center was contacted to offer management advice in these ten cases. Antivenom was recommended in eight cases along with narcotic analgesics for pain control. In eight cases the patient left the hospital ED against medical advice, including two cases in which he requested specific pain medications and was refused. Twice during hospitalizations it was noted that the patient had gone to the parking lot and removed snakes from his car to "let them get exercise". On one instance the patient was given pain medication by the ED physician, left AMA and preceded directly to another ED to repeat the process of being evaluated, repeating his complaint of severe pain and requesting specific medications for pain control. *Conclusion:* We report a case of multiple episodes of intentional snake envenomation as a drug-seeking gesture. Poison Centers should be aware of this type of behavior and be vigilant to guard against this type of abuse in the future.

289. Treatment of Methanol Poisoning without Maintenance Doses of Fomepizole during Dialysis

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Background: The major toxic effects of methanol are related to its main metabolite formic acid. Formic acid is theoretically highly dialyzable and is effectively removed by hemodialysis. Its inhibition, therefore during dialysis by fomepizole should not affect clinical outcome. We report another case of methanol poisoning treated without the recommended maintenance doses of fomepizole during dialysis. *Case Report:* A 73-year-old man presented an hour after an overdose of a de-icer fluid containing methanol and ethylene glycol. His physical examination was unremarkable. The eye examination revealed normal visual acuity. His initial pH was 7.37, CO2 11 meq/L, Cr 0.3 mg/dl and anion gap of 6.8. The patient was given and ampoule of bicarbonate and started on the loading dose of fomepizole. Repeat pH 31/2 hours later was 7.5, C02 23 meq/L, Cr 0.9 mg/dl and anion gap 6.0. The initial methanol level was 305 mg/dl and the ethylene glycol level 64 mg/dl. The patient was started on hemodialysis. He was dialyzed for 14 hours, without maintenance doses of fomepizole. Electrolytes were closely monitored, and no anion gap acidosis observed. Hemodialysis was stopped at a methanol level of 13 mg/dl. His repeat eye examination was normal with no change in visual acuity. *Case Discussion:* Concurrent use of fomepizole and hemodialysis was first reported in 1995. Fomepizole is a competitive inhibitor of alcohol dehydrogenase, and it prevents the conversion of methanol to its more toxic metabolite formic acid. However, formic acid is not protein bound and is easily dialyzable with a low molecular weight of 46 g/mol, and a volume of distribution of 0.5 L/kg. Its inhibition during dialysis may not affect clinical outcome. *Conclusion:* In our patient, hemodialysis without the use of maintenance doses of fomepizole did not result in any adverse outcome. We feel that methanol poisoning can be treated without maintenance doses of fomepizole during dialysis. This will have significant cost saving benefits and also simplify the management of methanol poisoning.

290. Gone with the Wind: Effects of Katrina/Rita on State Population and Poison Center Utilization

Ryan ML, Arnold TC. *Louisiana Poison Center, Shreveport, LA, USA.*

Background: No natural disaster in the history of the United States has prompted a greater population shift than the combined hurricanes of Katrina and Rita in August of 2005. New Orleans alone was predicted to lose half its population. Poison Center call volume in the months immediately following the storms dropped precipitously and has only begun to return to pre-storm levels two and a half years later. This study was designed to examine the relationship between population shifts and Poison Center call volume during the year before and two years after these disastrous storms. *Methods:* Population statistics for each State designated region of Louisiana were obtained for the year prior to Katrina/Rita and the following two years. Census data was obtained from the U.S. Census Bureau which utilized population estimates based on best available data for each year since the 2000 Census Report. Poison Center call volume and utilization were calculated for the corresponding regions by searching the local database by zip codes. *Results:* On the State level, while population dropped by 252,000 (5.6%), exposure call volume in the Poison Center fell by 20% in the year immediately following the disaster. In the most heavily affected New Orleans region the population diminished by 330,000 (33%) and corresponding call volume fell by 53% in the following year. Population and call volume have continued to increase in the second year following the storms but remain well below pre-disaster levels. *Discussion:* Differences between the loss of population and loss of call volume can be partially explained by the extended time-frame that many areas of the state were completely without phone service. Additionally, prior to the disaster, the New Orleans region accounted for roughly one quarter of the state's population and represented a large portion of exposure calls. While State and regional populations are rebounding slowly, call volumes appear to mirror these increases. *Conclusion:* Natural disasters causing population shifts can have profound effects on Regional Poison Center call volumes and utilization. Poison Centers should monitor utilization closely and plan for increased education efforts in disaster-stricken regions.

291. Challenges in Detection and Confirmation of Modafinil Use

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Background: Modafinil (MOD) is an alertness-promoting agent that has undergone controlled trials for use in ADHD treatment. Its precise mechanism of action remains uncertain, but appears to be associated with increased central adrenergic and reduced GABA activity, based on a mechanism distinct from that of amphetamine and/or amphetamine-like drugs. Analytical detection and confirmation of MOD may be difficult due to previously unreported similarities in its toxicoanalytic profile to that of diphenhydramine (DPH). We report a case of occult MOD use that illustrates these challenges. *Case Report:* A 16 yo female presented to the ED complaining of fast heart rate, headache, "body tingling" and fleeting chest pain. Her father reported changes in behavior that included restlessness and visual hallucinations ("bugs crawling"), and a past history of ADHD and depression. Admitted use of prescription/non-prescription drugs was limited to venlafaxine (VEN). Vitals signs: T 99.2 HR 134 BP 140/88 R 16. Physical exam was remarkable for 5–6 mm pupils, moist axillae, nondysarthric speech and intact sensorium. Labs revealed normal CBC and BMP, with nondetectable serum APAP, EtOH, or salicylate. A urine EMIT screen for drugs of abuse was negative. Further qualitative analysis of urine by GCMS was initially reported positive for VEN and DPH. Upon further inspection, the GCMS profile revealed the presence of MOD that could not be distinguished from a major DPH metabolite. Subsequent HPLC analysis of a serum specimen obtained 18 hours after initial presentation confirmed the presence of MOD at 13 mg/L (reported mean peak plasma levels after 200–600 mg: 4.8–17 mg/L) and VEN at 96 ng/mL (therapeutic reference range: 100–500 ng/mL). Further history revealed that MOD had been previously prescribed, although the patient continued to deny recent use. *Case Discussion:* Clinical features in this case were more consistent with a sympathomimetic than an anticholinergic toxidrome, and thus supported the further analytical investigation which concluded MOD rather than DPH toxicity. *Conclusion:* Analytical detection and confirmation of MOD use is subject to confounding by similarities between MOD and DPH metabolite profiles when GCMS is the chosen method.

292. Does Addition of Digoxin Immune Fab (DIGIBIND®) to Standard Supportive Care Affect K^+ or Length of Stay of Digoxin Toxic Patients?

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Background: There is wide practice variation in the use of Digoxin Immune Fab (Digibind®). The clinical effect of the use of Digibind outside the published indications is unclear. *Case Report:* IRB approved standardized chart review. Subjects identified via TrendStar® query of billing records for all digoxin concentration charges from 1/1/2005 – 12/31/2006. Medical students blinded to the purpose of the study used pre-printed collection instruments to review electronic medical records for: demographic data, digoxin concentrations, potassium (K^+) levels, Cr, total length of monitoring, hospitalization and mortality. Subjects billed for receiving

Digibind® were identified via a second TrendStar® query of the same database. Chart abstractors matched subjects from the larger database to identify closest match pairs for the variables of age, sex, presenting serum digoxin concentration and Cr between patients with an elevated digoxin concentration that received Digibind® and those that didn't. Descriptive statistics and Fisher's exact test were used to compare lengths of stay, and change in K^+ between the matched pairs. *Case Discussion:* Charges were generated for 3077 digoxin levels. There were 22 patient-encounters involving Digibind® (including 1 patient on 3 separate visits) and 3 deaths after Digibind®. No difference was found in average *presenting* digoxin concentration in patients receiving Digibind® = 3.44ng/mL (SD 2.25) and patients not receiving Digibind® = 2.81ng/mL (SD 1.45) (p=0.27; 95%CI=⁻1.76 – 0.49). Comparison of subjects matched for age, sex, Cr and digoxin revealed no difference in length of stay (244.3 hours vs. 192.4 hours; p=0.29; 95%CI= –150.3 to 46.5). Percentage change in K^+ was nearly significant between the two groups ($\triangle K^+ = 0.065$; 95%CI = ⁻0.005–0.065). *Conclusion:* In this matched pairs set of patients with elevated digoxin levels, there was no difference in length of stay or change in serum K^+ between patients that received Digibind and those that didn't.

293. Toxic Effects from Human Oral Exposure to 3-Methoxy-3-Methyl-1-Butanol (MMB)

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Background: Reed diffusers are popular as clean, attractive air-fresheners without the heat or soot elements of their scented candle counterparts. Reed diffuser liquid is made of essential oils and hydrocarbons. MMB is used to disseminate the odorant. The published data of MMB toxicity is limited to rodent screening and a single abstract presented at the 2007 NAACT meeting. We report the second human oral exposure to MMB and the first with toxic effects. *Case Report:* A healthy 2 year old male suffered a witnessed oral exposure of 2–3 ounces of reed diffuser liquid. Poison Control was contacted, and he was referred to an emergency department. Upon evaluation he was alert and interactive, but suffered oral pain and drooling. He was transferred to a children's hospital for further evaluation. During EGD evaluation he was found to have erosive esophagitis, friable mucosa, and sloughing. The patient was placed on IV proton-pump inhibition, tolerated PO at 24 hours and was discharged 30 hours post ingestion. *Case Discussion:* 3-Methoxy-3-Methyl-1-Butanol (MMB), chemical formula C6H14O2, CAS number 56539–66–3, is a colorless liquid with a slight ether odor. It is used as an ingredient in household products. In a rodent toxicity study it caused death after oral ingestion of 4000mg/kg. There have been no reports of toxic effects from lower volume ingestions. MMB has been deemed low priority for further study. This case demonstrates a small volume ingestion causing erosive esophagitis with sloughing and friable mucosa. These potential caustic effects in addition to parental frustration and worry may increase in health care spending associated with exposure to these products. *Conclusion:* We report the second human oral exposure to a Reed Diffuser Air Freshener containing (MMB) and the first with toxic effects. This is in contrast to the first reported oral exposure that exhibited no toxicity. In this case we show documented caustic injury to the esophagus via EGD. Young children are curious about these fragrant substances and are susceptible to oral ingestion. These findings and an increasing demand for reed diffusers warrant further evaluation of their potential human toxicity.

294. A Survey of Philadelphia Area Emergency Departments Regarding Preparedness for Radiation Emergencies

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Background: Radiation accidents are uncommon and US physicians have limited experience with such events. Potential radiation emergencies include exposures to individuals in industrial, military or academic settings as well as potential large-scale exposures resulting from radiological dispersal devices or nuclear device detonation. The purpose of this study was to assess the preparedness of emergency departments (EDs) in the Philadelphia area for the evaluation and treatment of radiation emergencies. *Methods:* This study employed a survey of physician ED directors at 40 hospitals in the Philadelphia area conducted in 2007. All hospitals in the Philadelphia area with EDs were included. Psychiatric and long-term care facilities were excluded. The survey was developed and vetted by a group of emergency physicians and medical toxicologists with advanced training in radiation medicine. The survey was distributed via mail. *Results:* 28 of the 40 surveys were returned (70%). The results below represent key survey responses:

Questionnaire results

	Yes	No	Don't Know
Has your ED staff received radiation emergency training in the last 5 years?	3.6 % (n=1)	89.3 % (n=25)	7.1 % (n=2)
Has your ED treated a radiation emergency in the past 5 years?	57.1 % (n=16)	39.3 % (n=11)	3.6 % (n=1)
Radiation emergency training planned in the next 6 months?	25 % (n=7)	67.9 % (n=19)	7.1 % (n=2)
How capable is your ED in treating radiation emergencies?	0% reported "very capable"		

Discussion: The potential for a large-scale exposure to radiation is a real threat. Almost 40% of Philadelphia area EDs surveyed lack the appropriate training to care for radiation exposed or contaminated patients. Despite 57% of Philadelphia EDs noting they had received training in the last five years, none stated that they felt "very capable" handling radiation emergencies. This is an indication that Philadelphia EDs may be both inadequately trained and incompletely prepared. *Conclusion:* Preparedness for radiation emergencies in the Philadelphia area is not uniform and varies by hospital. Specific action including staff training is recommended in order to elevate the level of ED preparedness with regard to radiation emergencies.

295. Making Conclusions from Serial Cases with No Adverse Outcomes

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Background: After managing a series of several patients who suffer exposures about which little is otherwise known, a practitioner frequently begins to develop an intuitive opinion about the safety of specific management options. Little guidance is available regarding the statistically firm interpretation of serial observed cases in which an adverse outcome does not occur. *Methods:* We conducted a mathematical evaluation of the basis for clinical judgments relying on serial negative findings. To do so, we modeled cases as individual Bernoulli trials, which are random variables with two possible outcomes. Each trial could result either in (1) an adverse event / poor patient outcome or (2) a "safe" outcome with lack of any adverse event. Multiple Bernoulli trials occur according to the binomial distribution. Accordingly, we used binomial parameters to calculate confidence levels that a given course of action was "safe." By calculating the upper confidence limits of a zero adverse event seen among case series of various size, we focused on the likelihood that a case series with no adverse outcome is statistically likely to predict the outcome of future cases. *Results:* After 10 sequential cases in specific circumstances are seen, the upper 95% confidence limit on the rate is still large (31%). For 15, 20 and 25 cases, the corresponding upper bounds are 22%, 17%, and 14%. Even after 50 negative cases, the calculated upper bound exceeds 7%. To achieve a calculated upper 95% confidence limit with an upper bound less than 5%, a series of sequential cases without adverse effect must include at least 72 cases; 366 cases are needed for an upper bound less than 1%. *Discussion:* Relatively large numbers of cases must be seen before a new exposure situation can be judged as "safe" on statistical grounds, even at 5% probability. *Conclusion:* The number of exposures without effects in a sequential case series required to conclude that such a future exposure is likely to be without consequences is larger than intuitively expected. Practitioners should beware of making premature conclusions on the basis of small case series.

296. Acute Intoxication with Quetiapine: A Cohort Study

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Background: Quetiapine is an atypical antipsychotic drug. Information about dose-severity-relationship in case of overdose is limited. The aim of this analysis was to find the minimal dose, that can cause severe symptoms in case of overdose. *Methods:* The analysis includes all acute monointoxications with Quetiapine registered at the Swiss Toxicological Information Centre from 2000 to 2007. Inclusion criteria were: written feedback from the treating physician with sufficient data about symptoms and evolution, age≥16 years, known ingested dose (limit of uncertainty 10%) and confirmed or likely causal relationship between overdose and clinical effect. The Poisoning Severity Score was used to assess the severity of intoxication. *Results:* 83 patients fulfilled all inclusion criteria. Patient baseline characteristics were: 61 female, 22 male; median age 31 years (16–91years); median ingested dose 2g (0.05–22g). The most often observed symptoms were CNS-depression (83.1%), tachycardia (45.8%), hypotension (20.3%), prolonged QTc interval (14.5%). 6 patients were asymptomatic. The severity of symptoms was mild in 53, moderate in 13 and severe in 11 cases. The median ingested dose was 0.88g for asymptomatic, 1.5g (0.05–10.8g) for mild, 4g (0.2–19.8g) for moderate and 6g (2.5–22g) for severe symptoms. Ingested dose had a significant influence on intoxication (p=0.0001).

Mild Symptoms		Moderate Symptoms		Severe Symptoms	
somnolence	53 (64%)	coma (GCS8–9)	7 (8%)	coma (GCS≤7)	9 (11%)
restlessness	2 (2%)	agitation	6 (7%)	multiple seizures	1 (1%)
dysarthria	5 (6%)	tachycardia (140–179bpm)	3 (4%)	sat O_2≤85%	1 (1%)
mild prolonged QTc interval	12 (15%)	hypotension BP syst. 55–79 mmHg	2 (2%)		
tachycardia (100–139bpm)	35 (42%)	sat O_2 86–90%	1 (1%)		
hypotension BP syst. <100mmHg	15 (18%)				
sat $O_2$90–94%	3 (4%)				
other minor sympt.	27 (33%)				

Discussion: Non of the patients with acute overdose of less than 2.5g developed severe symptoms. *Conclusion:* In case of overdose moderate intoxications must be expected at a dose of 200mg severe intoxication at a dose of 2.5g. Severe symptoms include coma, seizures and respiratory depression.

297. A Systematic Review of Animal Studies Using Antipsychotic Medications To Attenuate Cocaine Toxicity

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Background: The effectiveness of atypical antipsychotic medications (APMs) for the prevention of lethality due to cocaine toxicity has been debated (Wu, Acad EM, 2008). Previous work suggests that APMs may be effective in reducing the mortality seen in acute cocaine poisoning. The purpose of this study was to systematically review all studies which compared APMs to placebo for the prevention of cocaine related death in animal models. *Methods:* A PubMed search of English articles was performed using the following search terms: "haloperidol" OR "ziprasidone" OR "olanzapine" OR "chlorpromazine" [MeSH Term, Substance Name or Text Word] AND "cocaine" [MeSH Term] AND "animals" [MeSH Term]. Titles and abstracts were reviewed. Articles comparing the use of APMs to placebo for the prevention of death from

cocaine poisoning were reviewed and the following data were abstracted: APM dose, cocaine dose, animal used, number in each treatment group, survivors in each treatment group. We performed a meta-analysis to determine the relative risk (RR) with 95% CI of death for APM vs placebo using a random effects model. We performed one analysis including all APM and one stratified by APM. *Results:* We identified 10 papers reporting 27 experiments comparing various doses of ziprasidone (n=2), haloperidol (n=5) and chlorpromazine (n=3) to placebo. The study animals were: rats (n=4), mice (n=4), dogs (n=1) and monkeys (n=1). The overall relative risk was 0.83 (0.74 to 0.92) in favor of the APMs. The relative risks for haloperidol, ziprasidone and chlorpromazine were 0.94 (0.83 to 1.1), 0.49 (0.34 to 0.71) and 0.50 (0.36 to 0.70) respectively. *Discussion:* The decreased risk of death suggests that APMs are protective against cocaine toxicity. Further studies to directly compare APMs in cocaine poisoning and to compare APMs with other treatments (i.e. benzodiazepines) would be useful in determining the degree of protection and the most effective agents. *Conclusion:* Ziprasidone and chlorpromazine reduce the lethality of cocaine in animal models by approximately 50%. Haloperidol may also reduce the lethality of cocaine.

298. Results from the Nova Scotia Antidote Kit Project

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Background: The deficiency of antidote stocking in hospitals has been well documented. This project was designed to create and implement a concrete solution to this problem. *Methods:* A multidisciplinary team was assembled to develop a system for easy and timely access to antidotes in the Emergency Department (ED). A list of the most crucial antidotes was compiled through research and local surveys. A physical "kit" was created containing all necessary antidotes with an instruction manual. In 2005, antidote kits were placed in each of the eight EDs in our Health Care District. Antidotes were placed in highly visible large sealed yellow containers in the EDs. Education sessions were held for all emergency department personnel. When the kit was accessed, forms inside each kit were to be filled out by the involved health care provider and sent to the hospital pharmacy for case documentation and medication restocking. In addition, there was a reminder to call the poison centre for any case requiring an antidote. Outcome data were obtained through routine poison centre follow up calls. *Results:* Between August 2005 and March 2008, the kits were accessed 29 times in six out of the eight EDs. Nine types of antidotes were used. The three most commonly used antidotes were glucagon, fomepizole and digoxin Fab fragments and they were most commonly used for beta blocker, ethylene glycol and digoxin toxicity respectively. Just over half of the cases (15/29) were treated at the district's two university teaching hospitals. Of the 25 cases with known outcomes, there was one death which was due to calcium channel blocker toxicity. *Discussion:* The Nova Scotia Antidote Kit Project has been successfully implemented in eight EDs within this one district health authority (of eight such districts in the province). Plans for province-wide expansion are underway. Initial results from this project show that toxicity from cardiac drugs and toxic alcohols were the most common reasons for antidote usage, underscoring the importance that rapid access to antidotes is necessary. *Conclusion:* The availability of antidotes in the ED is crucial. The Nova Scotia Antidote Kit Project provides a solution to rapid access to antidotes.

299. Magnetic Object Bezoar Leading to Small Bowel Perforation

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Background: Serious toxicity and morbidity following ingestion of magnets is rare. Most magnetic objects are coated with a non-reactive to isolate metals that may be more toxic. Certain children with special needs are at increased risk for accidental ingestions. We report a patient with enteric fistulae and small bowel perforation following ingestion of multiple magnets and metallic objects. This was a recalled product. *Case Report:* A 6 yo male with a history of autism presented with a 7 d history of nausea and vomiting and a history of having passed a metallic ball on the day his parents took him to the hospital. He had minimal oral intake. Films showed multiple metallic foreign bodies. The collections in the cecum and small bowel had been pressed against each other appeared on x-ray as one mass. The patient went to the OR where they found one concretion in the stomach, one in the cecum, and two in the small bowel. The objects in the cecum and small bowel were clumped together and had perforated the bowel wall. After removal, fluoroscopy confirmed no further magnets. Post-op antibiotics and bowel rest lead to an uneventful recovery. *Case Discussion:* Perforation following metallic object ingestion is not unheard-of. However, perforation is usually due to the shape of the object. Magnets, in and of themselves, should not cause a problem with respect to ingestion. Complications arise when multiple metallic/magnetic objects are attracted to each other through bowel walls. This case was complicated by the fact that the patient was unable to provide a good history. *Conclusion:* Magnetic object ingestions may be more complicated than they first appear. While a passed metallic foreign body is reassuring, further evaluation may be indicated for evaluation of possible retained objects. Product recalls may not reach all consumers. Poison centers may wish to contact directly local agencies involved with special needs children when product recalls are announced.

300. Epidemiology of Human Poisonings in Chile

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Background: Poisonings are a public health issue in Chile. *Objective:* To describe and analyze poisoning cases received at the Poison Center of the Catholic University between the years 2006–2007. *Methods:* All calls received between January 1st, 2006 to December 31st,2007 that involved poisoning in humans were analyzed. Data was extracted from registries in the INTOX Data Management System software. Variables analyzed were: number of cases, age, gender, exposure circumstance, route of exposure and causal agent. *Results:* During the period studied there were 56,578 cases of human poisonings, 58% involved females and 41% males. The most frequent route of exposure is ingestion (78%), followed by inhalation (7%) and bite (6%). Main causal agent were pharmaceutical products (57%), followed by household products (16%), animals (8%) and pesticides (6%). Most frequent type of medication used were neurological agents (49%), of this a majority were psycholeptics (42%). The most common drug used was clonazepam. Of household products the most common product was sodium hypochlorite (22%). Most calls were received from health services (49%). Fifty-nine percent of cases were accidents and 37% were intentional (of this 94% were suicides). In suicide intents the agents involved were pharmaceutical products (88%), pesticides (4%) and household products (3%). Children of 1–4 years accounted for 30% of poisoning cases. *Discussion:* Most poisonings occur in females. The most affected age group is children 1–4 years, main causal agent are pharmaceuticals, those who act at the central nervous system are predominant, especially anxiolytics. The main toxic substances involved are clonazepam and sodium hypochlorite. Most common circumstance of exposure in children is accident and in adults suicide. *Conclusion:* Information obtained through IPCS INTOX Data Management System software of poisonings received in our center could assist to create a National Toxicovigilance Network based on updated data of the behavior of poisonings in our population, and to help create strategies to prevent poisonings.

301. Fruit-Flavored Cologne – A New Twist on the Look-Alike Problem

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Background: Marketing strategies that equate body care products with food items are increasingly popular. Several brands of body spray, perfume and cologne now feature edible-sounding fruit and dessert based products. At one local pharmacy, 5 out of 11 body sprays on the shelf were fruit flavored, and another 3 were dessert flavored (cotton candy, sugar vanilla, wild honey). These sprays all contained alcohol, and yet were 'smell-alikes' of sweet drinks. It is plausible that young children and adults with poor English literacy might incorrectly identify them as beverages, and be at risk for alcohol intoxication. *Case Report:* A 5 year old, 12 kg girl with developmental delay was found by her mother, lying in vomitus on the bathroom floor. An empty bottle of Lemonade Squeeze Body Refresher Spray containing denatured alcohol (content not further specified by manufacturer) was next to her. On arrival to the ED she was obtunded and her breath smelled of lemons. Vital signs included BP 112/60 mmHg, HR 96 beats/minute, RR 16/minute, rectal temperature 95.8° F, and capillary blood glucose of 20 mg/dL. She regained consciousness after IV administration of glucose, but remained confused and ataxic. Repeat glucose was 163 mg/dL. Her serum ethanol concentration was 121 mg/dL. The initial serum chemistry showed the following: Na+ 134 mEq/L; K+ 3.2 mEq/L; Cl- 95 mEq/L; HCO3- 10 mEq/L; BUN 23 mg/dL; creatinine 0.7 mg/dL; and glucose 24 mg/dL. Serum lactate was 3.8 mmol/L. Her metabolic acidosis quickly resolved with IV normal saline boluses. She was admitted to the PICU overnight for observation, had no further hypoglycemic episodes, and was discharged home the next morning. *Case Discussion:* Why this child drank body spray is a matter of speculation. It is possible that she mistook it for lemonade. Future research might gainfully investigate whether fruit and dessert flavored body products are particularly attractive to young children. *Conclusion:* Ingestion of body sprays, perfumes and colognes can cause consequential alcohol intoxication. Presuming a potential for misidentification and unintentional self-harm, Poisons Centers may consider including these products in their 'poisoning prevention' educational and public health initiatives.

302. *Vipera palaestinae* Bite and Serum Sickness during Pregnancy

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Background: Vipera palaestinae is the most common venomous snake in Israel. We report a case of *V. palaestinae* bite and antivenom induced serum sickness in a pregnant woman. *Case Report:* A 46 year old female, 14 weeks gestation, was admitted after snakebite in her right toe, in northern Israel. On admission: conscious, nausea, vomiting, pulse 76/minute, blood pressure 90/60mmHg, temperature 36.4°C, fang marks on toe, swelling of foot and distal leg. Laboratory workout was unremarkable. The snake's description, geographic location and clinical manifestations were compatible with *V. palaestinae* bite. She was treated supportively and with *V. palaestinae* antivenom due to borderline blood pressure, vomiting and marked progressive swelling. Resolution of manifestations followed. No fetal distress was noted throughout admission. Eight days later, rash and generalized lymphadenopathy developed. Serum sickness was diagnosed and she was treated with prednisone with complete recovery. She delivered a healthy baby on term; follow up at 2 months was normal. *Case Discussion: V. palaestinae* bite during pregnancy is potentially harmful to the fetus due to maternal hypotension and coagulopathy. Most components of *V. palaestinae* venom are high molecular weight, but it is unclear whether they cross the placenta and directly affect the fetus. *V. palaestinae* antivenom is an IgG, therefore it is expected to cross the placenta, depending on gestational age. There is no data about the safety of snake antivenoms during pregnancy; other immunoglobulin preparations are considered compatible. Corticosteroids were suggested to be associated with marginally increased risk for oral clefts in the first trimester. *Conclusion:* Favorable pregnancy outcome is reported after *V. palaestinae* bite and antivenom treatment complicated with serum sickness. Close maternal and fetal monitoring and supportive treatment are required. Risk *vs*. benefit of snake antivenom during pregnancy should be carefully considered. The same applies to corticosteroid treatment of antivenom induced serum sickness during pregnancy.

303. Acute Pediatric Malahabiya Oil Ingestion: A Case Report

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Background: Mahalabiya oil is commonly used to enhance pigmentation of newly applied Henna tattoos. Formulations vary between manufacturers and geographic region. Common ingredients include alcohols, hydrocarbons, or essential oils. Few pediatric ingestions of Mahalabiya are described in the medical literature. We report a 4-year-old boy who developed significant CNS effects after acute ingestion of Mahalabiya oil. *Case Report:* A previously healthy 4-year-old boy was brought to an emergency department by a parent 15 minutes after ingesting approximately 15–20ml of Mahalabiya Oil. The product label was written in Arabic. Ingredients were translated to be "essential oils" and noted to be "without alcohol". Interpretation

precluded the presence of ethanol, but could not rule out other forms of alcohols. Vital signs upon arrival were: HR 86 bpm, BP 85/36 mmHg, RR 23 bpm, SpO2 97% RA. His initial symptoms included intoxication-like effects and an aromatic odor emanating from his mouth. Blood glucose was 85 mg/dL. Osmol and anion gaps were checked and found to be within normal ranges. Blood alcohol content and volatile alcohol screens were negative. His lungs were clear to auscultation with no evidence of aspiration. The child became increasingly CNS depressed until his GCS reached 5 and lost his gag reflex. His pupils went from mid-position and reactive to constricted and fixed with dysconjugate gaze. As the patient was prepped for rapid sequence intubation, the patient became increasingly alert with return of the gag reflex. The child was admitted to the pediatric ICU and recovered completely. *Case Discussion:* None. *Conclusion:* Despite a favorable outcome in our patient, all pediatric ingestions of Malahabiya oil should be monitored for signs of CNS depression, aspiration, hypoglycemia, and respiratory depression.

304. Pediatric Imidazoline Poisonings as Reported to U.S. Poison Control Centers (USPCC)

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Background: While toxicologists know about imidazoline toxicity, many physicians and lay public may not understand the dangers associated with these drugs. We assessed the cases of imidazoline exposures as reported to USPCCs to guide education. *Methods:* A retrospective review of exposures reported to AAPCC in children 0–19 for the years 2000–2006 were assessed for demographics and differences in medical outcome, clinical effects and treatment. Non-parametric Chi-squared analysis was performed to assess for significance. *Results:* 14427 human exposures to imidazoline decongestants were recorded (ages: 0–19, mean age 4.1 years, 53% male). Exposures were more likely to occur in their own residences (93%). Liquid formulation was most likely to be ingested. Management occured in a non-health care facility in 70% of cases and 28% were enroute to or referred to a HCF at the time of PCC call. Activated charcoal was given in 5.3% of cases. 62% of cases had documentation on whether clinical effects occurred. While 90% of cases had no or minor effects known or suspected, 1.6% were noted to have major or moderate effects. These symptoms included drowsiness (N=129), bradycardia (62), hypotension (36), agitation (17), ocular irritation (16), and ataxia (14) among others. Tx needed include IV fluids (45), dilution (41), food (10) and naloxone (10) among others. 5 patients were intubated. Dilution and food were more likely to be recommended for those in non-HCF. No deaths occurred. No differences in reported amount ingested occurred between medical outcome groups. Significant differences were noted in regard to medical outcomes and the age of the patient ($p < 0.01$). *Discussion:* While it is rare for significant effects to occur with imidazoline overdoses, they can occur and required intensive care treatment including intubation. Significant differences were noted between medical outcome and age of the patient. Limitations exist for this study. AAPCC data does not include all imidazoline overdoses occurring in the US, and errors could occur in documentation by the specialist. *Conclusion:* While rare, imidazoline overdoses can result in moderate and major symptoms in children. Physicians and the public should be further educated on its toxicity.

305. Plasma Concentrations in Two Children with Unintentional Tetrahydrozoline Overdose

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Background: Major symptoms can occur from tetrahydrozoline (THZ) overdoses in young children requiring intensive care management. We report two cases that presented with CNS depression and cardiovascular effects where serum concentrations were performed. *Case Report:* Case #1 is a 3 yo male who ingested an unknown amount of eye drops containing THZ resulting in altered mental status, bradycardia, hypothermia, and hypotension. Case #2 is a 2 yo female who ingested 7.5 ml of eye drops containing THZ. She presented to ED without symptoms but became lethargic and bradycardic 90 min after ingestion. Both children were admitted to ICU for observation. Although Case #1 had a more prolonged course, both improved within 24 hours of ingestion. Urine obtained for drug screen was positive for THZ. Blood was obtained to assess levels. 1 mL urine or plasma containing naphazoline as internal standard was extracted. The extract was concentrated and analyzed using gas-chromatography mass-spectrometry (GC-MS). The linearity of the method is 25 ng/mL to10 mcg/mL. *Case Discussion:* Case #1 had plasma levels of 51.4 ng/mL and 23.6 ng/mL ~ 7 hours and 12 hours after ingestion. Pharmacokinetic (PK) calculations show a half-life of 4.4 hours with a peak concentration of 153.4 ng/ml, assuming first-order kinetics in a one compartment model. Other PK data is not available in humans to extrapolate a dose for this child's exposure profile. Urine concentration was 49.5 mcg/ml ~ 7 hours after ingestion. Case #2 had one level of 39.3 ng/mL at 2 hours and a urine concentration of 9.2 mcg/mL within 45 minutes of ingestion. Numerous case reports have been published documenting the dangers with ingesting these topical OTC products. These include hypotension, bradycardia and CNS depression requiring intubation. However, human PK data is not available that would help in our understanding of THZ toxicokinetics and disposition in humans after ingestion. Using GC-MS, concentrations can be obtained in plasma and urine. *Conclusion:* We report two pediatric cases after ingestion of THZ where plasma concentrations were obtained with a calculated half-life of 4.4 hours in one case. Due to lack of human PK data, other parameters cannot be calculated.