



2010 Annual Report of the American Association of Poison Control Centers' National Poison Data System (NPDS): 28th Annual Report

Alvin C. Bronstein, Daniel A. Spyker, Louis R. Cantilena, Jody L. Green, Barry H. Rumack & Richard C. Dart

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2010 Annual Report of the American Association of Poison Control Centers' National Poison Data System (NPDS): 28th Annual Report

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Table of Contents

Abstract.....	914
Introduction.....	914
<i>What's New in NPDS and the Annual Report</i>	914
<i>The NPDS Application</i>	915
<i>Limitations and Plans</i>	915
Methods.....	916
<i>Characterization of Participating Poison Centers and Population Served</i>	916
<i>Call Management – Specialized Poison Exposure Emergency Providers</i>	916
<i>NPDS – Near Real-time Data Capture</i>	916
<i>Annual Report Case Inclusion Criteria</i>	917
<i>Statistical Methods</i>	917
<i>NPDS Surveillance</i>	917
<i>Fatality Case Review and Abstract Selection</i>	917
<i>Pediatric Fatality Case Review</i>	918
Results.....	918
<i>Information Calls to Poison Centers</i>	918
<i>Exposure Calls to Poison Centers</i>	919
<i>Age and Gender Distributions</i>	922
<i>Caller Site and Exposure Site</i>	922
<i>Exposures in Pregnancy</i>	922
<i>Chronicity</i>	922
<i>Reason for Exposure</i>	922
<i>Scenarios</i>	923
<i>Reason by Age</i>	923
<i>Route of Exposure</i>	924
<i>Clinical Effects</i>	924
<i>Case Management Site</i>	925
<i>Medical Outcome</i>	925
<i>Decontamination Procedures and Specific Antidotes</i>	925
<i>Top Substances in Human Exposures</i>	926
<i>Changes from Last Year</i>	926
<i>Distribution of Suicides</i>	927
<i>Plant Exposures</i>	928
<i>Deaths and Exposure-related Fatalities</i>	928
<i>All fatalities – all ages</i>	929
<i>Pediatric fatalities – age ≤5 years</i>	936
<i>Pediatric fatalities – ages 6–12 years</i>	937
<i>Adolescent fatalities – ages 13–19 years</i>	937
<i>Pregnancy and Fatalities</i>	937
<i>AAPCC Surveillance Results</i>	938
<i>2010 Gulf of Mexico Oil Spill</i>	939
<i>THC Homologs and Bath Salts</i>	940
Discussion.....	940
Summary.....	940
References.....	940
Disclaimer.....	941

Appendix

Table 21. Listing of Fatal Nonpharmaceutical and Pharmaceutical Exposures.....	i
Table 22A. Demographic profile of SINGLE SUBSTANCE Nonpharmaceuticals exposure cases by generic category.....	xcviii
Table 22B. Demographic profile of SINGLE SUBSTANCE Pharmaceuticals exposure cases by generic category.....	cxviii
Appendix A – Acknowledgments.....	cxl
<i>NPDS Toxicology Quote of the Day</i>	cxl
<i>Poison Centers (PCs)</i>	cxl

<i>Fatality Review Team</i>	cxlii
<i>AAPCC Micromedex Joint Coding Group</i>	cxliii
<i>AAPCC Rapid Coding Team</i>	cxliii
<i>AAPCC Surveillance Team</i>	cxliii
<i>Regional Poison Center (PC) Fatality Awards</i>	cxliii
Appendix B – Data Definitions.....	cxliv
<i>Reason for Exposure</i>	cxliv
<i>Medical Outcome</i>	cxliv
<i>Relative Contribution to Fatality (RCF)</i>	cxlv
Appendix C – Abstracts of Selected Cases	cxlv
<i>Selection of Abstracts for Publication</i>	cxlv
<i>Abstracts</i>	cxlv
<i>Abbreviations & Normal ranges for Abstracts</i>	clxix

List of Figures and Tables

Figure 1. Human Exposure Calls, Information Calls and Animal Exposure Calls by Day since 1 January 2000	919
Figure 2. All Drug Identification and Law Enforcement Drug Identification Calls by Day since 1 January 2000	921
Figure 3. Health Care Facility (HCF) Exposure Calls and HCF Information Calls by Day since 1 January 2000.....	922
Figure 4. Change in Encounters from 2009 to 2010 with Graphical Breakdown of Exposure Calls	932
Figure 5. Gulf Oil Spill Encounters per Day	933
Figure 6. Emerging Trends: Bath Salts and THC Homologs Exposures	933
Figure 7. Human Exposure Calls By Year 2000–2010 – Top 4 Categories	934
Table 1A. AAPCC Population Served and Reported Exposures (1983–2010).....	918
Table 1B. Non-Human Exposures by Animal Type.....	919
Table 1C. Distribution of Information Calls	919
Table 2. Site of Call and Site of Exposure, Human Exposure Cases	922
Table 3A. Age and Gender Distribution of Human Exposures	923
Table 3B. Population-Adjusted Exposures by Age Group.....	923
Table 4. Distribution of Age ^a and Gender for Fatalities ^b	924
Table 5. Number of Substances Involved in Human Exposure Cases	924
Table 6A. Reason for Human Exposure Cases	924
Table 6B. Scenarios for Therapeutic Errors ^a by Age ^b	925
Table 7. Distribution of Reason for Exposure by Age	926
Table 8. Distribution of Reason for Exposure and Age for Fatalities ^a	927
Table 9. Route of Exposure for Human Exposure Cases.....	927
Table 10. Management Site of Human Exposures	928
Table 11. Medical Outcome of Human Exposure Cases by Patient Age ^a	928
Table 12. Medical Outcome by Reason for Exposure in Human Exposures ^a	929
Table 13. Duration of Clinical Effects by Medical Outcome.....	929
Table 14. Decontamination and Therapeutic Interventions	930
Table 15. Therapy Provided in Human Exposures by Age	930
Table 16A. Decontamination Trends (1985–2009).....	931
Table 16B. Decontamination Trends: Total Human and Pediatric Exposures ≤5 Years (2010) ^a	932
Table 17A. Substance Categories Most Frequently Involved in Human Exposures (Top 25).....	934
Table 17B. Substance Categories with the Greatest Rate of Exposure Increase (Top 25).....	935
Table 17C. Substance Categories Most Frequently Involved in Pediatric (≤5 years) Exposures (Top 25) ^a	935
Table 17D. Substance Categories Most Frequently Involved in Adult (≥20 years) Exposures (Top 25) ^a	936
Table 17E. Substance Categories Most Frequently Involved in Pediatric (≤5 years) Deaths ^a	936
Table 17F. Substance Categories Most Frequently Identified in Drug Identification Calls (Top 25).....	937
Table 17G. Substance Categories Most Frequently Involved in Pregnant Exposures ^a (Top 25)	937
Table 18. Categories Associated with Largest Number of Fatalities (Top 25) ^a	938
Table 19A. Comparisons of Death Data (1985–2010) ^a	938
Table 19B. Comparisons of Direct and Indirect Death Data (2000–2010) ^a	939
Table 20. Frequency of Plant Exposures (Top 25) ^a	939

Appendix

Table 21. Listing of Fatal Nonpharmaceutical and Pharmaceutical Exposures.....	i
Table 22A. Demographic profile of SINGLE SUBSTANCE Nonpharmaceuticals exposure cases by generic category	xcviii
Table 22B. Demographic profile of SINGLE SUBSTANCE Pharmaceuticals exposure cases by generic category	cxviii

Abstract

Background: This is the 28th Annual Report of the American Association of Poison Control Centers' (AAPCC) National Poison Data System (NPDS). All US poison centers upload case data automatically with a median time interval of 19.0 [11.9, 40.6] (median [25%, 75%]) minutes, creating a near real-time national exposure and information database and surveillance system.

Methodology: We analyzed the case data tabulating specific indices from NPDS. The methodology was similar to that of previous years. Where changes were introduced, the differences are identified. Poison center cases with medical outcomes of death were evaluated by a team of 33 medical and clinical toxicologist reviewers using an ordinal scale of 1 (Undoubtedly responsible)–6 (Unknown) to determine Relative Contribution to Fatality (RCF) of the exposure to the death.

Results: In 2010, 3,952,772 closed encounters were logged by NPDS: 2,384,825, human exposures, 94,823 animal exposures, 1,466,253 information calls, 6537 human confirmed nonexposures, and 334 animal confirmed nonexposures. Total encounters showed a 7.7% decline from 2009 while health care facility calls *increased* by 2.7%. Human exposures with more serious outcomes (minor, moderate, major or death) *increased* 4.5% while those with less serious outcomes (all other medical outcome categories) decreased 5.9%. All information calls decreased 12.6% and health care facility (HCF) information calls decreased 13.6%, Drug ID calls decreased 10.9%, and human exposures decreased 3.8%. The top 5 substance classes most frequently involved in all human exposures were analgesics (11.5%), cosmetics/personal care products (7.7%), household cleaning substances (7.3%), sedatives/hypnotics/antipsychotics (6.0%), and foreign bodies/toys/miscellaneous (4.2%). Analgesic exposures as a class increased the most rapidly by 32.8% over the last decade. The top five most common exposures in children age 5 years or less were cosmetics/personal care products (13.2%), analgesics (9.4%), household cleaning substances (9.2%), foreign bodies/toys/miscellaneous (7.2%), and topical preparations (6.8%). THC homolog and designer amphetamine ("Bath Salts") exposures were identified as emerging public health threats. Drug identification requests comprised 64.3% of all information calls. NPDS documented 1730 human exposures resulting in death with 1146 human fatalities judged related with an RCF of 1–Undoubtedly responsible, 2–Probably responsible, or 3–Contributory.

Conclusions: These data support the continued value of poison center expertise and need for specialized medical toxicology information to manage the more severe exposures, despite a decrease in calls involving less severe exposures. Unintentional and intentional exposures continue to be a significant cause of

morbidity and mortality in the US. The near real-time, always current status of NPDS represents a national public health resource to collect and monitor US exposure cases and information calls. The continuing mission of NPDS is to provide a nationwide infrastructure for public health surveillance for all types of exposures, public health event identification, resilience response and situational awareness tracking. NPDS is a model system for the nation and global public health.

Introduction

This is the 28th Annual Report of the American Association of Poison Control Centers' (AAPCC; <http://www.aapcc.org>) National Poison Data System (NPDS).¹ On 1 January 2010, sixty regional Poison Centers (PCs) serving the entire population of the 50 United States, American Samoa, District of Columbia, Federated States of Micronesia, Guam, Puerto Rico, and the US Virgin Islands submitted information and exposure case data collected during the course of providing telephonic patient tailored exposure management and poison information. On 17 December 2010, the Western New York Poison Center (Buffalo) serving Western New York ceased operations. The Ruth A. Lawrence Poison Center (Rochester) closed on 30 December 2010. The Long Island Regional Poison Control Center (Mineola) ceased operations on 31 December 2010. New York State is now served by two poison centers based in New York City and Syracuse. During this transition national coverage remained seamless.

NPDS is the data warehouse for the nation's poison centers. Poison Centers (PCs) place emphasis on exposure management, accurate data collection and coding, and the continuing need for poison related public and professional education. The PC's health care professionals are available free of charge to all, 24-hours a day, every day of the year. PCs respond to questions from the public, health care professionals, and public health agencies. The continuous staff dedication at the regional PCs is manifest as the number of exposure and information call encounters exceeds 3.9 million annually. PC encounters either involve an exposed human or animal (EXPOSURE CALL) or a request for information (INFORMATION CALL) with no exposed person or animal.

What's New in NPDS and the Annual Report

Several enhancements were made to the tables and figures for this report. Continuing goals of the writing team have been to remove inconsistencies, improve the reader's ability to clearly understand the data, and provide additional data where appropriate. Two new tables have been added to this year's report: Table 3B Population-Adjusted Exposures by Age Groups and Table 17G Substance Categories Most Frequently Involved in Pregnant Exposures (Top 25).

This year, the AAPCC Fatality Review team did not review death (indirect report) cases. Death (indirect report) cases are reports identified through other sources (news feeds, medical examiner data or other) about which no inquiry to the PC was made. In previous years, both death and death (indirect report) cases were reviewed and included in the

WARNING: Comparison of exposure or outcome data from previous AAPCC Annual Reports is problematic. In particular, the identification of fatalities (attribution of a death to the exposure) differed from pre-2006 Annual Reports (see Fatality Case Review—Methods). Poison center death cases are described as all cases resulting in death and those determined to be exposure-related fatalities. Likewise, Table 22 (Exposure Cases by Generic Category) since year 2006 restricts the breakdown including deaths to single-substance cases to improve precision and avoid misinterpretation.

tables. This year, all the tables related to fatalities contain only death cases with an AAPCC Relative Contribution of Fatality (RCF) of 1, 2, or 3, except Tables 11, 12, 19A, 19B, and 21 which also contain death (indirect report) cases—see list below:

Table	Fatalities Included	RCF	Number of Deaths
4	Death only	1,2,3	1,146
5	Death only	1,2,3	1,146
8	Death only	1,2,3	1,146
9	Death only	1,2,3	1,146
11	Death and Death (indirect report)	All	1,730
12	Death and Death (indirect report)	All	1,730
17E	Death and Death (indirect report)	All	1,730
18	Death only	1,2,3	1,366
19A	Death and Death (indirect report)	All	1,730
19B	Death and Death (indirect report)	All	1,730
21	Death and Death (indirect report)	1,2,3	1,366
22	Death and Death (indirect report) - Single substance deaths only	All	764

Enhancements were added to the NPDS Fatality module to aid the fatality team in performing their review. The assignment of the Annual Report ID for the fatality cases included in Table 21 has now been automated. This will allow the cases in Table 21 to be easily identified when responding to Annual Report questions or comments.

Throughout the year the AAPCC Micromedex Joint Coding Group reviews the Generic Codes and responds to questions and requests for new generic codes. The group consists of AAPCC members and editorial and lexicon staff from Micromedex Poisindex® (Micromedex Healthcare Series [Internet database]. Greenwood Village, CO: Thomson Reuters [Healthcare] Inc.). New Product Codes and AAPCC Generic Codes were added to NPDS to address emerging products. In 2010, new generic codes were added for the following six product classes:

1. Electronic Cigarettes
2. Energy Drinks
3. Hand sanitizers
4. Opioids
5. Tetrahydrocannabinol (THC) Pharmaceuticals
6. Tetrahydrocannabinol (THC) Homologs

At the time of this report, there were 965 active and 12 obsolete generic codes. The active codes are divided into Non-Pharmaceutical (541) and Pharmaceutical (424) groups. These two groups are further divided into Major (67) and Minor (167) categories. New products associated with these classes were also added by Micromedex. Addition of these generic codes provides enhanced report granularity as reflected in Table 22. Because the new codes were added at different times during the year, the numbers in Table 22 may not accurately reflect all of the cases in these categories, and for completeness certain categories require customized data retrieval until these categories have been in place for a minimum of a full year or more (2011 forward).

The NPDS Application

In 2010, numerous enhancements were introduced in the NPDS web-based application. Many of these focused on enhancing enterprise reports and surveillance functions. One hundred sixty-nine (169) enterprise reports now return multi-year results. The Case Log reports were expanded to support any combination of 24 separate search parameters and nine (9) different result formats. NPDS Case Log reports now support a variety of outputs including case line listing, daily and monthly counts, time series charts, and US maps. Case Log Counts Reports were added that stratify the results based on user defined classifications. To simplify product selection for reports, a new product selection function was added that displays products associated with a specific AAPCC Generic Code. Finally, a new National Case Log report was added that allows Regional Poison Centers to use the power of the Case Log (Generic Code) report to execute a national case listing without geographic or case identifiers.

New surveillance functions were added to support information call and animal call volume surveillance. To aid the AAPCC Surveillance Team anomaly review, a 'Pending' Status indicator was added for all anomalies to allow users to identify anomalies that are in the process of being analyzed. In addition, a new Case Classification parameter was added to the Case Based anomalies to allow users to classify the anomaly.

To provide centers with more information on public health events, a Special Projects report was added to the NPDS enterprise reporting system. This report provides geocentric reporting of AAPCC defined products for real time event monitoring. For example, the NPDS report was utilized by regional poison centers to access national cases related to the Gulf of Mexico Oil spill in real-time.

NPDS aggregate and case detail web services operate continuously, allowing external systems or viewers to analyze NPDS data in ways not otherwise possible in the NPDS application. The aggregate web service provides total call volume, human exposure call volume, or clinical effects counts allowing an external system such as RODS (Realtime Outbreak and Disease Surveillance, University of Pittsburgh, Department of Biomedical Informatics) to create time-series or GIS displays. Unique to NPDS, the aggregate case count web service is not only accessible by external computer systems but also directly by system users to create their own time series without the need for external system software. Two state health departments utilize the case detail web service to analyze data from their PCs. Four state health departments access the aggregate count web service for data. The web services allow NPDS data to be provisioned in a federated manner where the data is always current in NPDS and can be readily accessed as needed without the need for costly cloning and warehousing.²

Limitations and Plans

As outlined above, the encounters (exposure reports and information questions) which comprise NPDS are collected from spontaneous, self-reported calls made to US PCs. Exposures

in NPDS comprise a portion of the total number of incidents that occurred. These reflect the limitations of this type of passive reporting system (see DISCLAIMER).

Most of the 390,000 proprietary and non-proprietary drugs, chemicals, and biological agents including food poisoning agents in the NPDS products data base are classified by their primary active ingredient into one of 965 AAPCC generic codes. Some multiple ingredient products are coded to multiple product generic codes (e.g., acetaminophen with hydrocodone). Table 22 and other tables reporting information by generic category are organized by this system. Thus our current review and reporting methods do not necessarily distinguish between the individual components of a combination product.

Nonetheless, the scope and immediacy of these data have much to offer. In particular, the 28-years history offers a unique opportunity to assess the long term (secular) trends in exposures and information calls.

There are a number of plans to improve the data system and reporting for 2010 and beyond including:

- Enhancements to NPDS real-time geographic information system (GIS) with more data display options for appropriate data analyses;
- Enhancements to case-based surveillance systems;
- Continued improvements in data quality edits;
- Implement security paradigm enhancements to support specific product access for reports and surveillance;
- Enterprise report enhancements;
- New auto-upload requirements and improved solution;
- Lexicon based analysis of the current generic code system to better meet current exposure tracking and surveillance needs;
- Review and analysis of NPDS clinical effect coding terminology.

These and other initiatives are under continuous review by the AAPCC Board, NPDS Steering Committee, and CDC.

Methods

Characterization of Participating Poison Centers and Population Served

Sixty participating centers submitted data to AAPCC through 17 December 2010, 59 participating centers submitted data to AAPCC through 30 December 2010, 58 participating centers submitted data to AAPCC through 31 December 2010, with the total center count decreasing to 57 for the remainder of 2010. Fifty-seven centers (95%) were accredited by AAPCC as of 1 July 2010. The entire population of the 50 states, American Samoa, the District of Columbia, Federated States of Micronesia, Guam, Puerto Rico, and the US Virgin Islands was served by the US PC network in 2010.^{3,4}

The average number of human exposure cases managed per day by all US PCs was 6,534. Similar to other years, higher volumes were observed in the warmer months, with a mean of 6,950 cases per day in June compared with 6,305

per day in January. On average, US PCs received a call about an actual human exposure every 13.2 sec.

Call Management – Specialized Poison Exposure Emergency Providers

Most PC operations management, clinical education, and instruction are directed by Managing Directors (most are PharmDs and RNs with American Board of Applied Toxicology [ABAT] board certification). Medical direction is provided by Medical Directors who are board-certified physician medical toxicologists. At some PCs, the Managing and Medical Director positions are held by the same person.

Calls received at US PCs are managed by healthcare professionals who have received specialized training in toxicology and managing exposure emergencies. These providers include medical and clinical toxicologists, registered nurses, doctors of pharmacy, pharmacists, chemists, hazardous materials specialists, and epidemiologists. Specialists in Poison Information (SPIs) are primarily registered nurses, PharmDs, and pharmacists. They work under the supervision of a Certified Specialist in Poison Information (CSPI). SPIs must log a minimum of 2,000 calls over a 12-month period to become eligible to take the CSPI examination for certification in poison information. Poison Information Providers (PIPs) are allied healthcare professionals. They manage information-type and low acuity (non-hospital) calls and work under the supervision of a CSPI. Of note is the fact that no nursing or pharmacy school offers a toxicology curriculum designed for PC work and SPIs must be trained in programs offered by their respective PC. Centers are accredited by the AAPCC meeting strict standards and must be reaccredited every 5 years.

NPDS – Near Real-time Data Capture

Launched on 12 April 2006, NPDS is the data repository for all of the US regional PCs. In 2010, all 60 of the 60 US PCs uploaded case data automatically to NPDS through 17 December 2010. The center count decreased to 59 as of 17 December 2010, to 58 as of 30 December 2010 and to 57 as of 31 December 2010. All centers submitted data in near real-time making NPDS one of the few operational systems of its kind. PC staff record calls contemporaneously in 1 of 4 case management systems. Each center uploads case data periodically as it is entered. The time to upload data for all PCs is 19.9 [9.7, 58.7] (median [25%, 75%]) minutes creating a real-time national exposure database and surveillance system.

The web-based NPDS software facilitates detection, analysis, and reporting of NPDS surveillance anomalies. System software offers a myriad of surveillance uses allowing AAPCC, its member centers and public health agencies to utilize NPDS US exposure data. Users are able to access local and regional data for their own areas and view national aggregate data. The application allows for increased “drill-down” capability and mapping via a geographic information system (GIS). Custom surveillance definitions are available along with ad hoc reporting tools. Information in the NPDS

database is dynamic. Each year the database is locked prior to extraction of annual report data to prevent inadvertent changes and ensure consistent, reproducible reports. The 2010 database was locked on 9 October 2011 at 0930 hr EDT.

Annual Report Case Inclusion Criteria

The information in this report reflects only those cases that are not duplicates and classified by the regional PC as CLOSED. A case is closed when the PC has determined that no further follow-up/recommendations are required or no further information is available. Exposure cases are followed to obtain the most precise medical outcome possible. Depending on the case specifics, most calls are “closed” within the first hours of the initial call. Some calls regarding complex hospitalized patients or cases resulting in death may remain open for weeks or months while data continues to be collected. Follow-up calls provide a proven mechanism for monitoring the appropriateness of management recommendations, augmenting patient guidelines, and providing poison prevention education, enabling continual updates of case information as well as obtaining final/known medical outcome status to make the data collected as accurate and complete as possible.

Statistical Methods

All tables except Tables 3B and 17B were generated directly by the NPDS web-based application and can thus be reproduced by each center. The figures and statistics in Tables 3B and 17B were created using SAS JMP version 9.0.0 (SAS Institute, Cary, NC) on summary counts generated by the NPDS web-based application.

NPDS Surveillance

As previously noted, all of the active US PCs upload case data automatically to NPDS. This unique near real-time upload is the foundation of the NPDS surveillance system. This makes possible both spatial and temporal case volume and case based surveillance. NPDS software allows creation of volume and case based definitions. Definitions can be applied to national, regional, state, or ZIP code coverage areas. Geocentric definitions can also be created. This functionality is available not only to the AAPCC surveillance team, but to every regional PC. PCs also have the ability to share NPDS real-time surveillance technology with external organizations such as their state and local health departments or other regulatory agencies. Another NPDS feature is the ability to generate system alerts on adverse drug events and other products of public health interest like contaminated food or product recalls. NPDS can thus provide real-time adverse event monitoring and surveillance for resilience response and situational awareness.

Surveillance definitions can be created to monitor a variety of volume parameters, any desired substance or commercial product in the Micromedex Poisindex products database. The database contains over 390,000 entries. Surveillance definitions may be constructed using volume or case based

definitions with a variety of mathematical options and historical baseline periods from 1 to 11 years. NPDS surveillance tools include the following:

- Volume Alerts Surveillance Definitions
- Total Call Volume
- Human Exposure Call Volume
- Animal Exposure Call Volume
- Information Call Volume
- Clinical Effects Volume (signs and symptoms, or laboratory abnormalities)
- Case Based Surveillance Definitions utilizing various NPDS data fields linked in Boolean expressions
 - Substance
 - Clinical Effects
 - Species
 - Medical Outcome and others

Incoming data is monitored continuously and anomalous signals generate an automated email alert to the AAPCC's surveillance team or designated regional PC or public health agency. These anomaly alerts are reviewed daily by the AAPCC surveillance team and/or the regional PC that created the surveillance definition. When reports of potential public health significance are detected, additional information is obtained via the NPDS surveillance correspondence system or phone as appropriate from reporting PCs. The regional PC then alerts their respective state or local health departments. Public health issues are brought to the attention of the Health Studies Branch, Division of Environmental Hazards and Health Effects, National Center for Environmental Health, Centers for Disease Control and Prevention (CDC). This unique near real-time tracking ability is a unique feature offered by NPDS and the regional PCs.

AAPCC Surveillance Team clinical and medical toxicologists review surveillance definitions on a regular basis to fine-tune the queries. CDC, as well as State and local health departments with NPDS access as granted by their respective regional PCs, also have the ability to create surveillance definitions for routine surveillance tasks or to respond to emerging public health events.

Fatality Case Review and Abstract Selection

NPDS fatality cases can be recorded as DEATH or DEATH (INDIRECT REPORT). Medical outcome of death is by direct report. Death (indirect reports) are deaths that the PC acquired from medical examiners or media, but did not manage nor answer any questions related specifically to that death.

Although PCs may report death as an outcome, the death may not be the direct result of the exposure. We define exposure-related fatality as a death judged by the AAPCC Fatality Review Team to be at least contributory to the exposure. The definitions used for the Relative Contribution to Fatality (RCF) classification are defined in Appendix B and the methods to select abstracts for publications is described in Appendix C. For details of the AAPCC fatality review process, see the 2008 annual report.¹

Pediatric Fatality Case Review

A focused Pediatric Fatality Review team, comprised of 3 pediatric toxicologists, was assembled this year to evaluate cases in patients under 18 years of age. The panel reviewed the documentation of all such cases, with specific focus on the conditions behind the poisoning exposure and on finding commonality which might inform efforts at prevention. Seventy-one cases were reviewed and found to have a bimodal age distribution. Exposures causing death in children \leq age 5 years were mostly coded as “Unintentional-General” while those in ages over 12 years were mostly “Intentional”. Often the Reason Code did not capture the complexities of the case. For example, there were few mentions of details such as the involvement of law enforcement or child protective services. While there were some complete and informative reports, in many narratives the circumstances which preceded the exposure thought responsible for the death was unclear or absent. In response to these findings, the pediatric fatality review team will develop Pediatric Narrative Guidelines for the upcoming year, with specific attention to the root cause of these cases. As a result, poison centers will be requested to implement guidelines recommending the most in-depth “causality” investigation possible.

Results

In 2010, the participating PCs logged 3,952,772 total encounters including 2,384,825 closed human exposure cases (Table 1A), 94,823 animal exposures (Table 1B), 1,466,253 information calls (Table 1C), 6,537 human confirmed non-exposures, and 334 animal confirmed non-exposures. An additional 449 calls were still open at the time of database lock. The cumulative AAPCC database now contains nearly 51 million human exposure case records (Table 1A). A total of 13,357,650 information calls have been logged by NPDS since the year 2001.

Figure 1 shows the human exposures, information calls and animal exposures by day since 2001. Second order (quadratic) least squares regression for 2000–2010 has shown a statistically significant departure from linearity (declining rate of calls since mid-2007) for Human Exposure Calls. Information Calls are declining more rapidly than the quadratic regression this year, and Animal Exposure Calls have likewise been declining since mid-2005.

A hallmark of PC case management is the use of follow-up calls to monitor case progress and medical outcome. US PCs made 2,841,477 follow-up calls in 2010. Follow-up calls were done in 46.0% of human exposure cases. One follow-up call was made in 22.4% of human exposure cases, and multiple follow-up calls (range 2–666) were placed in 23.6% of cases.

Information Calls to Poison Centers

Data from 1,466,253 information calls to PCs in 2010 (Table 1C) was transmitted to NPDS, including calls in optional reporting categories such as prevention/safety/education (31,656), administrative (23,546) and caller referral (65,652).

Table 1A. AAPCC Population Served and Reported Exposures (1983–2010)

Year	No. of participating centers	Population served (in millions)	Human exposures	Exposures per thousand population
1983	16	43.1	251,012	5.8
1984	47	99.8	730,224	7.3
1985	56	113.6	900,513	7.9
1986	57	132.1	1,098,894	8.3
1987	63	137.5	1,166,940	8.5
1988	64	155.7	1,368,748	8.8
1989	70	182.4	1,581,540	8.7
1990	72	191.7	1,713,462	8.9
1991	73	200.7	1,837,939	9.2
1992	68	196.7	1,864,188	9.5
1993	64	181.3	1,751,476	9.7
1994	65	215.9	1,926,438	8.9
1995	67	218.5	2,023,089	9.3
1996	67	232.3	2,155,952	9.3
1997	66	250.1	2,192,088	8.8
1998	65	257.5	2,241,082	8.7
1999	64	260.9	2,201,156	8.4
2000	63	270.6	2,168,248	8.0
2001	64	281.3	2,267,979	8.1
2002	64	291.6	2,380,028	8.2
2003	64	294.7	2,395,582	8.1
2004	62	293.7	2,438,643	8.3
2005	61	296.4	2,424,180	8.2
2006	61	299.4	2,403,539	8.0
2007	61	305.6	2,482,041	8.1
2008	61	308.5 ^b	2,491,049	8.1
2009	60	310.9 ^b	2,479,355	8.0
2010	60 ^a	313.3 ^b	2,384,825	7.6
Total			50,935,385	

^aAs of 1 July 2010 there were 60 Participating Centers.

^bAs of 1 July Mid Year US Census (50 United States, American Samoa, District of Columbia, Federated States of Micronesia, Guam, Puerto Rico, and the US Virgin Islands).^{3,4}

Figure 2 shows that All Drug ID calls decreased dramatically in mid-2009, and again in late-2010 (no regression was fit to these data). Enforcement Drug ID Calls showed a declining rate of increase. The most frequent information call was for Drug ID, comprising 942,614 calls to PCs during the year. Of these, 566,543 (60.1%) were identified as drugs with known abuse potential; however, these cases were categorized based on the drug's abuse potential without knowledge of whether abuse was actually intended.

While the number of Drug Information calls decreased 9.4% from 2009 (239,943 calls) to 2010 (217,286), the Drug Information calls as a percentage of all information calls was 14.3% and 14.8%, respectively. Of these, the most common requests were in regards to therapeutic use and indications, followed by drug–drug interactions, questions about dosage and inquiries of adverse effects. Environmental inquiries comprised 1.6% of all information calls. Of these environmental inquiries, questions related to cleanup of mercury (thermometers and other) remained the most common followed by questions involving pesticides.

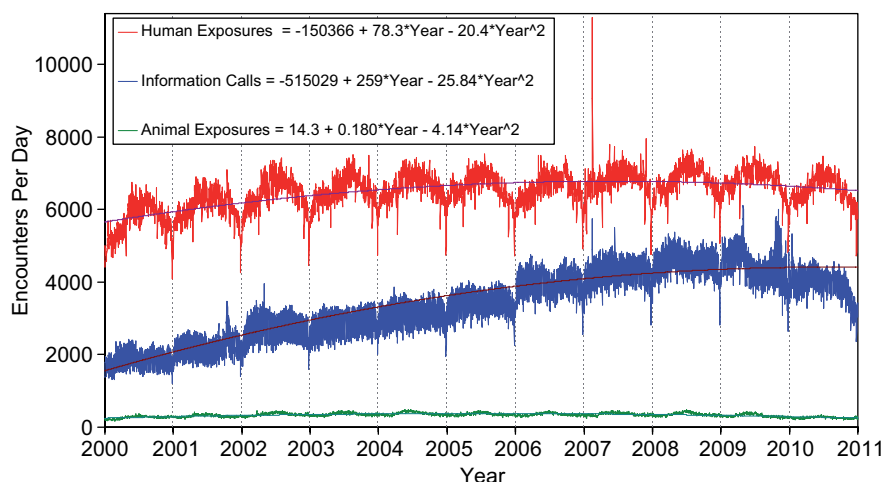


Fig. 1. Human Exposure Calls, Information Calls and Animal Exposure Calls by Day since 1 January 2000.

Black lines show least-squares second order regression – both linear and second order (quadratic) terms were statistically significant for each of the 3 regressions. (See colour version of this figure online).

Of all the information calls, poison information comprised 4.8% of the requests with inquiries involving general toxicity the most common followed by questions involving food preparation practices, plant toxicity, and safe use of household products.

Exposure Calls to Poison Centers

Figure 3 shows a graphic summary and analyses of Health Care Facility (HCF) Exposure and HCF Information calls. HCF Exposure Calls did not depart from linearity (continued to increase at a steady rate) while the rate of HCF Information Calls has been declining since early 2005. This linearly increasing use of the PCs for the more serious exposures (HCF calls) is important in the face of the declining growth of all exposure and information calls. The 2 May 2006, exposure data spike on the figure was the result of 602 children in a Midwest school reporting a noxious odor which caused anxiety, but resolved without sequelae.

Tables 22A (Nonpharmaceuticals) and 22B (Pharmaceuticals) provide summary demographic data on patient age, reason for exposure, medical outcome, and use of a health care facility for all 2,384,825 human exposure cases, presented by substance categories.

Table 1B. Non-Human Exposures by Animal Type

Animal	N	%
Dog	85,804	90.49
Cat	7,936	8.37
Horse	259	0.27
Bird	238	0.25
Rodent/lagomorph	185	0.20
Cow	70	0.07
Sheep/goat	64	0.07
Aquatic	30	0.03
Other	237	0.25
Total	94,823	100.00

Table 1C. Distribution of Information Calls

Information call type	N	% of Info. calls
Drug identification		
Public inquiry: Drug sometimes involved in abuse	462,128	31.52
Public inquiry: Drug not known to be abused	192,972	13.16
Public inquiry: Unknown abuse potential	5,416	0.37
Public inquiry: Unable to identify	86,201	5.88
HCP inquiry: Drug sometimes involved in abuse	6,819	0.47
HCP inquiry: Drug not known to be abused	12,317	0.84
HCP inquiry: Unknown abuse potential	458	0.03
HCP inquiry: Unable to identify	5,056	0.34
Law Enf. Inquiry: Drug sometimes involved in abuse	97,596	6.66
Law Enf. Inquiry: Drug not known to be abused	51,007	3.48
Law Enf. Inquiry: Unknown abuse potential	1,726	0.12
Law Enf. Inquiry: Unable to identify	14,121	0.96
Other drug ID	6,797	0.46
Subtotal	942,614	64.29
Drug information		
Adverse effects (no known exposure)	13,893	0.95
Brand/generic name clarifications	3,710	0.25
Calculations	213	0.01
Compatibility of parenteral medications	309	0.02
Compounding	617	0.04
Contraindications	1,824	0.12
Dietary supplement, herbal, and homeopathic	792	0.05
Dosage	13,506	0.92
Dosage form/formulation	2,865	0.20

(Continued)

Table 1C. (Continued)

Information call type	N	% of Info. calls
Drug use during breast-feeding	4,644	0.32
Drug-drug interactions	29,050	1.98
Drug-food interactions	1,659	0.11
Foreign drug	638	0.04
Generic substitution	1,108	0.08
Indications/therapeutic use	71,864	4.90
Medication administration	5,383	0.37
Medication availability	2,209	0.15
Medication disposal	4,907	0.33
Pharmacokinetics	2,615	0.18
Pharmacology	2,044	0.14
Regulatory	13,808	0.94
Stability/storage	3,446	0.24
Therapeutic drug monitoring	938	0.06
Other drug info	35,244	2.40
Subtotal	217,286	14.82
Environmental information		
Air quality	1,995	0.14
Carbon monoxide - no known patient(s)	847	0.06
Carbon monoxide alarm use	507	0.03
Chem/bioterrorism/weapons (suspected or confirmed)	22	0.00
Clarification of media reports of environmental contamination	26	0.00
Clarification of substances involved in a HAZMAT incident - no known victim(s)	104	0.01
General questions about contamination of air and/or soil	559	0.04
HAZMAT planning	150	0.01
Lead - no known patient(s)	671	0.05
Mercury thermometer cleanup	2,453	0.17
Mercury (excluding thermometers) cleanup	2,996	0.20
Notification of a HAZMAT incident - no known patient(s)	357	0.02
Pesticide application by a professional pest control operator	680	0.05
Pesticides (other)	3,017	0.21
Potential toxicity of chemicals in the environment	1,352	0.09
Radiation	70	0.00
Safe disposal of chemicals	1,740	0.12
Water purity/contamination	945	0.06
Other environmental	5,251	0.36
Subtotal	23,742	1.62
Medical information		
Dental questions	132	0.01
Diagnostic or treatment recommendations for diseases or conditions - non-toxicology	9,633	0.66
Disease prevention	742	0.05
Explanation of disease states	1,448	0.10
General first-aid	1,418	0.10
Interpretation of non-toxicology laboratory reports	185	0.01
Medical terminology questions	72	0.00
Rabies - no known patient(s)	373	0.03
Sunburn management	119	0.01
Other medical	17,502	1.19
Subtotal	31,624	2.16

(Continued)

Table 1C. (Continued)

Information call type	N	% of Info. calls
Occupational information		
Occupational treatment/first-aid guidelines - no known patient(s)	39	0.00
Information on chemicals in the workplace	150	0.01
MSDS interpretation	71	0.00
Occupational MSDS requests	1,359	0.09
Routine toxicity monitoring	30	0.00
Safe handling of workplace chemicals	117	0.01
Other occupational	216	0.01
Subtotal	1,982	0.14
Poison information		
Analytical toxicology	805	0.05
Carcinogenicity	94	0.01
Food poisoning - no known patient(s)	2,815	0.19
Food preparation/handling practices	7,374	0.50
General toxicity	31,765	2.17
Mutagenicity	46	0.00
Plant toxicity	4,105	0.28
Recalls of non-drug products (including food)	856	0.06
Safe use of household products	3,743	0.26
Toxicology information for legal use/litigation	213	0.01
Other poison	18,640	1.27
Subtotal	70,456	4.81
Prevention/Safety/Education		
Confirmation of poison center number	15,051	1.03
General (non-poison) injury prevention requests	677	0.05
Media requests	390	0.03
Poison prevention material requests	13,046	0.89
Poison prevention week date inquiries	59	0.00
Professional education presentation requests	407	0.03
Public education presentation requests	567	0.04
Other prevention	1,459	0.10
Subtotal	31,656	2.16
Teratogenicity information		
Teratogenicity	3,058	0.21
Subtotal	3,058	0.21
Other information		
Other	45,538	3.11
Subtotal	45,538	3.11
Substance Abuse		
Drug screen information	7,165	0.49
Effects of illicit substances - no known patient(s)	335	0.02
New trend information	386	0.03
Withdrawal from illicit substances - no known patient(s)	207	0.01
Other substance abuse	1,006	0.07
Subtotal	9,099	0.62
Administrative		
Expert witness requests	37	0.00

(Continued)

Table 1C. (Continued)

Information call type	N	% of Info. calls
Faculty activities	51	0.00
Funding	47	0.00
Personnel issues	462	0.03
Poison center record request	211	0.01
Product replacement/malfunction (issues intended for the manufacturer)	2,350	0.16
Scheduling of poison center rotations	143	0.01
Other administration	20,245	1.38
Subtotal	23,546	1.61
Caller Referred		
Immediate referral - animal poison center or veterinarian	16,083	1.10
Immediate referral - drug identification	15,704	1.07
Immediate referral - drug information	931	0.06
Immediate referral - health department	5,958	0.41
Immediate referral - medical advice line	1,117	0.08
Immediate referral - pediatric triage service	60	0.00
Immediate referral - pesticide hotline	319	0.02
Immediate referral - pharmacy	2,620	0.18
Immediate referral - poison center	3,550	0.24
Immediate referral - private physician	2,442	0.17
Immediate referral - psychiatric crisis line	167	0.01
Immediate referral - teratology information program	162	0.01
Other call referral	16,539	1.13
Subtotal	65,652	4.48
Total	1,466,253	100.00

Column 1: Name of the major, minor generic categories and their associated generic codes.

Column 2: *No. of Case Mentions* (all exposures) in grey shading and displays the number of times the specific generic code was reported in all human exposure cases. If a human exposure case has multiple instances of a specific generic code it is only counted once.

Column 3: *No. of Single Exposures*—this column was previously named “No. of ‘Single Exposures’ ” and was renamed in the 2009 report for clarity. This column displays the number of human exposure cases that identified only one substance (one case, one substance).

The succeeding columns (Age, Reason, Treatment Site, and Outcome) show selected detail from these single-substance exposure cases. Death cases include both cases that have the outcome of Death or Death, (indirect report). These death cases are not limited by the relative contribution to fatality.

Tables 22A and 22B restrict the breakdown columns to single-substance cases. Prior to 2007, when multi-substance exposures were included, a relatively innocuous substance could be mentioned in a death column when, for example, the death was attributed to an antidepressant, opioid, or cyanide. This subtlety was not always appreciated by the user of this table. The restriction of the breakdowns to single-substance exposures should increase precision and reduce misrepresentation of the results in this unique by-substance table. Single substance cases reflect the majority (90%) of all exposures yet 41% of fatalities (Table 5).

Tables 22A and 22B tabulate 2,759,287 substance-exposures, of which 2,147,248 were single-substance exposures, including 1,125,336 (52.4%) nonpharmaceuticals and 1,021,909 (47.6%) pharmaceuticals. The remaining 4 exposure cases (3 single exposures cases) did not specify if the substance was pharmaceutical or nonpharmaceutical (invalid generic codes).

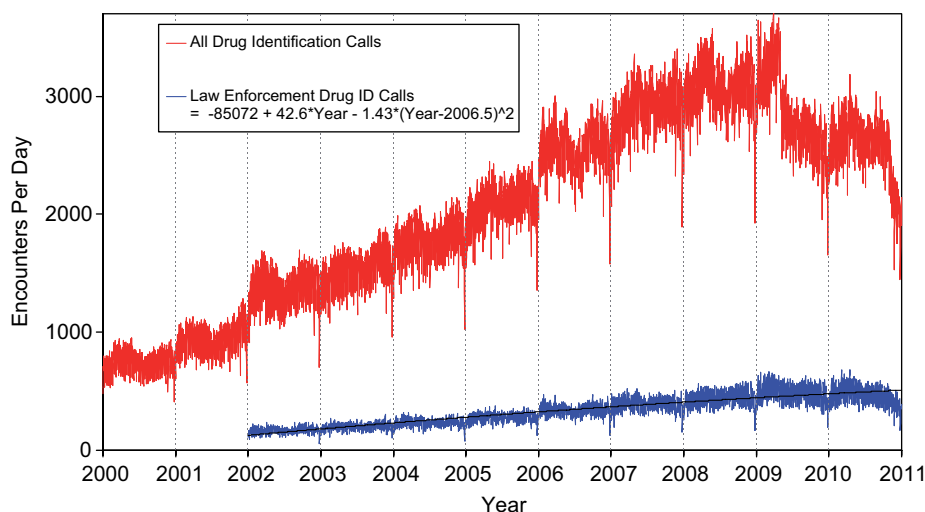


Fig. 2. All Drug Identification and Law Enforcement Drug Identification Calls by Day since 1 January 2000.

Black line shows least-squares second order regression – both linear and second order (quadratic) terms were statistically significant for the Law Enforcement Drug ID Calls. (See colour version of this figure online).

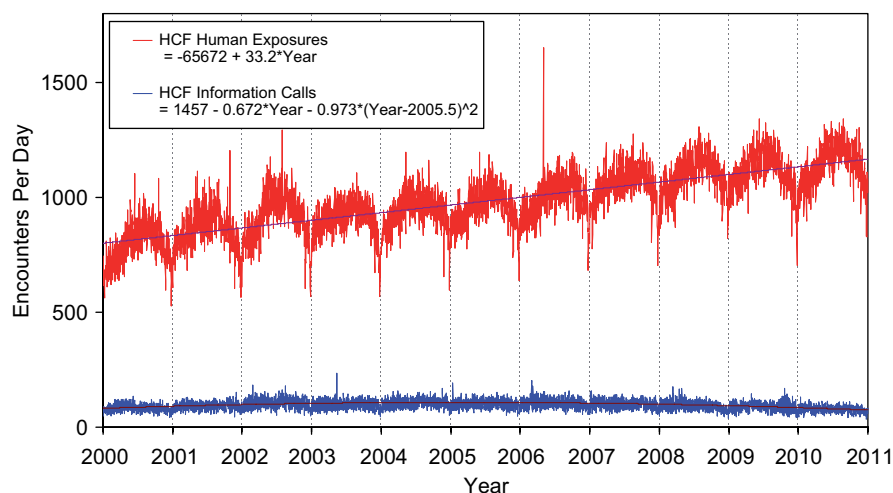


Fig. 3. Health Care Facility (HCF) Exposure Calls and HCF Information Calls by Day since 1 January 2000.

Black lines show least-squares first and second order regressions – linear regression for HCF Exposure Calls (second order term was not statistically significant) and second order regression for HCF Information Calls. All terms shown were statistically significant for each of the 2 regressions. (See colour version of this figure online).

In 17.6% of single-substance exposures that involved pharmaceutical substances, the reason for exposure was intentional, compared to only 3.5% when the exposure involved a nonpharmaceutical substance. Correspondingly, treatment in a health care facility was provided in a higher percentage of exposures that involved pharmaceutical substances (27.5%) compared with nonpharmaceutical substances (14.7%). Exposures to pharmaceuticals also had more severe outcomes. Of single-substance exposure-related fatal cases, 521 (0.05%) were pharmaceuticals compared with 242 (0.02%) nonpharmaceuticals.

Age and Gender Distributions

The age and gender distribution of human exposures is outlined in Table 3A. Children younger than 3 years of age were involved in 37.7% of exposures and children younger than 6 years accounted for approximately half of all human exposures (50.5%). A male predominance was found among cases involving children younger than 13 years, but this gender distribution was reversed in teenagers and adults, with females comprising the majority of reported exposures. Table 3B shows population-adjusted exposures for the same age groups.

Caller Site and Exposure Site

As shown in Table 2, of the 2,384,825 human exposures reported, 74.6% of calls originated from a residence (own or other) but 93.7% actually occurred at a residence (own or other). Another 17.5% of calls were made from a health care facility. Beyond residences, exposures occurred in the workplace in 1.6% of cases, schools (1.2%), health care facilities (0.3%), and restaurants or food services (0.2%).

Exposures in Pregnancy

Exposure during pregnancy occurred in 7,849 women (0.33% of all human exposures). Of those with known pregnancy duration

($n = 7,193$), 31.6% occurred in the first trimester, 37.5% in the second trimester, and 30.9% in the third trimester. Most (72.2%) were unintentional exposures and 20.4% were intentional exposures. Medical outcome was No effect in 16.9%, Minor effect in 20.3%, Moderate effect in 5.76%, and Major Effect in 0.542%. There was one death in a pregnant female in 2010.

Chronicity

Most human exposures, 2,136,572 (89.6%) were acute cases (single, repeated, or continuous exposure occurring over 8 hr or less) compared to 869 acute cases of 1730 fatalities (50.2%). Chronic exposures (continuous or repeated exposures occurring over >8 hr) comprised 2% (47,700) of all human exposures. Acute-on-chronic exposures (single exposure that was preceded by a continuous, repeated, or intermittent exposure occurring over a period greater than 8 hr) numbered 174,777 (7.3%).

Reason for Exposure

The reason category for most human exposures was unintentional (81.4%) with unintentional general (57.3%),

Table 2. Site of Call and Site of Exposure, Human Exposure Cases

Site	Site of caller		Site of exposure	
	N	%	N	%
Residence				
Own	1,736,145	72.80	2,172,987	91.12
Other	42,813	1.80	61,635	2.58
Workplace	28,429	1.19	37,707	1.58
Health care facility	418,412	17.54	7,381	0.31
School	10,901	0.46	29,568	1.24
Restaurant/food service	566	0.02	5,741	0.24
Public area	8,166	0.34	22,793	0.96
Other	131,067	5.50	26,020	1.09
Unknown	8,326	0.35	20,993	0.88

Table 3A. Age and Gender Distribution of Human Exposures

Age (y)	Male		Female		Unknown gender		Total		Cumulative total	
	N	% of age group total	N	% of age group total	N	% of age group total	N	% of total exposures	N	%
Children (< 20)										
< 1	61,837	51.96	56,779	47.71	401	0.34	119,017	4.99	119,017	4.99
1	196,460	51.83	182,070	48.03	539	0.14	379,069	15.90	498,086	20.89
2	209,515	52.29	190,541	47.55	629	0.16	400,685	16.80	898,771	37.69
3	96,889	54.90	79,231	44.90	358	0.20	176,478	7.40	1,075,249	45.09
4	46,270	55.91	36,300	43.86	187	0.23	82,757	3.47	1,158,006	48.56
5	26,281	56.46	20,098	43.18	167	0.36	46,546	1.95	1,204,552	50.51
Unknown ≤ 5	1,414	46.77	1,290	42.67	319	10.55	3,023	0.13	1,207,575	50.64
Child 6–12	83,114	57.95	59,525	41.50	785	0.55	143,424	6.01	1,350,999	56.65
Teen 13–19	72,506	46.43	83,122	53.23	536	0.34	156,164	6.55	1,507,163	63.20
Unknown Child	2,054	39.36	1,991	38.16	1,173	22.48	5,218	0.22	1,512,381	63.42
Subtotal	796,340	52.65	710,947	47.01	5,094	0.34	1,512,381	63.42	1,512,381	63.42
Adults (≥ 20)										
20–29	90,853	46.19	105,622	53.70	198	0.10	196,673	8.25	1,709,054	71.66
30–39	65,446	43.03	86,511	56.88	135	0.09	152,092	6.38	1,861,146	78.04
40–49	58,233	41.49	82,024	58.45	85	0.06	140,342	5.88	2,001,488	83.93
50–59	46,214	39.83	69,769	60.13	51	0.04	116,034	4.87	2,117,522	88.79
60–69	27,166	37.60	45,046	62.35	34	0.05	72,246	3.03	2,189,768	91.82
70–79	15,075	34.97	28,022	65.00	17	0.04	43,114	1.81	2,232,882	93.63
80–89	9,110	32.96	18,515	66.99	12	0.04	27,637	1.16	2,260,519	94.79
≥ 90	1,530	28.60	3,816	71.34	3	0.06	5,349	0.22	2,265,868	95.01
Unknown adult	41,761	39.59	61,333	58.14	2,401	2.28	105,495	4.42	2,371,363	99.44
Subtotal	355,388	41.37	500,658	58.29	2,936	0.34	858,982	36.02	2,371,363	99.44
Other										
Unknown age	4,718	35.05	5,954	44.23	2,790	20.73	13,462	0.56	2,384,825	100.00
Total	1,156,446	48.49	1,217,559	51.05	10,820	0.45	2,384,825	100.00	2,384,825	100.00

therapeutic error (11.3%) and unintentional misuse (5.4%) of all exposures (Table 6A).

Scenarios

Of the total 285,277 therapeutic errors, the most common scenarios for all ages included: inadvertent double-dosing (29.1%), wrong medication taken or give (14.7%), other incorrect dose (12.9%), doses given/taken too close together (9.5%), and inadvertent exposure to someone else's medication (9.0%). The types of therapeutic errors observed are different for each age group and are summarized in Table 6B.

Reason by Age

Intentional exposures accounted for 14.7% of human exposures. Suicidal intent was suspected in 9.2% of cases, intentional misuse in 2.5% and intentional abuse in 2.2%. Unintentional exposures outnumbered intentional exposures in all age groups with the exception of ages 13–19 years (Table 7). Intentional exposures were more frequently reported than unintentional exposures in patients aged 13–19 years. In contrast, of the 1,146 reported fatalities with RCF 1–3, the majority reason reported for children ≤ 5 years was unintentional while most fatalities in adults (≥ 20 years) were intentional (Table 8).

Table 3B. Population-Adjusted Exposures by Age Group

Age Group	Exposures/100k population	Number of Exposures ^a	Population ^b
Children (< 20)			
< 1	2,760	119,017	4,312,097
1	8,858	379,069	4,278,394
2	9,287	400,685	4,313,444
3	4,057	176,478	4,349,133
4	1,953	82,757	4,236,333
5	1,110	46,546	4,193,338
Child 6–12	502	143,424	28,575,574
Teen 13–19	533	156,164	29,262,563
Subtotal	1,813	1,512,381	83,520,876
Adults (≥ 20)			
20–29	451	196,673	43,608,697
30–39	753	152,092	20,183,872
40–49	220	140,342	63,820,032
50–59	279	116,034	41,553,408
60–69	251	72,246	28,800,304
70–79	261	43,114	16,502,508
80–89	288	27,637	9,580,266
≥ 90	260	5,349	2,059,452
Subtotal	380	858,982	226,108,539
Overall Total	761	2,384,825	313,306,729

^aNumber of Exposures excludes UNKNOWN ages from the individual age categories, but includes them in the Subtotals and Overall Total (see Table 3A).

^bAs of 1 July Mid Year US Census (50 United States, American Samoa, District of Columbia, Federated States of Micronesia, Guam, Puerto Rico, and the US Virgin Islands).^{3,4}

Table 4. Distribution of Age^a and Gender for Fatalities^b

Age (y)	Male	Female	Unknown	Total (%)	Cumulative total (%)
<1 year	1	2	0	3 (0.3%)	3 (0.3%)
1 year	4	5	0	9 (0.8%)	12 (1.1%)
2 years	1	5	0	6 (0.5%)	18 (1.6%)
3 years	4	2	0	6 (0.5%)	24 (2.1%)
4 years	2	3	0	5 (0.4%)	29 (2.5%)
5 years	1	2	0	3 (0.3%)	32 (2.8%)
Child 6–12 years	2	1	0	3 (0.3%)	35 (3.1%)
Teen 13–19 years	30	26	0	56 (4.9%)	91 (7.9%)
20–29 years	95	77	0	172 (15.0%)	263 (23.0%)
30–39 years	80	104	0	184 (16.1%)	447 (39.0%)
40–49 years	103	134	0	237 (20.7%)	684 (59.7%)
50–59 years	113	110	1	224 (19.6%)	908 (79.2%)
60–69 years	61	58	0	119 (10.4%)	1,027 (89.6%)
70–79 years	25	29	0	54 (4.7%)	1,081 (94.3%)
80–89 years	23	27	0	50 (4.4%)	1,131 (98.7%)
≥90 years	4	5	0	9 (0.8%)	1,140 (99.5%)
Unknown adult	1	2	0	3 (0.3%)	1,143 (99.7%)
Unknown age	2	0	1	3 (0.3%)	1,146 (100.0%)
Total	552	592	2	1,146 (100.0%)	1,146 (100.0%)

^aAge includes cases with both actual and estimated ages as shown in Table 21.

^bIncludes cases with relative contribution to fatality of 1-Undoubtedly responsible, 2-Probably responsible, or 3-Contributory. This excludes reports with outcome of Death INDIRECT.

Route of Exposure

Ingestion was the route of exposure in 83.5% of cases (Table 9), followed in frequency by dermal (7.2%), inhalation/nasal (5.7%), and ocular routes (4.5%). For the 1,146 exposure-related fatalities, ingestion (87.5%), inhalation/nasal (7.7%), and parenteral (3.1%) were the predominant exposure routes. Each exposure case may have more than one route.

Clinical Effects

The NPDS database allows for the coding of up to 131 different clinical effects (signs, symptoms, or laboratory

Table 5. Number of Substances Involved in Human Exposure Cases

No. of Substances	Human exposures		Fatal exposures ^a	
	N	%	N	%
1	2,147,248	90.04	474	41.36
2	151,642	6.36	270	23.56
3	48,575	2.04	159	13.87
4	19,666	0.82	97	8.46
5	8,773	0.37	67	5.85
6	3,913	0.16	31	2.71
7	2,130	0.09	20	1.75
8	1,152	0.05	12	1.05
≥9	1,726	0.07	16	1.40
Total	2,384,825	100.00	1,146	100.00

^aIncludes cases with relative contribution to fatality of 1-Undoubtedly responsible, 2-Probably responsible, or 3-Contributory. This excludes reports with outcome of Death INDIRECT.

Table 6A. Reason for Human Exposure Cases

Reason	N	% Human exposures
Unintentional		
Unintentional - General	1,367,682	57.3
Unintentional - Therapeutic error	269,889	11.3
Unintentional - Misuse	128,923	5.4
Unintentional - Bite/sting	61,584	2.6
Unintentional - Environmental	57,384	2.4
Unintentional - Food poisoning	26,221	1.1
Unintentional - Occupational	24,546	1.0
Unintentional - Unknown	4,619	0.2
Subtotal	1,940,848	81.4
Intentional		
Intentional - Suspected suicide	219,934	9.2
Intentional - Misuse	58,568	2.5
Intentional - Abuse	51,715	2.2
Intentional - Unknown	19,837	0.8
Subtotal	350,054	14.7
Adverse Reaction		
Adverse reaction - Drug	42,201	1.8
Adverse reaction - Other	13,612	0.6
Adverse reaction - Food	5,775	0.2
Subtotal	61,588	2.6
Unknown		
Unknown reason	14,332	0.6
Subtotal	14,332	0.6
Other		
Other - Malicious	8,351	0.4
Other - Contamination/tampering	8,191	0.3
Other - Withdrawal	1,461	0.1
Subtotal	18,003	0.8
Total	2,384,825	100.0

Table 6B. Scenarios for Therapeutic Errors^a by Age^b

Scenario	N	≤ 5 y (Row %)	6–12 y (Row %)	13–19 y (Row %)	≥ 20 y (Row %)	Unknown child (Row %)	Unknown adult (Row %)	Unknown age (Row %)
Inadvertently took/given medication twice	83,140	20.11	12.49	5.88	55.04	0.08	6.13	0.26
Wrong medication taken/given	41,794	16.20	12.01	6.52	58.69	0.07	6.19	0.33
Other incorrect dose	36,942	31.76	11.83	6.94	44.62	0.09	4.53	0.23
Medication doses given/taken too close together	27,233	19.53	10.15	7.12	56.66	0.06	6.29	0.18
Inadvertently took/given someone else's medication	25,542	20.48	18.80	6.94	49.03	0.07	4.54	0.13
Other/unknown therapeutic error	16,361	21.26	10.70	7.26	53.85	0.20	6.19	0.54
Incorrect dosing route	16,056	8.84	4.02	3.10	72.14	0.14	11.02	0.74
Confused units of measure	10,496	56.98	17.24	4.89	18.90	0.06	1.82	0.11
Incorrect formulation or concentration given	6,135	46.36	16.45	4.74	29.54	0.10	2.62	0.20
Health professional/iatrogenic error (pharmacist/nurse/physician)	5,684	28.20	10.38	6.33	47.59	0.48	5.96	1.06
More than 1 product containing same ingredient	5,589	15.80	14.96	14.17	48.77	0.05	6.07	0.18
Dispensing cup error	5,395	62.65	18.78	4.54	13.01	0.11	0.83	0.07
Drug interaction	1,701	8.47	7.94	6.88	66.67	0.06	9.64	0.35
Incorrect formulation or concentration dispensed	1,656	43.90	15.16	4.95	31.28	0.30	4.17	0.24
10-fold dosing error	1,444	55.89	7.62	4.36	29.36	0.14	2.35	0.28
Exposure through breast milk	109	88.99	0.92	0.00	5.50	2.75	1.83	0.00

^aAll cases with a scenario category of therapeutic error regardless of reason.

^bOf the human exposure cases reported to U.S. Poison Centers in 2010, 425,655 (17.8%) were coded to 1 or more of 54 scenarios.

abnormalities) for each case. Each clinical effect can be further defined as related, not related, or unknown if related. Clinical effects were coded in 849,516 (35.6%) cases. (17.9% had 1 effect, 9.3% had 2 effects, 4.9% had 3 effects, 2% had 4 effects, 0.8% had 5 effects, and 0.9% had >5 effects coded). Of clinical effects coded, 79.2% were deemed related to the exposure(s), 9.3% were considered not related, and 11.5% were coded as unknown if related.

The duration of effect is required for all cases that report at least one clinical effect and have a medical outcome of minor, moderate, or major effect ($n = 514,203$; 21.6% of exposures). Table 13 demonstrates an increasing duration of the clinical effects observed with more severe outcomes.

Case Management Site

The majority of cases reported to PCs were managed in a non-health care facility (71.3%), usually at the site of exposure, primarily the patient's own residence (Table 10). 1.8% of cases were referred to a health care facility but refused referral. Treatment in a health care facility was rendered in 25.2% of cases.

Of the 601,197 cases managed in a health care facility, 292,289 (48.6%) were treated and released, 97,650 (16.2%) were admitted for critical care (intensive care or monitored unit), and 62,346 (10.4%) were admitted to a noncritical unit.

The percentage of patients treated in a health care facility varied considerably with age. Only 11.1% of children ≤5 years or younger and only 12.7% of children between 6 and

12 years were managed in a health care facility compared to 48.6% of teenagers (13–19 years) and 40.1% of adults (age ≥ 20 years).

Medical Outcome

Table 11 displays the medical outcome of human exposure cases distributed by age. A greater number of severe medical outcomes is observed in the older age groups. Table 12 compares medical outcome and reason for exposure and shows a greater frequency of serious outcomes in intentional exposures.

Decontamination Procedures and Specific Antidotes

Tables 14 and 15 outline the use of decontamination procedures, specific antidotes, and measures to enhance elimination in the treatment of patients reported in the NPDS database. These must be interpreted as minimum frequencies because of the limitations of telephone data gathering.

Ipecac-induced emesis for poisoning continues to decline as shown in Tables 16A and 16B. Ipecac was administered in only 163 (0.01%) pediatric exposures in 2010. The continued decrease in ipecac syrup use over the last two decades was likely a result of ipecac use guidelines issued in 1997 by the American Academy of Clinical Toxicology, European Association of Poisons Centres, and Clinical Toxicologists and updated in 2004.^{5,6} In a separate report, the American Academy of Pediatrics concluded not only that ipecac should no longer be used routinely as a home treatment strategy,

Table 7. Distribution of Reason for Exposure by Age

Reason	≤ 5 y		6–12 y		13–19 y		≥ 20 y		Unknown child		Unknown adult		Unknown age		Total	
	N	Row %	N	Row %	N	Row %	N	Row %	N	Row %	N	Row %	N	Row %	N	%
Unintentional	1,198,972	64.55	127,612	6.87	67,487	3.63	455,897	24.54	4,577	0.25	78,768	4.24	7,535	0.41	1,940,848	81.38
Intentional	1,014	0.30	9,999	2.99	80,139	23.99	239,151	71.58	276	0.08	15,696	4.70	3,779	1.13	350,054	14.68
Adverse reaction	4,543	8.39	3,102	5.73	4,632	8.55	40,833	75.40	162	0.30	7,274	13.43	1,042	1.92	61,588	2.58
Other	2,248	14.44	1,885	12.11	2,039	13.10	9,109	58.53	149	0.96	2,291	14.72	282	1.81	18,003	0.75
Unknown	798	6.23	826	6.45	1,867	14.57	8,497	66.32	54	0.42	1,466	11.44	824	6.43	14,332	0.60
Total	1,207,575	53.10	143,424	6.31	156,164	6.87	753,487	33.13	5,218	0.23	105,495	4.64	13,462	0.59	2,384,825	100.00

but also recommended disposal of home ipecac stocks.⁷ A decline was also observed since the early 1990s for reported use of activated charcoal. While not as dramatic as the decline in use of ipecac, reported use of activated charcoal decreased from 3.7% of pediatric cases in 1993 to just 1.4% in 2010.

Top Substances in Human Exposures

Table 17A presents the most common 25 substance categories, listed by frequency of human exposure. This ranking provides an indication where prevention efforts might be focused, as well as the types of exposures PCs regularly manage. It is relevant to know whether exposures to these substances are increasing or decreasing.

To better understand these relationships, we examined exposures per year over the last 11 years for the change over time for each of the 67 major generic categories via least squares linear regression. Despite an overall decrease in human exposure calls (3.8%) for this year, the calls per year increased for 42 and decreased for 25 of the 67 major categories. The change over time for the 11-yearly values was statistically significant ($p < 0.05$) for 49 of the 67 categories. Table 17B shows the 25 categories which were increasing the most rapidly. Statistical significance of the 25 regressions can be verified by noting the 95% confidence interval on the rate of increase excludes zero. Figure 7 shows the linear regressions for the top 4 increasing categories in Table 17B. Tables 17C and 17D present exposure results for children and adults, respectively, and show the differences between substance categories involved in pediatric and adult exposures.

Table 17E reports the 25 categories of substances most frequently involved in pediatric (≤ 5 years) fatalities in 2010.

Table 17F reports the 25 Drug ID categories most frequently identified in 2010. The most often identified drug category is miscellaneous and unknown; this category includes medications which could not be identified. Drug ID information is of value to AAPCC, public health, public safety, and regulatory agencies. Internet based resources do not allow data capture nor do they afford the caller the ability to speak with a specialist in poison information if the inquiry is more than a drug identification question. Proper resources to continue this vital public service are essential, especially since the top 10 substance categories include antibiotics as well as drugs with widespread use and abuse potential such as opioids and benzodiazepines.

Table 17G (new this year) reports the 25 substance categories most frequently reported in exposures involving pregnant patients.

Changes from Last Year

Figure 4 shows the year-to-year changes for 2009–2010 for all encounters and for several major categories.

The graphic breaks down the change in exposure calls by outcome category. Although overall exposure calls have decreased by 94,530 calls (−3.8%), there is a consistent increase in the exposures with a more serious outcome

Table 8. Distribution of Reason for Exposure and Age for Fatalities^a

Reason	≤5 y	6–12 y	13–19 y	≥20 y	Unknown child	Unknown adult	Unknown age	Total
Unintentional								
Unintentional - General	15	0	0	24	0	0	0	39
Unintentional - Environmental	6	0	2	21	0	0	0	29
Unintentional - Occupational	0	0	2	11	0	0	0	13
Unintentional - Therapeutic error	3	0	1	22	0	0	0	26
Unintentional - Misuse	0	1	0	16	0	0	0	17
Unintentional - Bite/sting	2	0	0	3	0	0	0	5
Unintentional - Food poisoning	0	0	0	1	0	0	0	1
Unintentional - Unknown	0	0	0	4	0	0	0	4
Subtotal	26	1	5	102	0	0	0	134
Intentional								
Intentional - Suspected suicide	0	0	31	603	0	3	0	637
Intentional - Misuse	1	0	1	44	0	0	0	46
Intentional - Abuse	0	1	9	88	0	0	1	99
Intentional - Unknown	0	0	5	93	0	0	0	98
Subtotal	1	1	46	828	0	3	1	880
Other								
Other - Contamination/tampering	0	0	0	1	0	0	0	1
Other - Malicious	2	0	1	3	0	0	0	6
Other - Withdrawal	0	0	1	1	0	0	0	2
Subtotal	2	0	2	5	0	0	0	9
Adverse reaction								
Adverse reaction - Drug	1	0	0	25	0	0	0	26
Adverse reaction - Other	0	0	0	2	0	0	0	2
Subtotal	1	0	0	27	0	0	0	28
Unknown								
Unknown reason	2	1	3	87	0	0	2	95
Subtotal	2	1	3	87	0	0	2	95
Total	32	3	56	1,049	0	3	3	1,146

^aIncludes cases with relative contribution to fatality of 1-Undoubtedly responsible, 2-Probably responsible, or 3-Contributory. This excludes reports with outcome of Death INDIRECT.

(minor, moderate, major or death) and as a group *increased* by 22,175 encounters (4.5%).

Thus we see a consistent increase in exposure calls from HCFs and for the more severe exposures, despite a decrease in calls involving less severe exposures.

Distribution of Suicides

Table 19A shows the modest variation in the distribution of suicides and pediatric deaths over the past two decades as reported to the NPDS national database. Within the last decade, the percent of exposures determined to be suspected

Table 9. Route of Exposure for Human Exposure Cases

Route	Human exposures			Fatal exposures ^a		
	N	% of All Routes	% of All Cases	N	% of All Routes	% of All Cases
Ingestion	1,990,244	79.51	83.45	1,003	80.82	87.52
Dermal	172,318	6.88	7.23	18	1.45	1.57
Inhalation/nasal	136,799	5.47	5.74	88	7.09	7.68
Ocular	107,374	4.29	4.50	0	0.0	0
Bite/sting	61,606	2.46	2.58	5	0.40	0.44
Parenteral	16,865	0.67	0.71	35	2.82	3.05
Unknown	8,944	0.36	0.38	69	5.56	6.02
Other	3,016	0.12	0.13	4	0.32	0.35
Otic	2,519	0.10	0.11	0	0.0	0
Aspiration (with ingestion)	1,624	0.06	0.07	19	1.53	1.66
Vaginal	1,106	0.04	0.05	0	0.0	0
Rectal	736	0.03	0.03	0	0.0	0
Total Number of Routes	2,503,151	100.00	104.96	1,241	100.00	108.29^b

^aIncludes cases with relative contribution to fatality of 1-Undoubtedly responsible, 2-Probably responsible, or 3-Contributory. This excludes reports with outcome of Death INDIRECT.

^bEach exposure case may have more than one route.

Table 10. Management Site of Human Exposures

Site of management	N	%
Managed on site, nonhealth care facility	1,700,736	71.3
Managed in healthcare facility		
Treated/evaluated and released	292,289	12.3
Admitted to critical care unit	97,650	4.1
Patient lost to follow-up/left AMA	96,226	4.0
Admitted to noncritical care unit	62,346	2.6
Admitted to psychiatric facility	52,686	2.2
Subtotal (managed in HCF)	601,197	25.2
Other	29,417	1.2
Refused referral	42,497	1.8
Unknown	10,978	0.5
Total	2,384,825	100.0

suicides ranged from 45.0 to 54.3% and the percent of pediatric cases has ranged from 2.2% to 3.2%.

Plant Exposures

Table 20 provides the number of times the specific plant was reported to NPDS (N = 53,526). The 25 most commonly involved plant species and categories account for 40% of all plant exposures reported. The top 3 categories in the table are essentially synonymous for unknown plant and comprise 13.2% (7,076/53,526) of all plant exposures. For a variety of reasons it was not possible to make a precise identification in these three groups. The top most frequent plant exposures where a positive plant identification was made were (descending order): *Phytolacca americana* (L.), *Spathiphyllum* spp. Not otherwise specified (NOS), *Ilex* spp. (NOS), *Philodendron* spp. (NOS), and plants-pokeweed.

Deaths and Exposure-related Fatalities

A listing of cases (Table 21) and summary of cases (Tables 4, 5, 8, 9, 18, and 22) are provided for fatal cases for which there exists reasonable confidence that the death was a result of that exposure (exposure-related fatalities). Tables 11, 12, 17E and 19 list all deaths, irrespective of the RCF. Beginning in 2010, cases with outcome of death, indirect were not reviewed and the Relative Contribution to Fatality (RCF) was determined by the individual poison center team.

Table	Fatalities Included	RCF	Number of Deaths
4	Death only	1,2,3	1,146
5	Death only	1,2,3	1,146
8	Death only	1,2,3	1,146
9	Death only	1,2,3	1,146
11	Death and Death (indirect report)	All	1,730
12	Death and Death (indirect report)	All	1,730
17E	Death and Death (indirect report)	All	1,730
18	Death and Death (indirect report)	1,2,3	1,366
19A	Death and Death (indirect report)	All	1,730
19B	Death and Death (indirect report)	All	1,730
21	Death and Death (indirect report)	1,2,3	1,366
22	Death and Death (indirect report)	All	764
	- Single substance deaths only		

Table 11. Medical Outcome of Human Exposure Cases by Patient Age^a

Outcome	≤5 y			6–12 y			13–19 y			≥20 y			Unknown child			Unknown adult			Unknown age			Total		
	N	%		N	%		N	%		N	%		N	%		N	%		N	%		N	%	
No effect	302,659	25.06		25,660	17.89		25,014	16.02		93,311	12.38		1,018	19.51		10,418	9.88		1,199	8.9		459,279	19.26	
Minor effect	95,105	7.88		22,015	15.35		40,125	25.69		179,640	23.84		519	9.95		15,444	14.64		1,930	14.3		354,778	14.88	
Moderate effect	10,757	0.89		4,090	2.85		20,655	13.23		99,504	13.21		97	1.86		4,038	3.83		482	3.6		139,623	5.85	
Major effect	833	0.07		177	0.12		2,069	1.32		16,385	2.17		2	0.04		267	0.25		69	0.5		19,802	0.83	
Death	47	0.00		3	0.00		66	0.04		1,314	0.17		0	0.00		14	0.01		11	0.1		1,455	0.06	
No follow-up, nontoxic	232,671	19.27		21,810	15.21		8,698	5.57		44,926	5.96		647	12.40		10,775	10.21		837	6.2		320,364	13.43	
No follow-up, minimal toxicity	528,424	43.76		62,824	43.80		41,710	26.71		236,547	31.39		2,166	41.51		45,309	42.95		3,777	28.1		920,757	38.61	
No follow-up, potentially toxic	20,916	1.73		3,494	2.44		13,706	8.78		51,417	6.82		648	12.42		14,879	14.10		4,784	35.5		109,844	4.61	
Unrelated effect	16,155	1.34		3,349	2.34		4,108	2.63		30,203	4.01		121	2.32		4,341	4.11		371	2.8		58,648	2.46	
Death, indirect report	8	0.00		2	0.00		13	0.01		240	0.03		0	0.00		10	0.01		2	0.0		275	0.01	
Total	1,207,575	100.00		143,424	100.0		156,164	100.00		753,487	100.00		5,218	100.00		105,495	100.00		13,462	100.00		2,384,825	100.00	

^aTotal number of cases where Death was an outcome (1,455 + 275) is greater than the number of fatalities (1,146) judged to be exposure-related (relative contribution to fatality of 1-Undoubtedly responsible, 2-Probably responsible, or 3-Contributory).

Table 12. Medical Outcome by Reason for Exposure in Human Exposures^a

Outcome	Unintentional		Intentional		Other		Adverse reaction		Unknown		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
No effect	398,439	20.53	55,812	15.94	2,295	12.75	1,522	2.47	1,211	8.45	459,279	19.26
Minor effect	234,875	12.10	98,991	28.28	3,356	18.64	15,329	24.89	2,227	15.54	354,778	14.88
Moderate effect	46,532	2.40	80,998	23.14	1,265	7.03	7,914	12.85	2,914	20.33	139,623	5.85
Major effect	2,756	0.14	15,203	4.34	158	0.88	714	1.16	971	6.78	19,802	0.83
Death	172	0.01	1,023	0.29	14	0.08	62	0.10	184	1.28	1,455	0.06
No follow-up, nontoxic	313,047	16.13	4,926	1.41	1,228	6.82	891	1.45	272	1.90	320,364	13.43
No follow-up, minimal toxicity	853,887	44.00	36,708	10.49	6,547	36.37	21,727	35.28	1,888	13.17	920,757	38.61
No follow-up, potentially toxic	51,189	2.64	49,196	14.05	1,821	10.11	4,426	7.19	3,212	22.41	109,844	4.61
Unrelated effect	39,921	2.06	6,996	2.00	1,316	7.31	9,001	14.61	1,414	9.87	58,648	2.46
Death, indirect report	30	0.00	201	0.06	3	0.02	2	0.00	39	0.27	275	0.01
Total	1,940,848	100.00	350,054	100.00	18,003	100.00	61,588	100.00	14,332	100.00	2,384,825	100.00

^aTotal number of cases where Death was an outcome (1,455 + 275) is greater than the number of fatalities (1,146) judged to be exposure-related (relative contribution to fatality of 1-Undoubtedly responsible, 2-Probably responsible, or 3-Contributory).

There were 275 death, indirect and 1,455 deaths. Of these 1,730 cases, 1,366 were judged exposure-related fatalities (RCF = 1, Undoubtedly responsible; 2, Probably responsible; or 3, Contributory). The remaining 364 cases were judged as follows: 73 as RCF = 4, Probably not responsible; 27 as 5, Clearly not responsible; and 264 as RCF = 6, Unknown.

Deaths are sorted in Table 21 according to the category, substance deemed most likely responsible for the death (Cause Rank), and then by patient age. The Cause Rank permits the PC to judge two or more substances as indistinguishable in terms of cause, e.g., two substances which appear equally likely to have caused the death could have Substance Rank of 1, 2 and Cause Rank of 1, 1. Additional agents implicated are listed below the primary agent in the order of their contribution to the fatality.

As shown in Table 5, a single substance was implicated in 90.0% of reported human exposures, and 6.4% of patients were exposed to two or more drugs or products. The exposure-related fatalities involved a single substance in 474 cases (41.4%), 2 substances in 270 cases (23.6%), 3 in 159 cases (13.9%) and 4 or more in the balance of the cases.

In Table 21, the Annual Report ID number [bracketed] indicates that the abstract for that case is included in Appendix C. The letters following the Annual Report ID number

indicate: i = Death, Indirect report (occurred in 220, 16.1% of cases), p = prehospital cardiac and/or respiratory arrest (occurred in 666 of 1,366, 44.4% of cases), h = hospital records reviewed (occurred in 53, 3.9% of cases), a = autopsy report reviewed (occurred in 356, 26.1% of cases). The distribution of NPDS RCF was: 1 = Undoubtedly responsible in 559 cases (40.9%), 2 = Probably responsible in 599 cases (43.9%), 3 = Contributory in 208 cases (15.2%). The denominator for these Table 21 percentages is 1,366.

All fatalities – all ages

Table 4 presents the age and gender distribution for these 1,146 exposure-related fatalities (excluding death, indirect). The age distribution of reported fatalities is similar to that in past years with 91 (7.9%) of the fatalities in children (< 20 years old), 1,052 of 1,146 (92.1%) of fatal cases occurring in adults (age ≥ 20 years) and 3 (0.3%) of fatalities occurring in Unknown Age patients. Although children ≤ 5 years old were involved in the majority of exposures, the 32 fatalities comprised just 2.8% of the exposure-related fatalities. Most (71.4%) of the fatalities occurred in 20-to 59-year-old individuals.

Table 21 lists each of the 1,366 human fatalities (including death, indirect report) along with all of the substances

Table 13. Duration of Clinical Effects by Medical Outcome

Duration of effect	Minor effect		Moderate effect		Major effect	
	N	%	N	%	N	%
≤2 hours	122,045	34.40	8,186	5.86	443	2.24
>2 hours, ≤8 hours	94,233	26.56	30,472	21.82	1,242	6.27
>8 hours, ≤24 hours	64,672	18.23	46,587	33.37	4,826	24.37
>24 hours, ≤3 days	24,525	6.91	26,536	19.01	6,294	31.78
>3 days, ≤1 week	5,473	1.54	7,783	5.57	3,550	17.93
>1 week, ≤1 month	1,484	0.42	1,799	1.29	1,160	5.86
>1 month	568	0.16	465	0.33	170	0.86
Anticipated permanent	331	0.09	167	0.12	345	1.74
Unknown	41,447	11.68	17,628	12.63	1,772	8.95
Total	354,778	100.00	139,623	100.00	19,802	100.00

Table 14. Decontamination and Therapeutic Interventions

Therapy	N	%
Decontamination Only	960,389	40.3
Therapeutic Intervention Only	237,057	9.9
Decontamination and Therapeutic Intervention	405,953	17.0
Not Coded	781,426	32.8
Total	2,384,825	100.0

involved. Please note: the substance listed in column 3 of Table 21 (alternate name) was chosen to be the most specific generic name based upon analysis of the Micromedex Poisindex product name and generic code. Alternate names

are maintained in the NPDS for each substance involved in a fatality. The cross-references at the end of each major category section in Table 21 list all cases that identify this substance as other than the primary substance. This Alternate name may not agree with the AAPCC generic categories used in the summary tables (including Table 22).

Table 18 lists the top 25 minor generic substance categories associated with reported fatalities and the number of single substance exposure fatalities for that category—miscellaneous sedative/hypnotics/antipsychotics, miscellaneous cardiovascular drugs, opioids, and acetaminophen combination products, lead this list followed by miscellaneous antidepressants, miscellaneous alcohols, acetaminophen alone, miscellaneous anticonvulsants, and miscellaneous

Table 15. Therapy Provided in Human Exposures by Age.

Therapy	≤5 y	6–12 y	13–19 y	≥ 20 y	Unknown child	Unknown adult	Unknown age	Total
Decontamination								
Cathartic	2,426	249	3,388	11,544	2	221	12	17,842
Charcoal, multiple doses	141	21	397	1,446	0	15	4	2,024
Charcoal, single dose	16,440	1,104	13,221	40,965	6	602	69	72,407
Dilute/irrigate/wash	592,610	59,422	35,531	202,957	1,704	34,815	2,535	929,574
Food/snack	145,624	11,454	5,911	29,105	192	4,289	183	196,758
Fresh air	6,873	5,141	4,844	41,151	600	11,456	1,042	71,107
Ipecac	163	24	55	109	0	9	0	360
Lavage	180	27	872	3,746	0	52	6	4,883
Other emetic	5,323	473	845	4,213	9	362	39	11,264
Whole bowel irrigation	115	22	331	1,484	0	18	2	1,972
Other Therapies								
2-PAM	6	1	4	66	0	0	0	77
Alkalinization	127	69	1,586	8,396	0	70	12	10,260
Amyl nitrite	0	0	2	7	0	2	0	11
Antiarrhythmic	5	1	57	555	0	3	0	621
Antibiotics	2,025	919	1,245	12,084	21	925	84	17,303
Anticonvulsants ^a	47	19	116	665	0	7	1	855
Antiemetics	917	335	3,734	9,878	0	149	12	15,025
Antihistamines	2,664	1,702	1,945	10,710	20	1,418	103	18,562
Antihypertensives	12	10	114	1,879	0	25	1	2,041
Antivenin (fab fragment)	418	257	170	1,326	2	26	6	2,205
Antivenin/antitoxin ^b	34	34	27	246	0	5	0	346
Atropine	96	17	78	1,054	0	8	1	1,254
BAL	11	1	6	20	0	0	0	38
Benzodiazepines	871	359	4,212	20,459	4	233	34	26,172
Bronchodilators	533	312	405	4,340	29	259	18	5,896
Calcium	9,571	572	242	2,062	19	62	5	12,533
Cardioversion	3	2	26	203	0	0	0	234
CPR	31	7	75	707	0	5	2	827
Deferoxamine	2	1	29	28	0	1	0	61
ECMO	7	0	2	5	0	0	0	14
EDTA	46	2	1	12	0	0	0	61
Ethanol	2	1	5	100	0	1	2	111
Extracorp. procedure (other)	1	1	2	14	0	0	0	18
Fab fragments	39	23	19	570	0	4	2	657
Fluids, IV	6,687	1,609	21,596	102,505	8	1,126	123	133,654
Flumazenil	122	22	183	1,737	0	24	5	2,093
Folate	18	1	26	929	0	6	1	981
Fomepizole	132	17	106	1,668	0	15	3	1,941
Glucagon	31	6	57	1,436	0	16	2	1,548
Glucose, > 5%	346	24	186	2,586	0	29	3	3,174
Hemodialysis	12	4	107	2,162	0	12	1	2,298
Hemoperfusion	0	0	1	22	0	0	0	23
Hydroxocobalamin	5	0	5	37	0	6	0	53

(Continued)

Table 15. (Continued)

Therapy	≤5 y	6–12 y	13–19 y	≥ 20 y	Unknown child	Unknown adult	Unknown age	Total
Hyperbaric oxygen	32	37	35	302	1	14	0	421
Insulin	9	7	77	1,419	0	5	0	1,517
Intubation	502	73	1,509	16,996	0	188	40	19,308
Methylene blue	11	2	7	80	0	0	0	100
NAC, IV	210	91	3,341	13,169	0	128	22	16,961
NAC, PO	118	53	1,730	6,374	0	68	19	8,362
Nalmefene	0	0	4	20	0	0	0	24
Naloxone	1,152	131	1,603	15,509	1	197	28	18,621
Neuromuscular blocker	32	8	117	963	0	6	1	1,127
Octreotide	66	2	25	237	0	1	0	331
Other	51,470	9,878	13,882	86,302	203	6,606	712	169,053
Oxygen	1,659	618	3,406	38,675	78	710	104	45,250
Pacemaker	2	0	4	168	0	0	0	174
Penicillamine	1	1	0	2	0	0	0	4
Physostigmine	3	5	87	150	0	0	0	245
Phytonadione	28	6	57	686	0	7	2	786
Pyridoxine	14	2	68	404	0	1	2	491
Sedation (other)	304	67	1,121	11,122	0	96	15	12,725
Sodium nitrite	0	0	2	32	0	1	0	35
Sodium thiosulfate	4	0	5	51	0	3	1	64
Steroids	765	409	543	4,771	15	442	38	6,983
Succimer	117	3	7	65	0	2	0	194
Transplantation	0	0	1	21	0	0	0	22
Vasopressors	88	26	268	4,699	0	35	3	5,119
Ventilator	447	70	1,322	15,300	0	165	33	17,337

^aExcludes benzodiazepines.^bExcludes Fab fragments.

Table 16A. Decontamination Trends (1985–2009)

Year	Human exposures	Ipecac administered (% of all exposures)	Activated charcoal administered (% of all exposures)	Exposures involving children ≤ 5 y (% of all exposures)	Ipecac administered (% of child exposures)	Activated charcoal administered (% of child exposures)
1985	886,389	132,947 (14.999)	41,063 (4.6)	568,691 (64.2)	94,919 (16.6908)	14,718 (2.59)
1986	1,095,228	145,516 (13.286)	56,481 (5.2)	690,137 (63.0)	99,688 (14.4447)	18,191 (2.64)
1987	1,164,648	117,840 (10.118)	60,310 (5.2)	730,228 (62.7)	83,443 (11.427)	18,507 (2.53)
1988	1,364,113	114,654 (8.4050)	88,876 (6.5)	843,106 (61.8)	80,749 (9.5776)	26,118 (3.10)
1989	1,578,968	110,545 (7.0011)	101,368 (6.4)	963,924 (61.0)	79,192 (8.2156)	30,345 (3.15)
1990	1,646,946	98,986 (6.0103)	108,341 (6.6)	999,751 (60.7)	73,469 (7.3487)	31,579 (3.16)
1991	1,836,364	94,877 (5.1666)	129,092 (7.0)	1,099,179 (59.9)	73,069 (6.6476)	36,177 (3.29)
1992	1,862,796	79,493 (4.2674)	135,625 (7.3)	1,094,256 (58.7)	63,486 (5.8018)	38,937 (3.56)
1993	1,747,147	65,078 (3.7248)	127,893 (7.3)	978,560 (56.0)	50,834 (5.1948)	35,791 (3.66)
1994	1,926,992	51,356 (2.6651)	138,247 (7.2)	1,042,651 (54.1)	41,489 (3.9792)	35,670 (3.42)
1995	2,023,089	47,359 (2.3409)	155,880 (7.7)	1,070,472 (52.9)	38,372 (3.5846)	38,095 (3.56)
1996	2,155,952	39,376 (1.8264)	157,331 (7.3)	1,137,263 (52.7)	32,622 (2.8685)	37,986 (3.34)
1997	2,192,088	32,098 (1.4643)	156,213 (7.1)	1,150,931 (52.5)	26,536 (2.3056)	35,856 (3.12)
1998	2,241,082	26,653 (1.1893)	152,134 (6.8)	1,180,989 (52.7)	22,247 (1.8838)	34,302 (2.90)
1999	2,201,156	21,942 (0.9968)	145,853 (6.6)	1,154,799 (52.5)	18,326 (1.5869)	33,812 (2.93)
2000	2,168,248	18,177 (0.8383)	145,911 (6.7)	1,142,796 (52.7)	15,239 (1.3335)	31,554 (2.76)
2001	2,267,979	16,058 (0.7080)	149,442 (6.6)	1,169,478 (51.6)	13,389 (1.1449)	30,367 (2.60)
2002	2,380,028	13,555 (0.5695)	149,527 (6.3)	1,227,381 (51.6)	11,163 (0.9095)	30,340 (2.47)
2003	2,395,582	9,284 (0.3875)	140,412 (5.9)	1,245,584 (52.0)	7,310 (0.5869)	28,888 (2.32)
2004	2,438,643	4,701 (0.1928)	135,969 (5.6)	1,250,536 (51.3)	3,366 (0.2692)	28,335 (2.27)
2005	2,424,180	3,027 (0.1249)	123,263 (5.1)	1,233,695 (50.9)	1,999 (0.1620)	26,338 (2.13)
2006	2,403,539	2,176 (0.0905)	111,351 (4.6)	1,223,815 (50.9)	1,337 (0.1092)	23,843 (1.95)
2007	2,482,041	1,740 (0.0701)	106,010 (4.3)	1,271,595 (51.2)	1,052 (0.0827)	22,829 (1.80)
2008	2,491,049	1,205 (0.0484)	97,297 (3.9)	1,292,754 (51.9)	641 (0.0496)	21,286 (1.65)
2009	2,479,355	658 (0.0265)	84,805 (3.4)	1,290,784 (52.1)	330 (0.0256)	19,168 (1.48)
2010	2,384,825	360 (0.0200)	74,431 (3.1)	1,207,575 (50.6)	163 (0.0100)	16,581 (1.37)

Table 16B. Decontamination Trends: Total Human and Pediatric Exposures ≤5 Years (2010)^a.

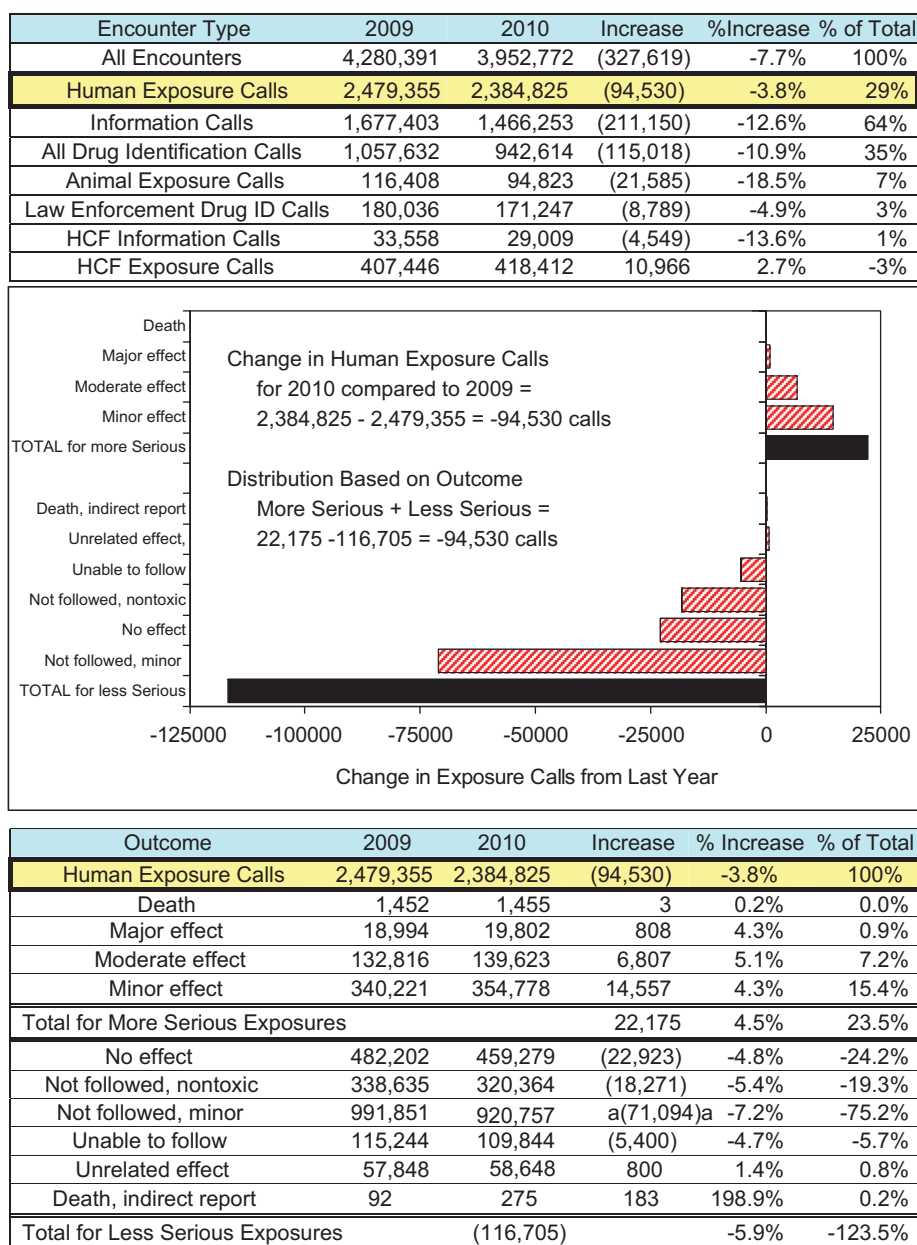
Therapy	Human exposures		Exposures children ≤5 y	
	N	%	N	%
Activated charcoal administered	74,431	3.12	16,581	1.37
Cathartic	17,842	0.75	2,426	0.20
Ipecac administered	360	0.02	163	0.01
Lavage	4,883	0.20	180	0.01
Other Emetic	11,264	0.47	5,323	0.44
Whole Bowel Irrigation	1,972	0.08	115	0.01
Total	110,752	4.64	24,788	2.05

^aHuman exposures = 2,384,825; Pediatric exposures = 1,207,575.

stimulants and street drugs. Note that Table 18 is sorted by all substances to which a patient was exposed (i.e., a patient exposed to an opioid may have also been exposed to 1 or more other products) and shows single substance exposures in the right hand column.

The first ranked substance (Table 21) was a pharmaceutical in 1,104 (80.8%) of the 1,366 fatalities. These 1,104 first ranked pharmaceuticals included:

526 analgesics (92 acetaminophen, 89 acetaminophen/hydrocodone, 67 methadone, 53 oxycodone, 36 salicylate, 27 morphine, 20 acetaminophen/oxycodone, 17 fentanyl, 16 acetaminophen/diphenhydramine, 16 acetaminophen/propoxyphene, 14 tramadol, 12

**Fig. 4. Change in Encounters from 2009 to 2010 with Graphical Breakdown of Exposure Calls.**

The figure shows how the decrease of 94,530 in Human Exposure Calls divides among the 10 Medical Outcomes. The More Serious Exposures (Minor, Moderate, Major and Death) all increased and their combined increase was 22,175 calls (23.5% of the 94,530 total decrease). The Less Serious Exposures (the other 6 outcome groups) decreased by 116,705 (-123.5% of the 94,530 total decrease). (See colour version of this figure online).

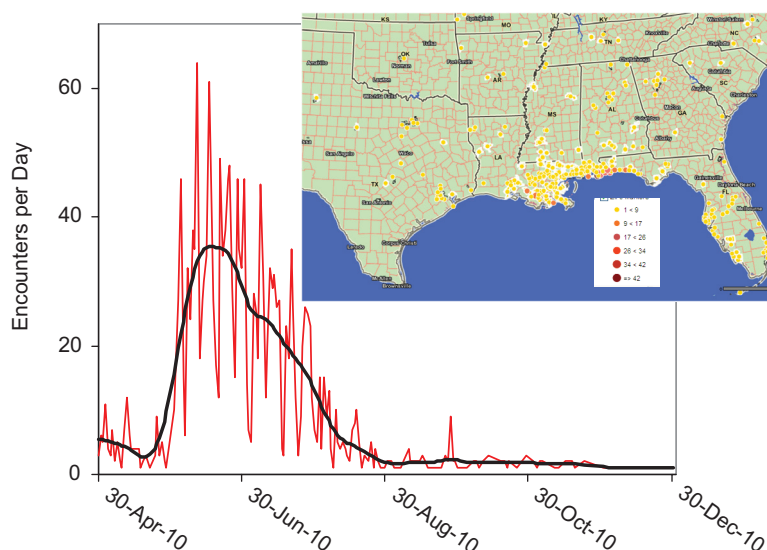
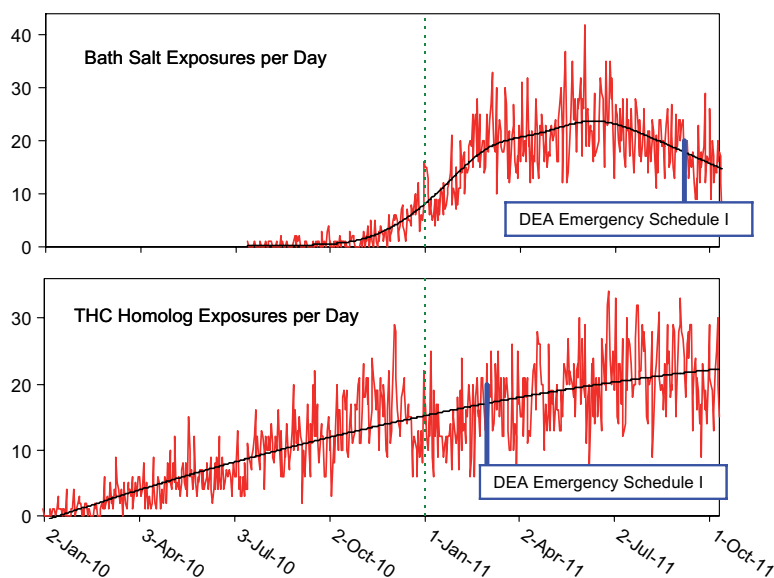


Fig. 5. Gulf Oil Spill Encounters per Day.

Black line for Gulf Oil Spill Encounters (human and animal exposure and information calls) shows a spline smoothing fit (lambda v 0.0000117, rsquare v 0.710). Map shows number of calls per day. (See colour version of this figure online).



	THC Homologs	Bath Salts
Chemicals	JWH-018, JWH-073, JWH-200, CP-47,497, cannabicyclohexanol	mephedrone , 3,4 methylenedioxypyrovalerone (MDPV), methylone
Products	herbal incense, spice, K2, Blaze, Red X Dawn	bath salts, plant food, Ivory Wave, Purple Wave, Vanilla Sky, Bliss
Local Action	banned in 16 states	banned in 33states
Clinical Effects	convulsions, anxiety attacks, tachycardia, hypertension, vomiting, disorientation	impaired perception, reduced motor control, disorientation, extreme paranoia, violent episodes
DEA Emergency Scheduled	1-Mar-2011	7-Sep-2011
First NPDS Exposure Report	3-Oct-2009	24-Feb-2010
Number of Exposures	8,264	5,624
Number of information calls	895	1,087
Total Encounters	9,159	8,479

Fig. 6. Emerging Trends: Bath Salts and THC Homologs Exposures.

Black line for Bath Salt Exposures shows a spline smoothing fit (lambda = 0.01, rsquare = 0.829).

Black line for THC Homolog Exposures shows s show least-squares second order regressions: $\text{THC Exposures} = -26,223 + 13.0 \cdot \text{Year} - 3.83 \cdot (\text{Year}-2011)^2$ (rsquare = 0.708). All 3 terms in this regression were statistically significant ($p < 0.05$). (See colour version of this figure online).

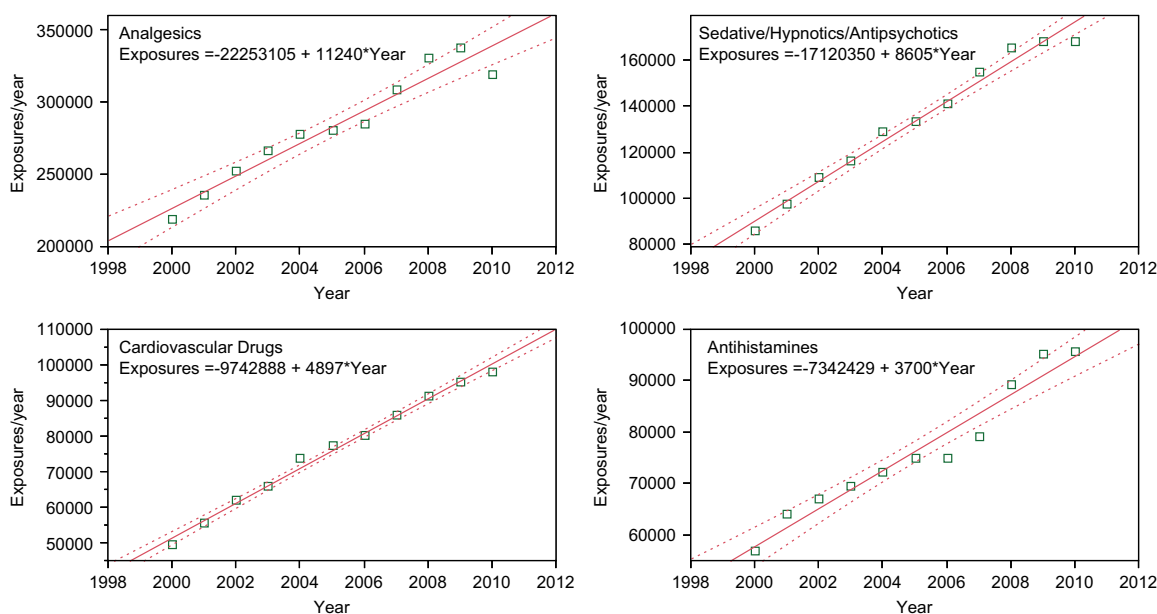


Fig. 7. Human Exposure Calls By Year 2000–2010 – Top 4 Categories.

Solid lines show least-squares linear regressions for the Human Exposure Calls per year for that category (□). Broken lines show 95% confidence interval on the regression. (See colour version of this figure online).

fentanyl (transdermal), 11 colchicine, 11 opioid, 7 propoxyphene)

128 cardiovascular drugs (24 amlodipine, 17 cardiac glycoside, 13 verapamil, 7 atenolol, 7 beta blocker, 7 diltiazem, 7 diltiazem (extended release), 7 metoprolol)

112 antidepressants (29 amitriptyline, 12 doxepin, 9 citalopram, 9 venlafaxine, 8 trazodone, 7 tricyclic antidepressant,

6 bupropion, 6 bupropion (extended release), 5 venlafaxine (extended release))

106 sedative/hypnotic/antipsychotics (31 quetiapine, 16 alprazolam, 8 clonazepam, 7 diazepam, 6 lorazepam), 86 stimulants/street drugs (28 methamphetamine, 20 heroin, 20 cocaine, 10 methylenedioxymethamphetamine (MDMA))

Table 17A. Substance Categories Most Frequently Involved in Human Exposures (Top 25)

Substance (Major Generic Category)	All substances	% ^a	Single substance exposures	% ^b
Analgesics	319,622	11.48	208,222	9.70
Cosmetics/Personal Care Products	215,387	7.73	208,321	9.70
Cleaning Substances (Household)	202,056	7.26	180,493	8.41
Sedative/Hypnotics/Antipsychotics	168,030	6.03	66,897	3.12
Foreign Bodies/Toys/Miscellaneous	116,659	4.19	113,877	5.30
Topical Preparations	110,033	3.95	107,874	5.02
Antidepressants	103,041	3.70	43,675	2.03
Cardiovascular Drugs	98,386	3.53	48,460	2.26
Antihistamines	95,880	3.44	69,291	3.23
Pesticides	91,940	3.30	86,419	4.02
Alcohols	85,205	3.06	39,404	1.84
Cold and Cough Preparations	77,899	2.80	57,793	2.69
Vitamins	71,545	2.57	62,743	2.92
Bites and Envenomations	67,692	2.43	66,944	3.12
Antimicrobials	66,021	2.37	55,139	2.57
Hormones and Hormone Antagonists	58,890	2.11	40,410	1.88
Plants	53,526	1.92	50,759	2.36
Gastrointestinal Preparations	53,388	1.92	42,797	1.99
Stimulants and Street Drugs	51,641	1.85	30,654	1.43
Anticonvulsants	48,005	1.72	21,064	0.98
Hydrocarbons	42,663	1.53	40,402	1.88
Chemicals	39,908	1.43	34,393	1.60
Arts/Crafts/Office Supplies	33,502	1.20	32,493	1.51
Fumes/Gases/Vapors	32,797	1.18	30,468	1.42
Electrolytes and Minerals	32,505	1.17	27,172	1.27

^aPercentages are based on the total number of substances reported in all exposures (N = 2,784,907).

^bPercentages are based on the total number of single substance exposures (N = 2,147,248).

Table 17B. Substance Categories with the Greatest Rate of Exposure Increase (Top 25)

Substance (Major Generic Category)	Increase in exposures per year ^a		All substances in 2010
	Mean	95% CI ^a	
Analgesics	11,240	[9034, 13446]	319,622
Sedative/Hypnotics/Antipsychotics	8,605	[7682, 9529]	168,030
Cardiovascular Drugs	4,897	[4579, 5216]	98,386
Antihistamines	3,700	[3055, 4346]	95,880
Alcohols	2,831	[2217, 3445]	85,205
Vitamins	2,337	[2005, 2668]	71,545
Gastrointestinal Preparations	2,256	[1706, 2807]	53,388
Hormones and Hormone Antagonists	1,948	[1633, 2264]	58,890
Anticonvulsants	1,898	[1557, 2240]	48,005
Topical Preparations	1,849	[611, 3088]	110,033
Other/Unknown Nondrug Substances	1,823	[1264, 2383]	32,102
Cosmetics/Personal Care Products	1,654	[56, 3252]	215,387
Cleaning Substances (Household)	1,560	[-295, 3415]	202,056
Antidepressants	1,475	[453, 2496]	103,041
Muscle Relaxants	1,241	[1074, 1407]	28,489
Miscellaneous Drugs	1,228	[781, 1676]	24,558
Anticholinergic Drugs	1,137	[852, 1422]	11,436
Foreign Bodies/Toys/Miscellaneous	1,093	[-142, 2329]	116,659
Antimicrobials	971	[533, 1409]	66,021
Dietary Supplements/Herbals/Homeopathic	900	[448, 1351]	32,052
Unknown Drug	784	[662, 905]	20,471
Deodorizers	684	[424, 944]	25,619
Essential Oils	646	[578, 715]	10,720
Eye/Ear/Nose/Throat Preparations	599	[471, 727]	21,172
Asthma Therapies	585	[22, 1149]	21,123

^aIncrease and confidence intervals are based on least squares linear regression of the number of calls per year for 2000–2010.

Table 17C. Substance Categories Most Frequently Involved in Pediatric (≤ 5 years) Exposures (Top 25)^a

Substance (Major Generic Category)	All substances	% ^b	Single substance exposures	% ^c
Cosmetics/Personal Care Products	165,719	13.18	162,208	13.83
Analgesics	117,586	9.35	106,743	9.10
Cleaning Substances (Household)	116,203	9.24	111,817	9.53
Foreign Bodies/Toys/Miscellaneous	86,426	6.88	84,580	7.21
Topical Preparations	85,384	6.79	84,129	7.17
Vitamins	52,254	4.16	47,758	4.07
Antihistamines	47,674	3.79	42,690	3.64
Pesticides	40,418	3.22	39,333	3.35
Cold and Cough Preparations	38,410	3.06	34,865	2.97
Gastrointestinal Preparations	35,680	2.84	32,749	2.79
Plants	35,674	2.84	34,363	2.93
Antimicrobials	34,769	2.77	32,729	2.79
Cardiovascular Drugs	26,253	2.09	17,246	1.47
Arts/Crafts/Office Supplies	24,600	1.96	23,982	2.04
Hormones and Hormone Antagonists	24,593	1.96	19,013	1.62
Electrolytes and Minerals	22,891	1.82	20,854	1.78
Dietary Supplements/Herbals/Homeopathic	22,017	1.75	20,240	1.73
Alcohols	21,860	1.74	21,512	1.83
Deodorizers	21,799	1.73	21,571	1.84
Sedative/Hypnotics/Antipsychotics	15,746	1.25	12,314	1.05
Other/Unknown Nondrug Substances	14,258	1.13	13,790	1.18
Hydrocarbons	13,503	1.07	13,094	1.12
Asthma Therapies	13,436	1.07	12,279	1.05
Antidepressants	13,433	1.07	9,829	0.84
Information Calls	11,963	0.95	11,383	0.97

^aIncludes all children with actual or estimated ages ≤ 5 years old. Results do not include “Unknown Child” or “Unknown Age”.

^bPercentages are based on the total number of substances reported in pediatric exposures (N = 1,257,025).

^cPercentages are based on the total number of single substance pediatric exposures (N = 1,173,168).

Table 17D. Substance Categories Most Frequently Involved in Adult (≥ 20 years) Exposures (Top 25)^a

Substance (Major Generic Category)	All substances	% ^b	Single substance exposures	% ^c
Analgesics	149,532	12.96	69,333	10.01
Sedative/Hypnotics/Antipsychotics	128,982	11.18	42,540	6.14
Antidepressants	71,367	6.19	24,389	3.52
Cleaning Substances (Household)	69,376	6.01	54,666	7.89
Cardiovascular Drugs	63,229	5.48	25,556	3.69
Alcohols	54,128	4.69	12,829	1.85
Bites and Envenomations	44,580	3.86	44,133	6.37
Pesticides	42,737	3.70	38,861	5.61
Anticonvulsants	33,720	2.92	12,391	1.79
Cosmetics/Personal Care Products	33,009	2.86	30,516	4.41
Antihistamines	29,962	2.60	14,557	2.10
Hormones and Hormone Antagonists	29,317	2.54	17,780	2.57
Stimulants and Street Drugs	25,559	2.22	12,065	1.74
Chemicals	23,504	2.04	19,552	2.82
Hydrocarbons	23,001	1.99	21,512	3.11
Fumes/Gases/Vapors	22,977	1.99	21,190	3.06
Antimicrobials	22,905	1.99	16,212	2.34
Muscle Relaxants	22,242	1.93	7,970	1.15
Cold and Cough Preparations	20,121	1.74	10,591	1.53
Topical Preparations	18,324	1.59	17,663	2.55
Food Products/Food Poisoning	17,228	1.49	16,728	2.42
Gastrointestinal Preparations	13,942	1.21	7,381	1.07
Information Calls	13,076	1.13	12,027	1.74
Miscellaneous Drugs	13,057	1.13	6,821	0.98
Other/Unknown Nondrug Substances	12,644	1.10	11,070	1.60

^aIncludes all adults with actual or estimated ages ≥ 20 years old. Results also include "Unknown Adult" but do not include "Unknown Age".

^bPercentages are based on the total number of substances reported in adult exposures (N = 1,153,827).

^cPercentages are based on the total number of single substance adult exposures (N = 692,666).

The exposure was acute in 706 (51.7%), A/C = acute on chronic in 266 (19.5%), C = chronic exposure in 86 (6.3%) and U = unknown in 308 (22.6%).

A total of 1,639 tissue concentrations for 1 or more related analytes were reported in 692 cases. Most of these (1,537) are listed in Table 21, while all tissue concentrations are available to the member centers through the NPDS Enterprise Reports. These 125 analytes included: 231 acetaminophen, 153 ethanol, 76 hydrocodone, 67 oxycodone, 60 alprazolam, 60 methadone, 54 salicylate, 33 diphenhydramine, 28 morphine.

Route of exposure was: Ingestion only in 1057 cases (77.4%), inhalation/nasal only in 89 cases (6.5%), parenteral in 23 cases (1.7%). Most other routes were combination routes or unknown.

Table 17E. Substance Categories Most Frequently Involved in Pediatric (≤ 5 years) Deaths^a

Substance (Major Generic Category)	All substances	% ^b	Single substance exposures	% ^c
Analgesics	11	15.71	7	14.89
Antihistamines	6	8.57	3	6.38
Sedative/Hypnotics/Antipsychotics	6	8.57	3	6.38
Fumes/Gases/Vapors	5	7.14	5	10.64
Chemicals	4	5.71	2	4.26
Cold and Cough Preparations	4	5.71	2	4.26
Food Products/Food Poisoning	4	5.71	4	8.51
Pesticides	4	5.71	2	4.26
Alcohols	3	4.29	1	2.13
Cardiovascular Drugs	3	4.29	3	6.38
Hydrocarbons	3	4.29	3	6.38
Unknown Drug	3	4.29	2	4.26
Automotive/Aircraft/Boat Products	2	2.86	1	2.13
Batteries	2	2.86	2	4.26
Bites and Envenomations	2	2.86	2	4.26
Other/Unknown Nondrug Substances	2	2.86	1	2.13
Cleaning Substances (Household)	1	1.43	1	2.13
Dietary Supplements/Herbals/	1	1.43	1	2.13
Homeopathic	1	1.43	1	2.13
Electrolytes and Minerals	1	1.43	1	2.13
Foreign Bodies/Toys/Miscellaneous	1	1.43	0	0.00
Hormones and Hormone Antagonists	1	1.43	1	2.13
Information Calls	1	1.43	0	0.00
Total	70	100.00	47	100.00

^aIncludes all children with actual or estimated ages ≤ 5 years old. Results do not include "Unknown Child" or "Unknown Age". Includes death and death, indirect regardless of Relative Contribution to Fatality.

^bPercentages are based on the total number of substances reported in pediatric fatalities (N = 70).

^cPercentages are based on the total number of single substance pediatric fatalities (N = 47).

The Intentional exposure reason was: Suspected suicide in 673 cases (49.3%), Abuse in 230 cases (16.8%), and Misuse in 49 cases (3.6%). Unintentional exposure reason was: Environmental in 36 cases (2.6%), Therapeutic error in 29 cases (2.1%), and Misuse in 21 cases (1.5%), and Occupational in 15 (1.1%). Adverse drug reaction was the reason in 27 (2.0%).

Pediatric fatalities – age ≤ 5 years

Although children younger than 6 years were involved in the majority of exposures, they comprised 55 of 1,730 (3.2%) of fatalities. These numbers are similar to those reported since 1985 (Table 19A). The percentage fatalities in children ≤ 5 years related to total pediatric

Table 17F. Substance Categories Most Frequently Identified in Drug Identification Calls (Top 25)

Substance (Major Generic Category)	All substances	% ^a
Analgesics	506,838	35.05
Sedative/Hypnotics/Antipsychotics	180,009	12.45
Information Calls	139,789	9.67
Unknown Drug	77,584	5.37
Muscle Relaxants	69,595	4.81
Antidepressants	63,202	4.37
Cardiovascular Drugs	57,682	3.99
Antihistamines	50,922	3.52
Antimicrobials	48,779	3.37
Stimulants and Street Drugs	31,795	2.20
Anticonvulsants	28,709	1.99
Hormones and Hormone Antagonists	26,667	1.84
Gastrointestinal Preparations	25,151	1.74
Cold and Cough Preparations	14,326	0.99
Diuretics	14,201	0.98
Miscellaneous Drugs	13,757	0.95
Pesticides	9,939	0.69
Foreign Bodies/Toys/Miscellaneous	7,074	0.49
Other/Unknown Nondrug Substances	6,324	0.44
Plants	5,945	0.41
Cleaning Substances (Household)	5,603	0.39
Electrolytes and Minerals	4,303	0.30
Chemicals	4,191	0.29
Vitamins	4,186	0.29
Bites and Envenomations	4,107	0.28

^aPercentages are based on the total number of substances reported in all drug identification calls (N = 1,446,038).

exposures was 32/1,207,575 = 0.00265%. By comparison, 1,052/858,982 = 0.122% of all adult exposures involved a fatality. Of these 32 pediatric fatalities, 18 (81.3%) were reported as unintentional and 2 (6.3%) were coded as resulting from malicious intent (Table 8).

The 37 fatalities in children ≤5 years old in Table 21 (includes death, indirect reports, and RCF 1–3) included 16 pharmaceuticals and 21 nonpharmaceuticals. The first ranked substances associated with these fatalities included: carbon monoxide in 3 cases, aluminum phosphide, hydrofluoric acid, lamp oil, smoke, diphenhydramine, flecainide in 2 cases each, and 22 other substances (1 each).

Pediatric fatalities – ages 6–12 years

In the age range 6–12 years, there were 3 reported fatalities, 1 of which was unintentional misuse, 1 was intentional abuse, and 1 unknown reason (Table 8). The 4 fatalities listed in Table 21 (includes death, indirect reports, and RCF 1–3) included: 2 fluorinated hydrocarbons, 1 carbon monoxide, and 1 oxycodone.

Adolescent fatalities – ages 13–19 years

In the age range 13–19 years, there were 56 reported fatalities including 46 intentional and 4 unintentional (Table 8). The 67 fatalities listed in Table 21 (includes death, indirect

Table 17G. Substance Categories Most Frequently Involved in Pregnant Exposures^a (Top 25)

Substance (Major Generic Category)	All substances	% ^b	Single substance exposures	%
Analgesics	1,121	12.42	685	9.75
Cleaning Substances (Household)	796	8.82	593	8.44
Pesticides	629	6.97	576	8.20
Bites and Envenomations	523	5.79	521	7.41
Fumes/Gases/Vapors	506	5.61	471	6.70
Sedative/Hypnotics/Antipsychotics	434	4.81	198	2.82
Vitamins	372	4.12	305	4.34
Antihistamines	303	3.36	186	2.65
Foreign Bodies/Toys/Miscellaneous	278	3.08	260	3.70
Antidepressants	262	2.90	131	1.86
Information Calls	249	2.76	233	3.32
Cosmetics/Personal Care Products	247	2.74	227	3.23
Antimicrobials	219	2.43	158	2.25
Chemicals	194	2.15	169	2.40
Hydrocarbons	192	2.13	178	2.53
Cold and Cough Preparations	180	1.99	107	1.52
Food Products/Food Poisoning	149	1.65	146	2.08
Cardiovascular Drugs	144	1.60	97	1.38
Hormones and Hormone Antagonists	142	1.57	120	1.71
Alcohols	136	1.51	57	0.81
Electrolytes and Minerals	136	1.51	116	1.65
Gastrointestinal Preparations	132	1.46	105	1.49
Stimulants and Street Drugs	130	1.44	84	1.20
Other/Unknown Nondrug Substances	122	1.35	104	1.48
Paints and Stripping Agents	121	1.34	111	1.58

^aIncludes all patient classified as pregnant and all female patients with a 'duration of pregnancy' greater than 0.

^bPercentages are based on the total number of substances reported in pregnant exposures (N = 9,027).

^cPercentages are based on the total number of single substance pregnant exposures (N = 7,028).

reports, and RCF 1–3) included 53 pharmaceuticals and 14 nonpharmaceuticals. The first ranked pharmaceuticals associated with these fatalities included: acetaminophen/hydrocodone, methylenedioxymethamphetamine (MDMA), oxycodone, and salicylate (3 cases each); acetaminophen, acetaminophen/diphenhydramine, clonazepam, colchicine, diphenhydramine, methadone, morphine (2 cases each); and the balance 1 substance each. The first ranked nonpharmaceuticals associated with these fatalities included: ethanol in 3 cases, cyanide, and ethylene glycol (2 cases each); and the balance 1 substance each.

Pregnancy and Fatalities

A total of 25 deaths of pregnant women have been reported from the years 2000 through 2010. The majority (21 of 25)

Table 18. Categories Associated with Largest Number of Fatalities (Top 25)^a

Substance (Minor Generic Category)	All substances	% ^b	Single substance exposures	% ^c
Miscellaneous Sedative/Hypnotics/Antipsychotics	445	15.82	29	3.80
Miscellaneous Cardiovascular Drugs	265	9.42	53	6.94
Opioids	265	9.42	59	7.72
Acetaminophen	240	8.53	65	8.51
Miscellaneous Antidepressants	212	7.54	16	2.09
Miscellaneous Alcohols	171	6.08	38	4.97
Acetaminophen Alone	130	4.62	60	7.85
Miscellaneous Anticonvulsants	121	4.30	11	1.44
Miscellaneous Stimulants and Street Drugs	117	4.16	45	5.89
Cyclic Antidepressants	88	3.13	21	2.75
Miscellaneous Muscle Relaxants	78	2.77	6	0.79
Miscellaneous Antihistamines	66	2.35	12	1.57
Acetylsalicylic Acid Alone	62	2.20	21	2.75
Nonsteroidal Antiinflammatory Drugs	58	2.06	5	0.65
Miscellaneous Fumes/Gases/Vapors	50	1.78	52	6.81
Miscellaneous Unknown Drug	41	1.46	57	7.46
Miscellaneous Chemicals	34	1.21	29	3.80
Oral Hypoglycemic	28	1.00	6	0.79
Miscellaneous Hormones and Hormone Antagonists	23	0.82	8	1.05
Other Miscellaneous Drugs	18	0.64	4	0.52
Miscellaneous Hydrocarbons	17	0.60	16	2.09
Acids	16	0.57	11	1.44
Miscellaneous Anticoagulants	13	0.46	3	0.39
Antacids	12	0.43	0	0.00
Automotive Products	12	0.43	10	1.31

^aNumbers represent total exposures associated with 1,366 fatalities (with relative contribution to fatality of 1-Undoubtedly responsible, 2-Probably responsible, or 3-Contributory); each fatality may have had exposure to more than one substance.

^bPercentages are based on the total number of substances reported in fatal exposures (N = 2,813).

^cPercentages are based on the total number of single substance fatal exposures (N = 764).

were intentional exposures (misuse, abuse, or suspected suicide). There was 1 death in a pregnant women reported to NPDS in 2010. A 25 year-old female at 27 weeks gestation presented to the maternity ward with fetal demise. The patient was acidotic and in fulminate hepatic failure following an intentional ingestion of acetaminophen and aspirin. She expired on the afternoon of hospital day 3. The fatality was judged undoubtedly responsible to the acetaminophen and salicylate.

Table 19A. Comparisons of Death Data (1985–2010)^a

Year	Total fatalities		Suicides		Pediatric deaths ^b	
	N	% of cases	N	% of deaths	N	% of deaths
1985	328	0.036	174	(53.0)	20	(6.1)
1986	406	0.037	223	(54.9)	15	(3.7)
1987	398	0.034	227	(57.0)	22	(5.5)
1988	544	0.040	296	(54.4)	30	(5.5)
1989	590	0.037	323	(54.7)	24	(4.1)
1990	553	0.032	320	(57.9)	21	(3.8)
1991	764	0.042	408	(53.4)	44	(5.8)
1992	705	0.038	395	(56.0)	29	(4.1)
1993	626	0.036	338	(54.0)	27	(4.3)
1994	766	0.040	410	(53.5)	26	(3.4)
1995	724	0.036	405	(55.9)	20	(2.8)
1996	726	0.034	358	(49.3)	29	(4.0)
1997	786	0.036	418	(53.2)	25	(3.2)
1998	775	0.035	421	(54.3)	16	(2.1)
1999	873	0.040	472	(54.1)	24	(2.7)
2000	921	0.042	477	(51.8)	20	(2.2)
2001	1,085	0.048	553	(51.0)	27	(2.5)
2002	1,170	0.049	635	(54.3)	27	(2.3)
2003	1,109	0.046	592	(53.4)	35	(3.2)
2004	1,190	0.049	642	(53.9)	27	(2.3)
2005	1,438	0.059	674	(46.9)	32	(2.2)
2006	1,515	0.063	705	(46.5)	39	(2.6)
2007	1,597	0.064	737	(46.1)	47	(2.9)
2008	1,756	0.070	797	(45.4)	39	(2.2)
2009	1,544	0.062	779	(50.5)	37	(2.4)
2010	1,730	0.072	779	(45.0)	55	(3.2)

^aHuman exposures with medical outcome of death or death, indirect regardless of Relative Contribution to Fatality.

^bIncludes all children with actual or estimated ages ≤ 5 years old. Results do not include "Unknown Child" or "Unknown Age". Includes death and death, indirect regardless of Relative Contribution to Fatality.

AAPCC Surveillance Results

A key component of the NPDS surveillance system is the variety of monitoring tools available to the NPDS user community. In addition to AAPCC national surveillance definitions, 38 regional PCs utilize NPDS as part of their surveillance programs. Five state health departments plus CDC run surveillance definitions in NPDS. Since Surveillance Anomaly 1, generated at 2:00 pm EDT on 17 September 2006, over 177,000 anomalies have been detected. More than 600 were confirmed as being of public health significance with regional PCs working collaboratively with their local and state health departments and in some instances CDC on the public health issues identified.

At the time of this report, 375 surveillance definitions run continuously, monitoring case and clinical effects volume and a variety of case based definitions from food poisoning to nerve agents. These definitions represent the surveillance work by many regional PCs, state health departments, the AAPCC, and the Health Studies Branch, Division of Environmental Hazards and Health Effects, National Center for Environmental Health, Centers for Disease Control, and Prevention (CDC).

In 2010, the NPDS surveillance application module underwent incremental improvements. Information call

Table 19B. Comparisons of Direct and Indirect Death Data (2000–2010)^a

Year	All deaths			Suicides					Pediatric deaths				
	Total	Direct	Indirect	Total	% of deaths	Direct	% of direct	Indirect	Total	% of deaths	Direct	% of direct	Indirect
2000	864	845	19	448	51.85	443	52.43	5	18	2.08	18	2.13	0
2001	1066	952	114	542	50.84	503	52.84	39	26	2.44	24	2.52	2
2002	850	739	111	455	53.53	436	59.00	19	24	2.82	15	2.03	9
2003	867	826	41	464	53.52	454	54.96	10	29	3.34	22	2.66	7
2004	955	898	57	516	54.03	501	55.79	15	25	2.62	21	2.34	4
2005	1423	1332	91	666	46.80	656	49.25	10	32	2.25	26	1.95	6
2006	1515	1415	100	705	46.53	687	48.55	18	39	2.57	32	2.26	7
2007	1597	1502	95	737	46.15	712	47.40	25	47	2.94	41	2.73	6
2008	1756	1535	221	797	45.39	750	48.86	47	39	2.22	32	2.08	7
2009	1544	1452	92	779	50.45	748	51.52	31	37	2.40	31	2.13	6
2010	1730	1455	275	779	45.03	732	50.31	47	55	3.18	47	3.23	8

^aHuman exposures with medical outcome of death or death, indirect regardless of Relative Contribution to Fatality.

surveillance tools were enhanced with the activation of animal exposure call surveillance for volume definitions. Analysis process improvements included the addition of anomaly status tracking and case based time series reports.

Automated surveillance continues to remain controversial as a viable methodology to detect the index case of a public health event. Uniform evaluation algorithms are not available to determine the optimal methodologies.⁸ Less controversial is the benefit to situational awareness that NPDS can provide. Typical NPDS surveillance data detects a response to an event rather than event prediction. This aids in situational awareness and resilience during and after a public health event.

2010 Gulf of Mexico Oil Spill

On Tuesday, 20 April 2010, an explosion aboard the Deep-water Horizon drilling rig working on a well one mile below the surface of the Gulf of Mexico created the largest unintentional oil spill in history. The human, animal, and environmental impact spanned thousands of miles across the Gulf Coast and the coastal states of Alabama, Florida, Louisiana, Texas, and Mississippi. US Poison Centers began receiving calls related to the spill. In order to better track these calls to aid state and CDC public health response, the AAPCC Rapid Coding Team in concert with Micromedex Poisindex staff activated a Gulf Oil Spill surveillance code. Product codes were also initiated for the two dispersants used (Corexit EC

Table 20. Frequency of Plant Exposures (Top 25)^a

	Botanical name or Category	AAPCC Generic Code Name	N
1	Plants-general-unknown	Unknown Toxic Types or Unknown if Toxic	2,761
2	Botanical terms	Unknown Toxic Types or Unknown if Toxic	2,201
3	Unknown Botanical Name	Unknown Toxic Types or Unknown if Toxic	2,114
4	<i>Phytolacca americana</i> (L.)	Gastrointestinal Irritants (Excluding Oxalate Containing Plants)	1,933
5	<i>Spathiphyllum</i> spp.	Oxalates	1,550
6	<i>Ilex</i> spp. (not otherwise specified)	Gastrointestinal Irritants (Excluding Oxalate Containing Plants)	877
7	<i>Philodendron</i> spp.	Oxalates	852
8	Plants-pokeweed	Other Toxic Types	823
9	<i>Euphorbia pulcherrima</i> (Willd.)	Gastrointestinal Irritants (Excluding Oxalate Containing Plants)	750
10	<i>Toxicodendron radicans</i> (L.)	Skin Irritants (Excluding Oxalate Containing Plants)	690
11	Plants-cardiac glycosides	Cardiac Glycosides (Excluding Drugs)	637
12	Cherry (<i>Prunus</i> spp.)	Amygdalin and/or Cyanogenic Glycosides	556
13	Plants-cyanogenic glycosides	Amygdalin and/or Cyanogenic Glycosides	537
14	<i>Zantedeschia aethiopica</i>	Oxalates	497
15	<i>Malus species</i>	Amygdalin and/or Cyanogenic Glycosides	495
16	Berry (not otherwise specified)	Unknown Toxic Types or Unknown if Toxic	495
17	<i>Caladium</i> spp.	Oxalates	461
18	Mold (not otherwise specified)	Unknown Toxic Types or Unknown if Toxic	451
19	<i>Narcissus pseudonarcissus</i> (L.)	Gastrointestinal Irritants (Excluding Oxalate Containing Plants)	424
20	<i>Taraxacum officinale</i>	Non-Toxic	409
21	<i>Epipremnum areum</i>	Oxalates	409
22	<i>Solanum dulcamara</i>	Solanine	406
23	<i>Nandina domestica</i> (Thumb)	Unknown Toxic Types or Unknown if Toxic	384
24	<i>Schlumbergera bridgesii</i>	Non-Toxic	384
25	Plants-oxalates	Oxalates	375

^aNumber of substances related to a human exposure with a Major Generic Category of Plant. Unknown Botanical Name represents substances with a Major Generic Category of Plant and a NULL substance code. Total = 53, 526.

9500A and EC 9527A, Nalco Company, Naperville, IL). As the disaster progressed, another product code was implemented for Contaminated Seafood so seafood questions could be tabulated. This code allowed the tracking of these calls in NPDS. US poison centers received 1932 calls (1222 exposure calls and 710 information calls). Figure 5 shows the distribution of calls received as of 1 July 2010 over space and time.

This data demonstrates how the public utilizes PCs in times of crisis. This unique system can be supported and enhanced to serve as a national public health hotline providing information and management beyond traditional poison exposure calls. PCs represent the only 24/7 system that is always open in the US and requires no membership or preregistration where the public can speak to a health care professional at no charge. This data demonstrates how the public utilizes PCs in times of crisis. This unique system can be supported and enhanced to serve as a national public health hotline providing information and management beyond traditional poison exposure calls.

THC Homologs and Bath Salts

In 2009 US poison centers began receiving an increased number of calls about THC homologs and Bath Salts. Several PCs worked with their state governments to ban sales of these products. On 1 March 2011, the US Drug Enforcement Administration used its emergency scheduling authority to place 5 THC homologs into controlled substances Schedule I.⁹ Likewise on 7 September 2011, the DEA placed 3 synthetic stimulants into Schedule I.¹⁰ This action makes possessing and selling these chemicals or the products that contain them illegal in the US for at least one year while the DEA and the Department of Health and Human Services decide whether these chemicals should be permanently controlled.

Figure 6 shows these emerging trends for each substance along with the time of the DEA action. The continuation of the graphics through October 2011 illustrates the real-time nature of NPDS.

Discussion

The exposure cases and information requests reported by PCs in 2010 do not reflect the full extent of PC efforts which also include poison prevention activities and public and health care professional education programs.

NPDS exposure data may be considered as providing "numerator data", in the absence of a true denominator, that is, we do not know the number of actual exposures that occur in the population. NPDS data covers only those exposures which are reported to PCs.

NPDS regression analyses indicate that all reported analgesic exposures including opioids and sedatives are increasing year after year. This trend is shown in Table 17B and Figure 7. NPDS data mirrors CDC data that demonstrates similar findings.¹¹ Thus NPDS provides a real-time view of these public health issues without the need for data source extrapolations.

One of the limitations of NPDS data has been the perceived lack of fatality case volume compared to other reporting sources. Although NPDS fatality volumes are less than those reported by CDC for prior years, the immediacy of NPDS data offers a current window not readily available with other US surveillance systems.

Overall, NPDS encounter volume is larger than similar reporting systems for pharmaceutical exposures, adverse events, or food borne cases. Perceived limitations in NPDS volume are due in part to the fact that electronic surveillance systems seldom follow a federated approach with common output streams. This is particularly apparent with the various electronic medical record systems available. It is important to build a federated approach similar to the one modeled by NPDS to allow data sharing, for example, between hospital emergency departments and other medical record systems including medical examiner offices nationwide. Enhancements to NPDS can promote interoperability between NPDS and electronic medical records systems to better trend poison-related morbidity and mortality in the US and internationally.

Summary

Unintentional and intentional exposures continue to be a significant cause of morbidity and mortality in the US. The near real-time, always current status of NPDS represents a national public health resource to collect and monitor US exposure cases and information calls.

Changes in encounters in 2010 compared to 2009 shown in Figure 4 include:

- Total encounters (all exposure and information calls) decreased by 7.7%;
- All information calls decreased 12.6%, Drug ID calls decreased 10.9%, and human exposures decreased 3.8%;
- Health care facility (HCF) information calls decreased 13.6% while HCF exposures *increased* 2.7%;
- Human exposures with less serious outcomes decreased 5.9% while those with more serious outcomes (minor, moderate, major, or death) *increased* 4.5%;

These data support the continued value of poison center expertise and need for specialized medical toxicology information to manage the more severe exposures, despite a decrease in calls involving less severe exposures.

The continuing mission of NPDS is to provide a nationwide infrastructure for public health surveillance for all types of exposures, public health event identification, resilience response, and situational awareness tracking. NPDS is a model system for the nation and global public health.

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Disclaimer

The American Association of Poison Control Centers (AAPCC; <http://www.aapcc.org>) maintains the national database of information logged by the country's regional Poison Centers (PCs) serving all 50 United States, Puerto Rico, and the District of Columbia. Case records in this database are from self-reported calls: they reflect only information provided when the public or healthcare professionals report an actual or potential exposure to a substance (e.g., an ingestion, inhalation, or topical exposure, etc.), or request information/educational materials. Exposures do not necessarily represent a poisoning or overdose. The AAPCC is not able to completely verify the accuracy of every report made to member centers. Additional exposures may go unreported to PCs and data referenced from the AAPCC should not be construed to represent the complete incidence of national exposures to any substance(s).

Supplementary material available online

Tables 21 and 22, and appendices are also available separately online at www.informahealthcare.com/ctx/10.3109/15563650.2011.635149.