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To cite this article: Jeffrey Damon Dagnone, Robert C. McGraw, Cheryl A. Pulling & Ann K. Patteson (2008) Interprofessional resuscitation rounds: a teamwork approach to ACLS education, Medical Teacher, 30:2, e49-e54, DOI: [10.1080/01421590701769548](https://doi.org/10.1080/01421590701769548)

To link to this article: <https://doi.org/10.1080/01421590701769548>



Published online: 03 Jul 2009.



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WEB PAPER

Interprofessional resuscitation rounds: a teamwork approach to ACLS education

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Abstract

Purpose: We developed and implemented a series of interprofessional resuscitation rounds targeting fourth year nursing and medical students, and junior residents from a variety of specialty programs.

Methods: Each two hour session was conducted in our patient simulation lab, and was held weekly during the academic year. Students were given specific instruction on the roles and responsibilities of resuscitation team members, and then teams of five worked through pre-defined Advanced Cardiac Life Support (ACLS) scenarios on a high fidelity patient simulator. At the end of each session students completed an anonymous evaluation of the program via a standardized questionnaire using Likert rating scales.

Results: A total of 222 evaluations (101 nursing students, 42 medical students, and 79 junior residents) were submitted from October 2005 to April 2006. Mean scores reflected a strong consensus that these rounds were valuable for their training, provided a vehicle for understanding team roles in resuscitation, and that these rounds should be mandatory for all medical and nursing trainees. Participants also expressed a desire for additional interprofessional training.

Conclusion: Despite challenges inherent in teaching a diverse group of learners, these interprofessional resuscitation rounds were rated highly by nursing and medical trainees as valuable learning experiences.

Introduction

The role of collaborative team-building in health care is increasingly recognized as a means to ensure patient care is timely, coordinated, patient-centred and cost-effective (DeVita et al. 2004b). Resuscitation rounds that focus on the skills of teamwork in the setting of a simulated cardiac resuscitation provide a unique and engaging opportunity for promoting inter-professional collaboration amongst nursing students, medical students, and postgraduate medical trainees.

The Faculty of Health Sciences at Queen's University opened its patient simulation lab in the fall of 2005. The lab has three high fidelity adult patient simulators, a baby and pediatric simulator, and a range of basic simulation models such as suturing and IV arms. The lab is used by the Schools of Medicine, Nursing, and Rehabilitation Therapy for simulation-based educational programs. The goal of the Queen's University Patient Simulation Program is to promote excellence in clinical care and enhance patient welfare through simulation-based educational programs and research.

As one of the first initiatives in the new lab, we developed and implemented a novel inter-professional cardiac resuscitation program. The program is a series of 2-hour sessions that focus on the importance of teamwork in cardiac resuscitation and targets 4th year nursing and medical students, as well as postgraduate trainees from a variety of specialty programs. The main challenge to the success of the program was making the sessions relevant to a diverse group of learners with skills ranging from nurses and medical students, with basic CPR

Practice points

- High fidelity medical simulation is a valuable learning tool.
- Interprofessional education should be encouraged and supported within medical training.
- Instruction in resuscitation skills should focus on hands-on, interactive, and interprofessional strategies.

training only, to residents with ACLS training and real critical care experiences. As well, the nursing students would only attend one session while some of the residents would return for up to eight sessions in consecutive weeks. With each new session the nursing students and other first time participants would quickly need to learn to function as a member of the team, while the scenarios would have to be challenging enough to maintain the interest of the residents.

Medical simulation, including high-fidelity human patient simulators, has been shown to be effective in health sciences education (Dunn et al. 2004; Issenberg et al. 2005), but there are limited reports of specifically using it to enhance inter-professional teamwork skills (Howard et al. 1992; Fletcher et al. 2002; Dunn et al. 2004). In our review, only one specifically targeted the practice of emergency medicine (Small et al. 1999). Coordination and communication between individuals representing a number of disciplines is critical for optimal patient care during cardiac resuscitation

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(McQuillan et al. 1998; Buist et al. 2002; DeVita et al. 2004a; Lighthall et al. 2004). The purpose of this paper is to describe a novel series of interprofessional cardiac resuscitation rounds for trainees in nursing and medicine, and consider some of the unique challenges presented by targeting such a diverse group of learners. As well, attitudinal outcomes within each group of learners will be quantified for each discipline group.

Methods

Selection and description of participants

The resuscitation rounds are a joint effort between the School of Nursing and the School of Medicine at Queen's University in Kingston, Ontario. Each session consists of two hours in the Faculty of Health Sciences Patient Simulation Lab. Sessions are attended by fourth year nursing students, fourth year medical students, and junior residents from a variety of specialties on their Emergency Medicine rotation. All fourth year undergraduate nursing students are scheduled to attend only one session as part of their clinical learning. Medical students and junior residents attend the sessions as part of their clinical rotations in Emergency Medicine and attend two to four sessions in a row.

Description of educational environment

The educational teaching environment is comprised of two large rooms, each of which is occupied by a high fidelity ECS model METI mannequin (Medical Education Technologies, Inc.), a defibrillator unit (Lifepack-12, Medtronic), and a crash cart with airway and intravenous supplies. Each teaching room is facilitated by an Emergency physician instructor with a 5:1 teacher:student ratio. The rooms are adjoined with 1-way mirrors by a central control room and are operated by a full-time simulator lab technician.

Description of teaching sessions

During the sessions, learners are given specific instruction on the roles and responsibilities of resuscitation team members. Teams of five then work through pre-defined Advanced Cardiac Life Support (ACLS) scenarios on a high fidelity patient simulator. Students are encouraged at the start of each session to view the simulation lab as a safe environment where errors are an expected and instrumental part of the active learning process.

At the start of each session the nursing students, medical students, and residents participating in their first session are taken aside for orientation, instruction and to practice the approach to an unresponsive patient. The purpose of the orientation, which takes between 30 and 45 minutes, is to quickly get the new participants to the point where they can understand the individual team roles and skills well enough to function as a member of the team. Medical students and residents who have previously received the orientation are taken directly to the adjoining room to immediately practice scenarios with the high fidelity patient simulator.

The skills taught in the orientation sessions include initial assessment, calling for help, bag-mask ventilation, and chest compressions. All of the students had received basic cardiac life support training prior to the sessions and so these skills were, for the most part, a quick review. The learners are also shown how to correctly attach the patient to the Lifepack-12 cardiac monitor and how to charge and safely discharge the defibrillator. This was often a new skill for the nursing and medical students and therefore required a little more time.

During the orientation the instructor also introduces the basic skills of team leadership and communication by walking the learners through a Code Blue response to a pulseless patient. Designated leaders do the initial assessment and call for help. Leaders are trained to delegate specific tasks as the team arrived. It is emphasized that leaders should make eye contact with individual team members, speak clearly but not shout, use names where possible, and be very specific about what the team member was being asked to do.

At the point where the new participants are able to work as a team through a simple ventricular fibrillation arrest they join the 'experienced' group. Teams of five, made up of a blend of new and experienced participants, then practice responding to a series of cardiac emergencies.

While it is expected that medical students and nurses might find it difficult and intimidating to lead the initial sequence of a cardiac resuscitation, it is our expectation that all learners would lead the team to the point of assigning members to take over the airway, do chest compressions, hook up and turn on the monitor, and start an IV. The rationale for this is that nurses are often the first person to find an unresponsive patient in the hospital and they should feel empowered to direct the team members to their roles until such time as the designated code blue leader arrives and formally takes over care. In keeping with this expectation, the scenarios incorporate a formal handover of leadership from nurse or medical student to physician leader at the point where reach the limit of their knowledge or skills. This usually occurs when rhythm interpretation becomes necessary.

Learners are given the opportunity to practice multiple scenarios and to take a turn at each of the defined roles. The scenarios are intentionally simple cases such as ventricular fibrillation, pulseless ventricular tachycardia, pulseless electrical activity and unstable bradycardia (Table 1) so that emphasis would be on leadership and team functioning more than medical knowledge. After each 3 to 5 minute scenario, short debriefing sessions are utilized for feedback on team dynamics and individual performance. 'Closing the loop' is an example of a topic discussed during debriefing sessions. Closing the loop means that team members clearly report to the leader significant events such as 'the monitor is on and the rhythm is Vfib' or 'the IV is in and running'. As well, members are encouraged to speak up if an error was being made either through omission or commission. Approximately 10–15 scenarios would be completed during each session.

At the end of each session all learners complete an anonymous evaluation of the program via a standardized questionnaire using 5-point Likert rating scales and written responses (Figure 1). Scores are continuous from 1 (strongly disagree with statement), to 2 (disagree with statement),

Table 1. Outline of Scenario Objectives.

	Objectives & Roles
VFIB arrest	Assess unresponsiveness and manage initial ABCs Initiate CODE BLUE activation of team Start CPR, airway management, determine rhythm Immediate defibrillation Team leader to coordinate team tasks and decision making
ASYSTOLE	Assess unresponsiveness and manage initial ABCs Initiate CODE BLUE activation of team Start CPR, airway management, determine rhythm Initiate IV access/IV epinephrine, and confirm rhythm Team leader to coordinate team tasks and decision making
Unstable Bradycardia	Assess unresponsiveness and manage initial ABCs Initiate CODE BLUE activation of team Initiate airway management and determine rhythm Initiate IV access/IV atropine Initiate cardiac pacing and confirm capture Team leader to coordinate team tasks and decision making
Pulseless VTAC	Assess unresponsiveness and manage initial ABCs Initiate CODE BLUE activation of team Start CPR, airway management and determine rhythm Immediate defibrillation Team leader to coordinate team tasks and decision making
VTAC with pulse	Assess unresponsiveness and manage initial ABCs Initiate CODE BLUE activation of team Initiate airway management and determine rhythm Immediate cardioversion and reassessment of rhythm Team leader to coordinate team tasks and decision making
PEA arrest	Assess unresponsiveness and manage initial ABCs Initiate CODE BLUE activation of team Start CPR, airway management, and determine rhythm Initiate IV access/IV epinephrine, and confirm rhythm Consider IV bicarb/atropine therapy Team leader to coordinate team tasks and decision making

to 3 (neutral), to 4 (agree with statement), to 5 (strongly agree with statement). Learner scores were tabulated and compared between discipline groups (nursing students, medical students, residents). This project was approved by the University Ethics Review Board.

Statistics

Statistical analyses on the 5-point Likert scores were not carried out between discipline groups due to the limited variance.

Results

A total of 222 evaluations (Figure 1) were completed from October 2005 to April 2006. A summary of the study population is presented in Table 2. Evaluations were completed by all learners, and in some cases, more than once when participants made repeat visits. Written comments and attitudinal scores from the questionnaires consistently reflect a positive attitude towards the simulator-based inter-professional program from all three groups of learners (Tables 3 and 4). There was very little variation between discipline groups for all attitudinal outcomes.

Additional written and verbal comments from residents, medical students, and nursing students participating in these sessions reinforces the need for additional simulation-based training sessions, further inter-professional team skills in

resuscitation settings, and demands the implementation of simulator-based sessions earlier in training. As well, written and verbal feedback underscores the lack of other similar educational initiatives within undergraduate and postgraduate medical curriculums.

Criticisms of these rounds include the decreased access of individual nursing students to multiple sessions due to scheduling difficulties, the resource-intensive nature for each session (2 instructors and 1 technician), and the desire for more opportunities to be the team leader during the simulation scenarios.

Discussion

Advancing knowledge, educational innovations, and society's changing needs demand that medical curriculums continually evolve as educators and clinicians strive to optimize care (Bland et al. 2000). The pace of innovation, however, is a slow process and must be embraced by learners to be effective and sustained (Bandaranayake 1989; Siegfried et al. 1995). The resuscitation course described in this paper presents a transformational approach with its novel delivery vehicle (high fidelity simulation) and inter-professional group participants (nursing students, medical students, and junior residents). As indicated by the course evaluations, the learners are uniformly embracing the contextually relevant and interactive team-based approaches this novel technology provides, and

Faculty of Health Sciences: Team Based Cardiac Life Support

Your feedback on these sessions is important. Your ratings and comments will be used to determine the educational content and delivery of future sessions.

Please circle your level of training: Nursing 4 or Clerkship or PGY-1, 2, 3, 4, 5 or NP or PA

Please rate your responses to each of the statements according to the following scale.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

I enjoyed participating in this session.

1 2 3 4 5

The inter-professional component of this session adds value to my training.

1 2 3 4 5

I would be interested in additional inter-professional programs during my training.

1 2 3 4 5

Simulator-based cardiac life support education adds value to my training.

1 2 3 4 5

I would be interested in additional simulator-based programs during my training.

1 2 3 4 5

I have a better understanding of the cardiac life support team members' roles as a result of this session.

1 2 3 4 5

This session should be mandatory for all medical and nursing students as well as post-graduate medical trainees.

1 2 3 4 5

Please comment on the strengths of this exercise.

Please comment on areas for improvement.

Please comment on why you would or would not value additional inter-professional activities during your training.

Figure 1. Learner evaluation form.

are requesting increased simulator-based interactions during their training. This is important because learner acceptance is essential for sustaining novel educational initiatives.

Student-centred learning, problem-based learning, integration of teaching, and a systematic approach to teaching and learning should be priorities in developing educational strategies for medical training (Harden et al. 1984). The planning and implementation of our resuscitation rounds focuses heavily on these components. Learners are guided through numerous resuscitation scenarios in a hands-on, clinically relevant, problem-based, inter-professional team setting. Instructors serve as facilitators, helping learners solve problems using high fidelity medical simulation scenarios. Debriefings following each scenario allow for timely integration of teaching and focus on student-centred concerns, interests, and needed areas of reinforcement.

There are many theoretical benefits to inter-professional educational programs (Goble 1994; Pirrie et al. 1998; Mires et al. 1999; DeVita et al. 2004a), many of which we observe and/or are commented on by students. These include the development of respect between professional disciplines and

Table 2. Summary of study population.

Total number of training sessions	20
Total number of students trained	
Nursing students	101
Medical students	36
Residents	25
Total	144
Total number of evaluation forms (%)	
Nursing students*	101 (45.4)
Medical students**	42 (18.9)
Residents**	79 (35.6)
Total	222 (100.0)
Average number of training sessions attended	
Nursing students	1
Medical students	2
Residents	4

*Each nursing student was only able to attend one training session.

**Medical students and residents were permitted to complete more than one evaluation form for a subsequent training session.

an appreciation and awareness of the interdependence of team members. As well, interprofessional education encourages students to reflect on their perceptions of other health care disciplines.

Table 3. Summary of questionnaire scores.

Questionnaire Item	Likert scores		
	Mean	Range	Percentage = 4 or >
Interprofessional component valuable			
Nursing students (<i>n</i> = 101)	4.85	3–5	99.0
Medical students (<i>n</i> = 42)	4.64	3–5	95.2
Residents (<i>n</i> = 79)	4.68	2–5	93.8
Total (<i>n</i> = 222)	4.75	2–5	96.4
Desire for further interprofessional sessions			
Nursing students	4.79	3–5	99.0
Medical students	4.6	3–5	95.2
Residents	4.61	2–5	96.2
Total	4.69	2–5	97.3
Better understanding of team roles in resuscitation			
Nursing students	4.76	3–5	99.0
Medical students	4.67	3–5	97.6
Residents	4.66	2–5	96.2
Total	4.71	2–5	97.7
Sessions should be mandatory			
Nursing students	4.87	3–5	98.0
Medical students	4.71	3–5	95.2
Residents	4.84	3–5	98.7
Total	4.83	3–5	97.7
Simulation component valuable			
Nursing students	4.89	4–5	100
Medical students	4.85	4–5	100
Residents	4.96	4–5	100
Total	4.91	4–5	100
Desire for further simulator-based sessions			
Nursing students	4.82	3–5	98.0
Medical students	4.86	4–5	100
Residents	4.91	3–5	98.7
Total	4.86	3–5	98.6

Table 4. Summary of written comments of learners.

Please comment on the strengths of this exercise.

- Forces me to think through problems. Realistic team elements.
- Great to learn roles during codes using a collaborative, team-based approach.
- Great to practice team work. Hands-on experiences most valuable.
- Excellent teaching/leadership. Simulator mannequin was awesome.
- Non-threatening environment allows everyone to participate and make mistakes.

Please comment on areas for improvement.

- Not enough sessions for the nurses to practice.
- More simulator mannequins should be used so we can practice more.
- Medical simulation should be used more often in teaching.
- More teaching sessions.
- More practice with advanced airway skills and components of the crash cart.

Please comment on why you would or would not value additional inter-professional activities during your training.

- Inter-professional environment is more realistic and promotes better understanding of each other's roles.
- These sessions promote better communication skills and cooperation among health care professionals.
- This is a valuable experience that we previously hadn't been exposed to in our training.

On a more pragmatic level this inter-professional program centres on the non-technical communication skills required in resuscitation scenarios. Leadership, team management, contingency planning, and skilled resource allocation are all key components in the optimal management of high-risk situations (Gaba et al. 1994; Lighthall et al. 2004). Reports within the medical literature suggest that in spite of successful completion of a course, members of teams responding to cardiac arrests do not possess essential communication skills and are likely to fail while performing vital tasks

(Lindekaer et al. 1997; McQuillan et al. 1998; Nadel et al. 2000; Iriola et al. 2002). With this in mind we chose to move beyond the traditional focus of simply defining treatment goals and concentrate rather on the process required how to best accomplish these goals. Within our simulator-based interprofessional rounds, we observed no differences between groups with respect to the attitudinal outcomes. All groups of learners valued the interprofessional component of these sessions and felt they achieved a better understanding of team roles. Explaining why this occurred is difficult but may be due to the

great need for interprofessional training and the limited resuscitation experiences of all the learners prior to these rounds. Alternatively, it may identify that the questionnaire was inadequate in delineating differences between the discipline groups and may also suggest our study would have benefited from a 9-point Likert scale scoring system.

There are other limitations to this study. We did not perform a pre-intervention assessment for comparison of interprofessional attitudes between and within discipline groups. This limited our data for comparison within and between groups. As well, individual nursing students do not have the opportunity to participate in multiple sessions, and some report they do not have adequate opportunities to be team leader. In response to these concerns, we have scheduled two consecutive sessions for each of the nursing students for the 2006–2007 academic year. Additionally, third year nursing students will now be attending a hands-on seminar on basic airway management and approach to the unresponsive patient that is part of the medical undergraduate curriculum. The purpose of these seminars is to better prepare the nursing and medical students for working together in the resuscitation rounds that occur in their fourth year of training.

Implementation of these rounds can also be limited by the fact that they are resource intensive. The nature of high fidelity simulation is such that the initial capital costs and ongoing investment is high. As well, we required at least two instructors and a technician present at each session.

Conclusions

These inter-professional cardiac life support rounds are accepted and praised by medical and nursing participants as valuable learning experiences. We believe this program is the first of its kind in a Canadian medical school to offer learners an early opportunity for the development of interprofessional basic resuscitation and crisis resource management skills in a protected simulator-based setting. This program has helped build interprofessional bridges within the Faculty of Health Sciences and has provided a launching pad for further undergraduate, postgraduate, and Faculty level inter-professional projects focusing on collaborative patient-centred practice and critical care within the ED.

Acknowledgement

This research was carried out at Queen's University in Kingston, Ontario, Canada. It was supported by an educational grant from the Queen's University Interprofessional Patient-Centred Education Direction (QUIPPED).

Notes on contributors

Dr. DAMON DAGNONE and Dr. BOB MCGRAW are both Emergency Medicine physicians at Queen's University (Kingston, Ontario, Canada) and have special interests in medical simulation and resuscitation training.

CHERYL PULLING and ANN PATTESON are faculty members within the School of Nursing at Queen's University and have helped establish interprofessional training sessions within the Faculty of Health Sciences.

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