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A Simulated Night on Call Experience for Graduating Medical Students

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Abstract

Introduction: A number of medical schools have developed capstone courses to help prepare medical students for their transition to residency training. As part of our capstone program, we developed a Night on Call experience for graduating medical students to simulate the experience of an intern physician responding to medical emergencies in the hospital setting. **Methods:** Our 2-hour program incorporates high-fidelity simulation in a four-station format (four clinical cases) with semistructured debriefing at the conclusion of the experience. **Results:** The program has been well received. The majority of students report that the exercise achieves its learning objectives and has been a valuable experience. In addition, the students note that our cases offer a realistic experience. **Discussion:** A program such as this allows the faculty an opportunity to observe and provide formative feedback to the students regarding their clinical performance when caring for patients in a simulated inpatient setting.

Keywords

Editor's Choice, Simulation, Entrustable Professional Activities, Capstone

Educational Objectives

At the conclusion of the Night on Call experience, the learners will be able to:

1. Manage patients in a setting and time line similar to an intern's night on call.
2. Assess and manage multiple patients in rapid succession.
3. Respond to unanticipated medical emergencies.
4. Determine whether previously stable patients require an increased level of care.
5. Provide handoff to a patient care team about patients they are covering.
6. Debrief with peers and faculty, allowing for self-reflection on performance along with near real-time feedback.

Introduction

In recent years, a number of medical schools have created capstone courses to further assist medical students in their transition to residency training. However, there is little information in the literature regarding implementation of such programs or the content that should be included.^{1,2} As of 2010, there were 16 medical schools that reported having a capstone or transition to residency course.¹ The majority of these programs were between 2 and 4 weeks in length and typically taught near the end of the final year of medical school.¹ Unpublished data obtained from the Clerkship Directors in Emergency Medicine Listserv in 2012 identified 20 capstone programs at U.S. medical schools. These programs frequently incorporated simulation and standardized patient (SP) experiences and provided procedural training using task trainers. In addition, the majority of programs had resident physicians participate. Capstone courses are typically offered in the spring of the last semester of medical school and can be designed to review the management of common clinical conditions and medical emergencies, communication skills, and various procedures and tasks to better prepare students to enter graduate medical education training programs.^{1,2} The design of these types of programs often needs the perspective of a number of stakeholders—clerkship directors, residency program directors, students, and medical school administrators—to optimize the curriculum and meet the needs of individual institutions. Some authors recommend that this type of training be a requirement for graduation from medical school.¹ Even if this

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Appendices

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- U. Capstone 2015 Group Evaluation.pdf

were to occur, there is little standardization of curricula across institutions at the current time. Individual medical schools may employ an internal needs assessment and assess both faculty and facility resources to guide the development of such programs.

As part of our capstone program, which was first implemented in 2009, we recently added a 2-hour, four-station (four clinical case) Night on Call experience for graduating medical students to simulate the experience of an intern responding to medical emergencies in the hospital setting. We identified a variety of chief complaints and clinical conditions that an intern may be faced with early in the internship year. We have operationalized this exercise to simulate an experience where graduating medical students function in the role of an intern and work together to care for unexpected medical emergencies in a safe learning environment.

Methods

Simulation has been shown to be an effective teaching modality and can easily be incorporated into the undergraduate medical education curriculum.³⁻⁵ The use of simulation can also help to provide a more standardized and uniform experience for students. At our institution, we have developed and implemented simulation-based workshops.^{3,6} Our Night on Call experience is also a simulation-based program. The incorporation of simulation allows for a more standardized and uniform experience that can offer medical school faculty an opportunity to provide formative feedback or to evaluate achievement of any of the recently published Core Entrustable Professional Activities for Entering Residency Training.⁷

Our Night on Call experience takes place over 2 hours and exposes the students to four clinical cases. The program is completed over four separate afternoons to accommodate student participants, faculty and resident availability, and simulation center resources. The target audience for this program is senior medical students. Our program is administered after the completion of all clinical rotations, approximately 1 month prior to medical school graduation. One week prior to the exercise, students self-assign themselves into groups of three. The sample student scheduling template can be found in Appendix A. We run three sessions each afternoon for 4 afternoons (up to 12 students in each session, four groups of three students each). Currently, we use high-fidelity simulation (HFS) cases for all four stations. Although some stations may be complementary to others, they are all stand-alone, and completion of one station is not a prerequisite to participating in any other station. Therefore, each student group starts at a different station and rotates until all four clinical encounters are completed. Below is a brief overview of each HFS case.

- Case 1 (Appendix B, supplemental materials in Appendices C-E): Patient admitted with biliary colic develops shortness of breath (pulmonary edema) and severely elevated blood pressure.
- Case 2 (Appendix F, supplemental materials in Appendices G-I): Patient admitted with a chronic obstructive pulmonary disease (COPD) exacerbation and community-acquired pneumonia develops worsening shortness of breath. The patient decompensates and has a pulseless electrical activity (PEA) arrest regardless of therapy provided.
- Case 3 (Appendix J, supplemental materials in Appendices K & L): Patient admitted with chest pain for rule-out myocardial infarction has ongoing pleuritic chest pain (a missed pulmonary embolism).
- Case 4 (Appendix M, supplemental materials in Appendices N-P): Patient admitted with an upper gastrointestinal bleed develops worsening abdominal pain resulting from a perforated viscus.

As part of this experience, all students attend a brief session prior to the workshop that highlights the objectives of the program along with outlining the student roles and expectations. The students are reminded that they should work as a team, focus on the ABCs, be systematic in their approach to the simulation patients, and perform a complaint-directed history and physical examination (H&P). The students are told that they can use resources they would normally use in patient care, such as their smart

All appendices are peer reviewed as integral parts of the Original Publication.

phones, and are advised to bring their stethoscopes to the exercise. The students are also told to manage each case as they would in the inpatient setting, to follow up and respond to in-house emergencies as they would on a rapid response call, to function as an intern, and to call their senior resident (or consultant) if help is needed.

For a typical session, four groups of students (up to 12 in total) report at their assigned time. All students report to a classroom adjacent to the simulation center. At the beginning of each session, the students are reoriented to the exercise and receive a verbal and written sign-out from one of the emergency medicine (EM) or internal medicine (IM) residents who are role-playing a senior medicine resident. The sign-out is a traditional paper sign-out that informs the on-call students about their patient's current clinical condition, past medical history, and any tasks or follow-up issues that need to be addressed by the Night on Call team. A copy of the sign-out is included (Appendix Q).

The students work in groups of three and are brought to the individual stations by SP proctors after the written sign-out is completed. The students are informed by the SP proctors as they enter the examination room that the patient requires their assistance. Each station is 20 minutes in length; after all four stations are completed, the students undergo a 30-minute debriefing by one of the faculty. We have found that this is helpful for the three students in each group.

Equipment/Environment

All four cases are designed as hospital inpatients admitted to an IM service. For our exercise, we use SimMan; however, this exercise can easily be implemented with alternative simulators. Each simulation room is set up in an identical fashion, as a medical/surgical floor bed. For all cases, oxygen delivery devices such as a nasal cannula, non-rebreather face mask, and bag-valve mask should be available in the patient room. For each case, we also provide a written admission H&P that is kept in the exam room for the students to review. All four simulation case H&Ps are included in this module (Appendix R). For Case 2 (COPD/PEA arrest), because of the progression of the case, we also have a code cart available that is kept in the corner of the room.

Personnel

The manpower resources needed for each afternoon session include four preceptors to run the simulation cases, one faculty debriefer, two residents (one role-playing a senior resident, the other a nurse for Case 2), and two SPs who function as proctors to help move the student groups from station to station. Guidelines for the resident and nurse confederate are contained in Appendix S.

Each simulation preceptor (resident or faculty) needs to be familiar with all of the cases in addition to the case he or she is running, along with having a basic understanding of the operation of the simulation software. The preceptor should also be familiar with the assessment instrument for his or her assigned case (Appendix T). In addition to portraying the simulated patient for selected cases, the preceptor can also role-play the nurse as needed for Cases 1, 3, and 4. The preceptor may also need to role-play the senior resident to provide advice/guidance over the phone if the senior resident is unavailable. Faculty debriefers should be familiar with all cases and should try to observe some of the student groups' performance during the workshop from the simulation control room. The resident (role-playing senior resident) should be familiar with all cases, while the senior resident (role-playing nurse) should be familiar with Case 2 (COPD/PEA arrest). Proctors should be familiar with the schedule and the workshop logistics, room locations, and group progression.

Assessment

The student groups can be assessed by direct observation. We developed an assessment instrument based on various aspects of the medical history, physical examination, diagnostics, and therapeutic

management for each case. Each case has a variable number of elements felt to be important when properly managing the simulated case's essentially critical actions. The tool is completed by the simulation preceptor in real time for each group of students (not for individual students). The simulation cases' assessment instruments can be modified to suit the needs of the program, that is, either formative or summative assessment. In addition, a postsession questionnaire (Appendix U) can be used to evaluate the program and further self-assess individual or group performance.

Debriefing

After all groups have completed the four stations, the students are brought to a small conference room where a faculty member debriefs the exercise. The debriefing lasts about 30 minutes, is semistructured, and is designed to review each case, identify misconceptions, and discuss key/critical elements of each case. In general, especially with a new program, it is helpful to obtain feedback on the workshop (group size, logistics, length of the station, and overall workshop). This can be obtained through a formal postsession questionnaire or more informally during the debriefing. A typical debriefing starts out by asking the students to reflect on both their individual and group performance. This allows for a more general discussion, in part student-led, to identify what went well with regard to the care provided and what could be improved. Based on how the conversation develops, the debriefing circles back to review the clinical performance on a case-by-case basis. Although the faculty debriefer is unable to directly observe all of the groups' performance, he or she should have had the opportunity to observe some of the groups during the workshop; this will be helpful during the debriefing. At times, it may be helpful for the faculty debriefer to take notes during the workshop regarding a particular group's performance. This can then be reviewed in a constructive manner during the debriefing. In addition, the faculty debriefer can ask general questions of the students or direct a specific question to a particular group based on observations of its performance. The faculty debriefer can pose reflective questions such as "When your patient went into cardiac arrest, what were you thinking?" or "If you had to care for the case over again, would you do anything different?" or "When you spoke to the surgical consultant, how did you feel the conversation went?"

We purposely decided not to hold the debriefing session until the students had completed all four clinical cases. This was done for a few reasons. In clinical practice, especially in a night-on-call environment, house staff are often expected to multitask and manage multiple patient-related tasks simultaneously. We decided not to break up the clinical experience of handling one medical emergency followed shortly thereafter by another with debriefing to hold more true to a real-life night on call. We also felt that since the entire clinical experience is less than 2 hours, the slight delay in debriefing would not affect the value of the discussion. In addition, we decided on a single end-of-session debriefing because of logistics. This allowed the entire experience to flow uninterrupted until the end, an advantage ensuring a smooth and rapid transition from one station to the next. A single end-of-session debrief also allowed the student groups to discuss their experiences together in the same room, another advantage over separate smaller end-of-case debriefings. The only time during the stations that students were provided with feedback was at the end of Case 2. This case typically ends a few minutes early to allow the senior resident and nurse confederate to talk with the student groups about their performance.

Lastly, although the checklist for each case focuses on clinical actions and medical decision making, it is important to consider how the students interacted together as a team. Did one team member assume a leadership role, or did the students seem to take a shared approach to the management of the patients? A discussion along these lines should also focus on communication skills with the patient, amongst team members, and in conversations with the senior resident, nurse, and consultants.

Logistics

Since 2012, when the Night on Call experience was first implemented, the basic logistics of the program, such as number of stations and workshop length, have not changed. However, we have modified the way that the workshop has been run.

Format 1: 2012 (first year of the Night on Call workshop):

- Station 1—HFS Case 1: Students evaluate the patient as a group.
- Station 2—HFS Case 2: Students evaluate the patient as a group.
- Station 3—SP cases: For this station, the group of three students is separated to allow each student to evaluate one SP case independently. We used three SP cases: chest pain (acute coronary syndrome), altered mental status (hypoglycemia), and fever (sepsis).
- Station 4—procedure station: This was an unproctored station where students were able to practice intravenous access and phlebotomy using task trainers. For this station, when the students walked into the procedure room, we had file cards that outlined simple tasks next to a particular task trainer (e.g., Ms. Smith's IV infiltrated and needs to be reinserted, or Mr. Jones needs to have a repeat basic metabolic profile).

Format 2: 2013-2014:

- Station 1—same.
- Station 2—same.
- Station 3—same.
- Station 4—HFS Case 4: Students evaluate as a group. This change from the prior format was instituted to add a new case that required surgical consultation. For this case, the senior resident also played the role of the surgical consultant.

Format 3: 2015-present:

- Station 1—same.
- Station 2—same.
- Station 3—HFS Case 3: chest pain rule-out (stable cardiopulmonary patient who actually has a pulmonary embolism). Students evaluate as a group. This change from the prior format was instituted to add a new case to further allow the preceptors to assess the student's clinical decision-making skills. For this case, the patient was admitted to the hospital for chest pain and was undergoing a cardiac rule-out. In actuality, the patient had ongoing sharp, pleuritic chest pain, historical features (recent travel), and physical exam findings (calf pain) that supported the diagnosis of a pulmonary embolism. The debriefing of the management of this case allowed us to focus some of the discussion on anchoring bias and ways to help prevent this from occurring.
- Station 4—same.

Results

Our Night on Call program has consistently been well received by our medical students. In the first year of the program (2012 Format 1), 131 students (97%, $n = 135$) reported that the exercise achieved its learning objectives, and the majority of students (95%, $n = 132$) reported that the program was a valuable experience. Regarding logistics, most students (90%, $n = 135$) reported that the use of a written sign-out was an effective way of conveying information about the cases and tasks. The group size of three students worked well, as reported by 98% ($n = 131$) of students. The station length was felt to be appropriate by most students (86%, $n = 134$), and the overall length of the program was also appropriate (93%, $n = 134$). The postworkshop debriefing was also well received; 93% ($n = 135$) of students reported that the debriefing was a valuable experience. Regardless of the format used, we have not modified the written sign-out process, group size, and station or program length. When evaluated again the following year (2013), we identified that the overwhelming majority of students felt the HFS and SP cases offered a realistic experience in dealing with a medical emergency. For the COPD/PEA case, 97% ($n = 134$) of students, for the cardiopulmonary/shortness of breath and elevated blood pressure case, 96% ($n = 132$) of

students, and collectively for the SP cases, 93% of students reported the cases offered a realistic experience. Postworkshop evaluations this past spring (2015) by the 46 student groups (students were evaluated by groups as opposed to individuals) that completed the exercise noted that all HFS cases offered a realistic experience. In addition, all groups reported that the Night on Call workshop was valuable.

When asked “The most important thing I learned today,” some of the responses were as follows:

- “Good communication is key.”
- “Have a low threshold to call for help.”
- “Take our own history as well.”
- “Don’t hesitate to call for help.”
- “Work as a team.”

Discussion

Overall, this workshop has been a successful endeavor. We have modified and updated this exercise over the past few years, and in its current form, we employ four HFS stations. For the first year of the Night on Call program (2012), we had the students document a progress note in the SOAP (subjective, objective, assessment, plan) format after each SP encounter. As part of the postworkshop evaluation, we identified that only 53 students (40%, $n = 134$) reported that completing a progress note after the SP encounter was a valuable experience. Although conceptually this seemed like a good idea at the time, most students did not find it a valuable experience. In addition, we initially planned on reviewing the progress notes to provide formative feedback to the students regarding their documentation. Ultimately, this did not happen as we did not have the faculty resources to review the written notes in a timely fashion. Because of this, we decided to remove the documentation component from the program in future years. We have decided to replace the SP cases with an additional simulation case. We did this for a number of reasons. Logistically, it continued to be a challenge to break the students groups up so that each student could evaluate an SP individually. In addition, some students would want to perform one or more tasks throughout the SP cases. We did not have a mechanism in place for this as the individual SP cases were stand-alone and there were no additional preceptors or proctors to assist with the performance of these tasks. To have a nurse available for each SP would have required additional resources that we did not have. As for the procedure station, the benefit of this was unclear since it was self-directed by the students and not precepted by a faculty member. Additional resources were not available to make this a teaching station.

Lastly, the format of our exercise optimizes our available resources and achieves the objectives. This past year, we implemented the simulation cases’ evaluation instrument in an attempt to better understand the performance of our students with regard to Entrustable Professional Activity 10: “Recognize a patient requiring urgent or emergent care and initiate evaluation and management.”⁷ Annually, we continue to review and update the cases on an as-needed basis and have considered expanding the workshop down the road as we are undergoing a curriculum renewal process at our institution. Since we started our capstone Night on Call program, we have implemented a few specialty-specific programs (surgery, obstetrics/gynecology, and pediatrics) to further prepare students for residency training in these disciplines. We would like to be able to expand the experience to better prepare our students for common Level 1 milestones. In the last few years, we have published three abstracts about our program.⁸⁻¹⁰

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Ethical Approval

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