

# Handoffs and Nurse Calls: Overnight Call Simulation for Fourth-Year Medical Students

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## Abstract

**Introduction:** Interns must be able to give and receive handoffs and use handoff information to respond to calls from nursing staff regarding patient concerns. Medical students may not receive adequate instruction in these tasks and often feel unprepared in this aspect of transitioning to residency. This program simulated an overnight call experience for fourth-year medical students emphasizing handoffs, nurse calls, and medical emergency response. **Methods:** The program utilized a combination of traditional didactics and simulated handoffs, nurse calls, and patient scenarios to allow groups of fourth-year medical students to independently manage a simulated overnight call. The program was designed for students as part of a larger Transition to Residency capstone course. **Results:** We ran four sessions over 3 years, with a total of 105 medical student participants. All students reported increased confidence or comfort in their ability to manage handoffs and respond to nurse calls. Students reported that the sessions were helpful and realistic. **Discussion:** This program provided fourth-year medical students with a realistic and useful opportunity to simulate handoffs and response to nurse calls, which increased their confidence and comfort. Minor changes were made between iterations of the course with continued positive feedback from medical students. The course is generalizable and can be adapted to the needs and resources of different institutions.

## Keywords

Simulation, Handoffs, Communication, Communication Skills, Case-Based Learning

## Educational Objectives

By the end of this program, learners will be able to:

1. Describe the importance of detailed and complete handoffs between health care providers.
2. List key elements of a successful nurse-provider communication about a patient concern.
3. Apply communication techniques, such as I-PASS, SIGNOUT, and SBAR, to convey patient status between health care providers.
4. Demonstrate management of concerns raised by nurses in a simulated setting.
5. Demonstrate the initial management of common emergencies in a simulated setting.

## Introduction

Every year, thousands of trainees embark on the transition from medical school to residency.<sup>1</sup> In their new roles, residents may be tasked with working overnight, often referred to as being on call. Overnight call may include caring for unfamiliar patients with reduced attending oversight.<sup>2,3</sup> Managing overnight call relies on successfully receiving and giving handoffs, responding to calls from nurses, triaging patient concerns, and managing time.<sup>4,5</sup> The complexity of these tasks offers numerous opportunities for catastrophic error. Handoff gaps between health care providers and inadequate communication between residents and other care team members contribute significantly to overall medical errors and patient harm.<sup>6-12</sup>

Incoming interns feel unprepared to cross-cover patients during overnight call.<sup>13</sup> Residency program directors indicate that residents are unprepared for giving and receiving handoffs and communicating with nursing staff.<sup>4,14</sup> There is a paucity of formalized training for medical students in how to manage overnight calls.<sup>13,15-17</sup> Most residents indicate they learned these important skills informally or during their intern year rather than in medical school curricula.<sup>15</sup> Formalized training in handoffs

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and interprofessional communication can improve physician performance and patient outcomes.<sup>18-23</sup> More specifically, educational programs about handoffs and on-call training skills have improved the performance, comfort, and confidence of medical students or new interns during their transition to residency.<sup>18,19,24-27</sup>

Overnight call programs described in the literature mainly focus on separate elements of the on-call experience, either responding to unanticipated medical emergencies<sup>28,29</sup> or responding to mock pages from nurses.<sup>25-27</sup> Several other publications describe comprehensive overnight call programs,<sup>30,31</sup> but there are no published curricula that combine nurse call response training, handoff training, and patient management scenarios into an adaptable simulation-based program. Furthermore, there are no curricula that provide medical students with the opportunity to manage patients from a range of primary services. To address these issues, we developed a multimodal simulation-based program to allow fourth-year medical students to practice handoffs, communication with nurses, and medical emergency response in a safe learning environment.

## Methods

### Development

We developed this program with the goal of providing a realistic overnight call experience for senior medical students in a simulated setting. The program included a combination of didactic teaching, simulation experiences, and group discussion, with simulation constituting the majority of the allotted time. Simulation was chosen as the primary teaching modality for its effective learner engagement and experiential nature. The overnight call program was implemented as a curricular portion of a 2-week Transition to Residency capstone course for fourth-year medical students. Members of the program development team were all familiar with simulation-based education and undergraduate and graduate medical education. The suggested outline for the handoffs and nurse calls program was as follows:

- Introduction—large group (20 students): brief introductory didactic session on best practices in managing nurse calls and handoffs.
- Handoff to learners—large group (20 students): learners provided with handoff by facilitators acting as the departing team.
- Simulated nurse calls—large group divided into three small groups (six to seven students in each group): simulated nurse calls involving patients received in handoff.
- Simulated patient scenarios—large group divided into three small groups (six to seven students in each group): simulation cases involving patients who decompensated or had emergency calls from covering nurses with in-room case debriefing.
- Handoff to facilitators—large group (20 students): facilitators acting as the oncoming team provided with handoff about the night's events by learners.
- Debrief—large group (20 students): program debrief.

During the introduction, we described several communication techniques for transfer of patient care, including I-PASS (Illness severity, Patient summary, Action list, Situation awareness and contingency planning, Synthesis by receiver),<sup>20</sup> SIGNOUT (Sick/not sick, Identification, General hospital course, New events, Overall health/clinical condition, Upcoming possibilities with a plan, Tasks to complete overnight, summary/questions),<sup>32</sup> and SBAR (Situation, Background, Assessment, Recommendations).<sup>21</sup>

Simulated patient units (floors) were created, each with its own primary service—medicine, neurology, and pediatric. Each floor had its own patient census. Simulated nurse calls and simulated patient scenarios were created based on the patients and clinical scenarios. All patient demographics, medical record numbers, and clinical scenarios were fictional. The time line, description of each component, number of facilitators required, and environment for each program component are outlined in [Table 1](#).

### Equipment/Environment

This program required multiple physical environments for successful partitioning of students and facilitators. The introduction to the program and handoff to learners took place in a large-group setting in a classroom or conference room with approximately 20 students. The learner group was then split into three small groups of six to seven students for the simulated nurse calls and simulated patient scenarios. Each small group of learners began on a floor: medicine, neurology, or pediatrics. Each floor had a call room (a classroom or small-group space where learners could sit as they formulated responses to nurse calls), a space for facilitators (typically a nearby conference room, office, or simulation control room), and a simulated hospital room. One to two facilitators were assigned to manage the simulated nurse calls and simulated patient scenarios for each patient floor.

To perform the simulated nurse calls, each group of learners and facilitators required phones for communication. The simulated patient scenarios required high-fidelity manikins for two of the

**Table 1.** Suggested Time Line, Facilitator Requirement, and Environment

Program Component	Time	Description	Facilitators	Environment
Introduction	15 minutes	Brief introductory large-group didactic session on best practices in managing nurse calls and handoffs (Appendix A)	1	Classroom or conference room
Handoff to learners	30 minutes	Facilitator handoff of patients to learners (Appendices B and C)	1-3	Classroom or conference room
Simulated nurse calls and simulated patient scenarios <sup>a</sup>	45 minutes	Medicine floor: Medicine nurse calls (Appendix D) High-fidelity simulation (Appendix G: perforated diverticulitis)	1-2	Call room for learner team to receive calls Nearby conference room, office, or simulation control room for facilitators to make calls Simulated hospital room with high-fidelity manikin
	45 minutes	Neurology floor: Neurology nurse calls (Appendix E) High-fidelity simulation (Appendix H: stroke with hemorrhagic transformation) Standardized participant scenario (Appendix I: anxiety)	1-2	Call room for learner team to receive calls Nearby conference room, office, or simulation control room for facilitators to make calls Simulated hospital room with high-fidelity manikin; can also be used for standardized participant scenario
	45 minutes	Pediatric floor: Pediatric nurse calls (Appendix F) Standardized participant scenario (Appendix J: leaving against medical advice)	1-2	Call room for learner team to receive calls Nearby conference room, office, or simulation control room for facilitators to make calls Simulated hospital room for standardized participant scenario
Handoff to facilitators	20 minutes	Learner handoff of patients to facilitators	1-6	Classroom or conference room
Debrief	30 minutes	Program debrief	1-6	Classroom or conference room

<sup>a</sup>Three groups run simultaneously, with three learner small groups rotating between floors, 2.5 hours total (allowing 5 minutes for groups to switch between floors).

cases and standardized participants for the other two cases. Equipment needs for the scenarios included the following:

- Simulated nurse calls.
  - One phone per learner small group (three total).
  - One phone for facilitator(s) from each floor (three total).
- Medicine simulated patient scenario—perforated diverticulitis: high-fidelity simulation scenario.
  - High-fidelity manikin (one that allowed for physical assessment and was programmable or controllable).
- Neurology simulated patient scenario—stroke with hemorrhagic transformation: high-fidelity simulation scenario.
  - High-fidelity manikin (one that allowed for physical assessment and was programmable or controllable).
- Neurology simulated patient scenario—anxiety: standardized participant scenario.
  - Hospital gown for standardized participant.
  - Two chairs.
- Pediatrics simulated patient scenario—leaving against medical advice: standardized participant scenario.
  - Low-fidelity infant manikin (that did not require computerized control and ideally was tetherless) or other prop to simulate swaddled infant (if manikin was unavailable).
  - Stained blanket to swaddle the infant manikin.

**Personnel**

The program required a minimum of four facilitators but operated best with six. Facilitators included faculty, residents, staff, and

nurses who were familiar with undergraduate and graduate medical education and had experience with simulation. We trained several facilitators as standardized participants to portray the role of patients in the simulated patient scenarios. Although these standardized participants were not as rigorously trained as traditional standardized patients in undergraduate medical education, they were trained to standardize the case experience between groups and sessions. These standardized participants were provided with the case for review the week before the session. The entire facilitator group met for 60 minutes prior to the session to review session format and rehearse the key elements of the simulated patient scenarios with the program development team. There were two standardized participants per session and four total across all sessions.

One facilitator provided the introduction to the course. All facilitators were split between the medicine, neurology, and pediatric floors. Ideally, each floor had two facilitators; if resources were limited, one facilitator was assigned to each floor, and a fourth facilitator provided timekeeping and extra assistance. One facilitator from each floor provided the handoff to learners, though we found a single facilitator could provide handoff for all patients if sufficient facilitators were unavailable. The facilitators for each floor were responsible for making the nurse calls, running the high-fidelity manikin-based simulations, or serving as standardized participants. A single facilitator could lead the handoff to facilitators and debrief, though as many as all six facilitators participated.

## Implementation

The program began with the entire group gathered for the introduction, a short introductory didactic session on best practices in handoffs and nurse calls (Appendix A).

In the handoff to learners, facilitators provided handoff to the students on 20 patients admitted to the medicine, neurology, and pediatric floors. Handoff information in the facilitator copy of the patient list (Appendix B) included a purposeful mixture of appropriate handoffs, omissions, and extraneous detail. Students were also given patient lists that included only demographic details and a brief inpatient course (Appendix C). They were permitted to take notes and ask clarifying questions during the handoff.

Students and facilitators then split into groups for simulated nurse calls and simulated patient scenarios. Students were divided into three small groups of six to seven students, each group managed by one to two facilitators covering a floor of patients—medicine, neurology, or pediatric. All groups were partitioned into separate call rooms, so they could not hear the other groups. Each group of learners provided a cell phone number to receive calls from the facilitators. Facilitators then made nurse calls from their scripts (Appendices D-F) to the student groups. Each nurse call from the facilitators was scripted to convey an issue that the students were asked to collaboratively resolve.

Each floor also had one to two patients who required a face-to-face assessment due to increasingly complex or acute clinical concerns. If students did not appreciate the severity of the clinical concern being communicated, the scripted nurse calls escalated in frequency and urgency until the face-to-face assessment occurred. These face-to-face assessments took place as simulated patient scenarios, using either high-fidelity manikins or standardized participants (Appendices G-J). Each simulation scenario required students to manage a major medical, surgical, social, or psychiatric emergency.

After completion of the simulated nurse calls and simulated patient scenarios for each floor, students were debriefed by the floor facilitators with the PEARLS (Promoting Excellence and Reflective Learning in Simulation) framework.<sup>33</sup> The students then switched floors to experience all of the calls and cases.

After completion of all simulation experiences by all students, handoff to facilitators took place. Each small group of students was asked to sign out a floor of patients to the oncoming team, portrayed by the facilitators. A large-group debrief then occurred, emphasizing the overall objectives and other learner experiences from the session (Appendix K).

## Debriefing

This program involved multiple debriefing sessions. After managing the nurse calls and simulation scenarios on each floor, the students and facilitators debriefed in small groups using the PEARLS framework.<sup>33</sup> This debrief focused on the nurse calls and simulated cases for the floor, including clinical management questions and feedback on provider-nurse interactions. At the conclusion of the program, a final debrief involving all learners and facilitators focused on the overall course objectives and concepts surrounding handoffs. These were all learner-centric debriefing sessions to assess clinical reasoning and answer questions about the experiences.

## Assessment

In the pilot year, the course was evaluated with a preprogram and postprogram survey (Appendix L), which included eight student comfort questions about giving and receiving handoffs, handling phone calls from nursing staff about patients, and providing sign-out.

In subsequent years, students completed an overall course evaluation for the 2-week Transition to Residency capstone course, which included a smaller number of confidence questions specifically about the handoffs and nurse calls program (Appendix M). In both surveys, students were asked to report their perceptions on a 5-point Likert scale (1 = *strongly disagree*, 2 = *disagree*, 3 = *neither agree nor disagree*, 4 = *agree*, 5 = *strongly agree*). Median, mean, and *p* values were calculated per question. All *p* values were calculated with the Student *t* test using STATA version 16 (StataCorp, 2020). Qualitative data were collected via a comments section and reviewed for student impressions.

## Results

This program was implemented over 3 years with a total of 105 students. In the first year, the session took place with 19 students participating in the course. All 19 students completed the precourse survey; 17 (90%) completed the postcourse survey. In the subsequent 2 years, 86 students participated in the course. All 86 students completed the precourse survey; 78 (91%) completed the postcourse survey. The surveys were voluntary and anonymous; therefore, several students were lost to follow-up.

During the initial year, all students reported statistically significant increases in comfort in managing handoffs and responding to nurse calls (Table 2). In the subsequent years combined, all students reported statistically significant increases in confidence in managing handoffs and responding to nursing

**Table 2.** Student Evaluation Results

Statement <sup>a</sup>	Mean Score		p
	Precourse (n = 19)	Postcourse (n = 17)	
Year 1—I feel comfortable:			
Giving a clear and concise handoff.	3.2	4.2	<.01
Receiving a clear and concise handoff.	3.8	4.2	<.01
Knowing which questions to ask during handoff.	2.9	4.0	<.01
Communicating with a nurse by phone.	2.5	3.9	<.01
Determining which patients require face-to-face evaluation based on a nurse's phone call.	2.5	3.8	<.01
Managing a nursing request by phone.	2.4	3.8	<.01
Providing clear and concise instructions by phone.	2.9	3.9	<.01
Identifying information that should be provided to a colleague at handoff.	2.8	4.1	<.01
Subsequent years—I feel confident in performing the following:			
Handing off patients.	3.7	4.1	<.01
Responding to nursing calls.	3.1	3.9	<.01

<sup>a</sup>Rated on a 5-point Likert scale (1 = *strongly disagree*, 2 = *disagree*, 3 = *neither agree nor disagree*, 4 = *agree*, 5 = *strongly agree*).

calls. Postcourse surveys showed a range of scores from 3 (*neither agree nor disagree*) to 5 (*strongly agree*), a median score of 5, and a mean score of 4.5.

Free-text comments indicated that students found the program helpful and realistic. Examples of comments included the following: “great session,” “[the session] helped a tremendous amount,” “creative and engaging,” and “This was a fantastic session. It focused on the big picture of cross-covering and dealing with acute changes in patients that we are not familiar with.” Some students suggested including use of the electronic medical record (EMR) or limiting group sizes to optimize engagement.

### Discussion

This program fills an educational gap in senior undergraduate medical education. Transition to residency is difficult, and appropriately managing overnight call is a common concern for incoming interns.<sup>3,34</sup> Formal instruction for senior medical students on receiving handoff, responding to nurse calls, and giving handoff is lacking.<sup>4,5,13,15-17</sup> After completing this program, students felt more comfortable handing off patients and responding to nurse calls. The subjective feedback was positive, though constructive criticism asked for limitation of small-group sizes and inclusion of EMRs.

In the past 3 years of implementation, we have made minor changes to the program’s format. In the first year, learners experienced a single large-group debriefing session at the end of the entire program. Based on feedback from this first session, we added multiple small-group debriefings after completion of the nurse calls and simulation scenarios on each floor, which enabled learners to better discuss specific clinical and communication concerns. Other changes included adjustments to details of

patient demographics, nurse calls, and simulation scenarios, as well as an additional simulated patient scenario. These changes allowed for increased realism, internal consistency, and active learning opportunities.

We believe this program can be adapted to fit the resources of various institutions. If there is insufficient space or facilitators for multiple simultaneous small groups, one to two facilitators could lead a small group of students through each floor of scenarios sequentially rather than simultaneously. Facilitators can choose to use a subset of the 20 patients, selecting a smaller number of associated nurse calls and simulation scenarios. Furthermore, the standardized participant scenarios do not require high-fidelity manikins, which allows for more flexible implementation. We used high-fidelity manikins during the simulation scenarios, but the cases can be adapted to medium fidelity based on an institution’s resources.

The chief limitation of our program is human resources. The program requires up to six facilitators, which can be challenging to assemble for one session of up to 21 students, assuming small-group sizes are limited to seven students. Though the program can operate with fewer facilitators, extra facilitators can ensure seamless transitions between standardized participant cases and nurse calls. Of note, not every facilitator requires extensive medical knowledge—for example, a physician facilitator managing a floor can be paired with a medical student, simulation technician, or other volunteer as a second facilitator, and provide guidance on medical aspects of the nurse calls or simulation scenarios. Another limitation of this program is that currently it has only subjective evaluation by participants of their own confidence and comfort. An objective assessment is currently in the pilot phase and will be implemented in future iterations of the course and submitted for publication.

This program is part of our Transition to Residency capstone course, which was initially offered as an elective and is now required for all graduating senior medical students. We continue to elicit and respond to learner feedback from these sessions, with improvements on each iteration.

## Appendices

- A. Nurse Calls Quick Intro.pptx
- B. Patient List Facilitator Copy.docx
- C. Patient List Student Copy.docx
- D. Simulated Nurse Calls Medicine Floor.docx
- E. Simulated Nurse Calls Neurology Floor.docx
- F. Simulated Nurse Calls Pediatric Floor.docx
- G. Simulated Patient Scenario Medicine.docx
- H. Simulated Patient Scenario Neurology.docx
- I. Simulated Patient Scenario Neurology 2.docx
- J. Simulated Patient Scenario Pediatrics.docx
- K. Course Debriefing Guide.docx
- L. Initial Pre- and Postprogram Survey.docx
- M. Current Pre- and Postprogram Survey.docx

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

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## Prior Presentations

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## Ethical Approval

Reported as not applicable.

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