Medical Students' Perception of Residents as Teachers: Comparing Effectiveness of Residents and Faculty During Simulation Debriefings

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Abstract

Background Simulation can enhance undergraduate medical education. However, the number of faculty facilitators needed for observation and debriefing can limit its use with medical students. The goal of this study was to compare the effectiveness of emergency medicine (EM) residents with that of EM faculty in facilitating postcase debriefings.

Methods The EM clerkship at Indiana University School of Medicine requires medical students to complete one 2-hour mannequin-based simulation session. Groups of 5 to 6 students participated in 3 different simulation cases immediately followed by debriefings. Debriefings were led by either an EM faculty volunteer or EM resident volunteer. The Debriefing Assessment for Simulation in Healthcare (DASH) participant form was completed by students to evaluate each individual providing the debriefing.

Results In total, 273 DASH forms were completed (132 EM faculty evaluations and 141 EM resident evaluations) for 7 faculty members and 9 residents providing the debriefing sessions. The mean total faculty DASH score was 32.42 and mean total resident DASH score was 32.09 out of a possible 35. There were no statistically significant differences between faculty and resident scores overall ($P = .36$) or by case type ($P_{trauma} = .11$, $P_{medical} = .19$, $P_{pediatrics} = .48$).

Conclusions EM residents were perceived to be as effective as EM faculty in debriefing medical students in a mannequin-based simulation experience. The use of residents to observe and debrief students may allow additional simulations to be incorporated into undergraduate curricula and provide valuable teaching opportunities for residents.

Editor's Note: The online version of this article contains the assessment tool used in this study (Debriefing Assessment for Simulation in Healthcare [DASH], Student Version Short Form as adapted from the Center for Medical Simulation) and the questionnaire administered to residents after simulation sessions.

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Introduction

In undergraduate medical education, simulation-based learning is becoming a staple for educating clinically eager yet novice medical students. Simulation is being increasingly emphasized in US medical school curricula, and emergency medicine (EM) and other specialty programs have begun incorporating simulations into clerkships to enhance medical student education.[1–5] At the same time, maintaining the rigor of simulation training and meeting the demands for repeated sessions require ample simulation personnel, sufficient time, and adequate funding. EM programs often rely on faculty to oversee simulation experiences for all types of learners.

Debriefing is a vital component of high-fidelity mannequin-based simulation training. Issenberg et al[6] identified feedback during debriefing sessions as the most important feature of simulation-based learning. Debriefing and the associated feedback "gives learners the opportunity to think critically about their performance, deconstruct events and errors that unfold during the scenario, and acquire new information to improve subsequent practice."[7] Effective debriefing sessions include positive reinforcement, open-ended questions, and appropriate use of audiovisual

aids.[8] Using residents to observe and facilitate simulation debriefings of medical students would increase the number of facilitators available to provide effective simulation training and would provide for unique teaching experiences for the residents. This arrangement also would afford residents providing the debriefing the opportunity to learn from these sessions by identifying and reflecting on the errors made by the medical students.[9] To date, no comparisons on the effectiveness of residents and faculty in facilitating simulation debriefings have been reported in the literature. We compared student assessments of EM faculty with EM residents in debriefing sessions during a mannequin-based simulation.

What was known

Simulation is made more valuable by debriefing that offers participants feedback and the opportunity to reflect. A barrier to the wider use of simulation is the number of facilitators needed for debriefing sessions.

What is new

Comparison with faculty showed emergency medicine residents were equally effective in facilitating postcase debriefings for simulation exercises for medical students.

Limitations

Single-site study, potential for sample (volunteer) bias, inability to control for prior simulation experience, and a small sample with insufficient power to detect a statistically meaningful effect.

Bottom line

Having emergency medicine residents facilitate debriefing sessions for medical student simulations allows added use of simulation in undergraduate medical education and offers valuable teaching and learning opportunities for the residents.

Methods

Setting and Participants

Indiana University School of Medicine has a required senior medical student clerkship with more than 300 students per year. The structured didactics of the rotation had been taught through a traditional lecture series with clinical case presentations until the spring of 2010, when simulation was added to the curriculum. All 53 academic EM faculty and all 39 postgraduate year 2 (PGY-2) or PGY-3 EM residents were asked to volunteer as facilitators in the simulation sessions.

Prior to each session, 1 faculty member and 1 resident were assigned to each case and were provided with the case scenario and a document describing common debriefing goals and objectives. On the day of each session, facilitators received a 30-minute orientation to the simulation laboratory and 10 to 15 minutes of instructions on the etiquette of debriefing. The debriefing strategy was to create a safe, nonjudgmental, and inclusive session with the aim of educating learners on critical decision making and medical management. Instructors were provided with a handout of case-specific learning objectives and checklist of expected clinical actions. Student performance was not graded, and study forms were not shared with facilitators. The school simulation center, technicians, mannequins, and supplies were provided at no cost; within a 4-hour time period, up to 36 students at a time were educated by 6 trainers (3 faculty and 3 residents).

The Indiana University and Purdue University of Indianapolis Institutional Review Board approved the study.

Intervention

Students were randomly divided into groups of 5 to 6 and participated in 3 high-fidelity mannequin cases. Cases were developed by EM faculty and included trauma with hypotension (trauma case), acute chest pain (medical case), and resuscitation of a febrile infant (pediatric case). Learning objectives encompassed medical management and critical decision-making skills. In each group, 2 students participated in the simulation room as physicians, while the remaining students observed a live video feed with audio in the neighboring debriefing room. Every student performed in at least 1 case and observed the remaining cases. Each case was facilitated by 1 EM faculty and 1 EM resident, lasted 15 minutes, and was followed immediately by a 15-minute debriefing session with all of the students in the group. The faculty member or resident leading the debriefing session observed student interactions from the simulation control room. The other faculty or resident facilitator participated as the nursing role in the simulation session and was not present for the debriefing. Faculty and residents alternated roles with each subsequent group of students.

Outcome Measures

We used the Debriefing Assessment for Simulation in Healthcare[10] (DASH; student version short form) instrument to evaluate the individuals providing the debriefing. Created and undergoing validation by the Center for Medical Simulation, DASH "evaluates the strategies and techniques used to conduct debriefings by examining concrete behaviors" (http://www.harvardmedsim.org/debriefing-assesment-simulation-healthcare.php; instrument provided as online supplemental material).

Using the DASH instrument, students reported the effectiveness of the residents and faculty in providing the debriefing sessions on a 7-point scale (1 = extremely uneffective, 7 = extremely effective) for the sessions in which they were participants and observers after each debriefing session. Question 1 of the DASH form was removed from the evaluation because all participants providing debriefing used the same room setup. The sum of the 5 individual questions yielded total DASH scores worth

TABLE **Mean Composite Debriefing Assessment for Simulation in Healthcare (DASH) Scores and *P* Values by Case Type**[a]

	EM Faculty	EM Residents	*P*	95% Confidence Interval of Difference	
	Total DASH Score (Mean ± SD)	Total DASH Score (Mean ± SD)	($\alpha = .05$)	Lower Bound	Upper Bound
Trauma case	32.90± 2.93	31.68 ± 3.44	.11	−0.30	2.75
Medical case	32.72 ± 2.69	32.04 ± 3.10	.20	−0.34	1.68
Pediatrics case	31.56 ± 3.15	32.02 ± 3.01	.48	−1.79	0.86
			.54 (between cases)		

Abbreviation: EM, emergency medicine.

[a] No significant differences were found between case types or between those providing debriefing within each case type.

a maximum of 35 points. Participants were informed their responses would be kept confidential, and researchers were blinded to the level of individual providing the debriefing (resident or faculty) until values were totaled.

In addition, residents completed a 15-item electronic questionnaire (provided as online supplemental material) 1 month after the experience to capture their attitudes and opinions as simulation facilitators. The questionnaire was developed by the authors and did not undergo pilot testing.

Data Analysis

An independent samples *t* test was used to compare the composite scores of faculty and residents, as well as their performance on individual DASH items. One-factor analysis of variance (ANOVA) was used to compare DASH scores by case type (trauma, medical, and pediatric). Homogeneity, according to Leven test ($P > .05$), and independence assumptions were satisfied, whereas normality was not. Because ANOVA is robust with respect to departures, we expect the violation of normality to be of no real consequence. A paired samples *t* test analyzed differences in performance between faculty and residents per case type. Statistical significance was reported at $\alpha = .05$. Throughout the study, data are presented as mean (μ) ± SD. Confidence intervals for the difference between the means (CI_{diff}) were calculated at 95% and are presented as lower and upper bound. All data were organized with Microsoft Excel 2007 (Redmond, WA) and assessed using SPSS statistical software (version 16.0; Chicago, IL).

Results

Comparing Faculty and Resident DASH Scores

During the 3-month study period, 7 EM faculty and 9 EM residents participated in the study. All resident volunteers participated once, whereas 2 faculty volunteers participated twice. A total of 273 DASH forms were completed by 93 undergraduate medical students on EM clerkship rotations to quantify the effectiveness of faculty and residents providing debriefing. After comparing the 5 questions and composite scores, no significant differences between faculty and residents were reported ($P \geq .21$). Faculty attained a mean composite DASH score of 32.42 ± 2.94, whereas residents attained a mean composite DASH score of 32.09 ± 3.12 ($CI_{diff} = -0.055, 0.248$).

Faculty and Resident DASH Scores per Case Type

In addition to comparing individual questions and composite DASH scores, interactions between and within the 3 case types (trauma, medical, and pediatrics) were assessed. One-factor ANOVA compared composite and individual question DASH scores of each case and reported no significant findings ($P \geq .27$) between case types. A paired samples *t* test reported no significant differences ($P \geq .11$) between faculty and resident composite DASH scores within each case type (TABLE).

Resident Survey Results

A total of 6 of 9 residents (67%) responded to the 1-month postintervention questionnaire. Overall, respondents agreed that serving as a simulation facilitator was a valuable experience (4.67 on a 5-point Likert scale) that helped to improve their medical knowledge (4.33) and familiarity with simulation (4.67). Residents were more comfortable running (4.17) and debriefing (4.17) simulations after serving as simulation facilitators than before the intervention (2.50 and 3.00). Furthermore, residents were more comfortable teaching the medical knowledge involved in the case (4.50) after facilitating the simulation sessions than before (3.50). All residents replied they would be willing to serve as a simulation facilitator again.

Discussion

To our knowledge, this is the first study that has directly compared resident and faculty effectiveness in providing

debriefing following a clinical simulation. We found that medical students perceived second- or third-year EM residents to be as effective as experienced EM faculty in facilitating high-fidelity simulation debriefings. Residents reported that the experience was valuable because it enhanced their knowledge of simulation, allowed them to revisit basic EM concepts, and generally increased their teaching comfort level. Our findings are echoed in a moderately related study in which residents and faculty were found to be equally effective in presenting radiology lectures to medical students.[11]

Using residents to facilitate simulation and to provide debriefing partially fulfills the Accreditation Council for Graduate Medical Education common program requirements and aligns with the suggested faculty development curriculum for EM residents as proposed by Farrell et al.[12] Research exploring the use of residents as teachers has reported that "teaching residents" are in a better position to relate to junior residents and medical students, and are thereby more effective in creating nonthreatening learning environments.[13]

At the same time, although residents benefit from instructing others, many residents consider themselves underprepared to teach and lack adequate teaching skills.[14,15] One early study found it is uncommon for residents to give feedback or to ask questions of learners.[16] Involving residents in simulation training and debriefing sessions may consequently prompt residents to pose questions and to give more frequent habitual feedback in other settings. A potential disadvantage of using residents for simulation debriefing sessions is that it removes residents from clinical duties and may be perceived as an additional chore for those who lack interest in teaching.

Our study has several limitations. First, DASH instruments come in 3 versions: (1) rater version, (2) student version long form, and (3) student version short form. Our use of only 1 instrument (ie, student version short form) limited cross-examination capabilities. Second, we could not control for prior simulation experience. All EM residents participated in the learner role during their training, EM faculty had variable experience as trainers for resident sessions, and medical students had unknown exposure to simulation prior to the EM clerkship simulation experience. Third, a post hoc power analysis (power = 0.1461) revealed a considerable limitation in our ability to detect a meaningful difference in reported scores; the probability that our findings were subjected to a type II error (β; "false negative") is high (β ≈ 85%). The final limitation was volunteer bias. The EM faculty and EM residents who volunteered are likely self-efficacious and perhaps welcomed the teaching opportunity more so than others, who may or may not be as effective as teachers or in providing debriefing sessions.

Future research should focus on determining how best to prepare residents for debriefing, as well as how much training might be required for debriefing based on the type and complexity of learning objectives (eg, communication, practice-based learning, and teamwork).

Conclusions

Our study suggests that EM residents are as effective as EM faculty at debriefing EM clerkship simulations. Resident facilitators reported that the debriefing experiences improved their medical knowledge and comfort with teaching. If simulations are expected to survive and become a core method for teaching, we contend that using residents as teachers will be a vital component to the sustainability and reproducibility of future simulation training programs.

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