

Research Article

Needs Assessment for *In situ* Simulation in the Emergency Department

Batley Nicholas¹, Tayeh Christelle², Lakissian Zavi², and Sharara-Chami Rana^{2*}

¹Department of Emergency Medicine, AUBMC, Lebanon

²Department of Paediatrics and Adolescent Medicine, AUBMC, Lebanon

***Corresponding author**

Rana Sharara-Chami, Department of Paediatrics and Adolescent Medicine American University of Beirut, Riad El-Solh 1107 2020, Beirut, Lebanon, Tel: 961-3-827792; Email: rsharara@aub.edu.lb

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OPEN ACCESS**Keywords**

• Emergency medicine; Education; In-Situ simulation; Needs assessment

Abstract

Background: In the Emergency Department (ED), interdisciplinary team coordination is particularly important. Simulation-based training provides an alternative venue to improving team interaction with the aim of enhancing safety and performance.

Objectives: To assess and compare ED personnel's: satisfaction with current teaching modes, familiarity with high-fidelity simulation, perceived need for the integration of high-fidelity or *in-situ* simulation in the medical curriculum, willingness to participate in such practices, perceived knowledge gap in other medical specialties and awareness and compliance with ED guidelines.

Methods: Attending physicians, residents, fellows, students, and ED nursing staff were invited to participate in a web-based survey.

Results: The majority of participants were satisfied with the amount of didactic lectures [59%]. Most were somewhat familiar with high-fidelity simulation [55%], and would be interested in simulation in a laboratory [57%] and/or *in-situ* [68%] setting as part of their educational curriculum. Although 52% were decisively willing to participate in high-fidelity simulation, 44% were hesitant to commit. There was significant knowledge gap across all participants in communication skills [p 0.000], dealing with difficult families [p 0.003], surgery/trauma [p 0.027] and internal medicine [p 0.02]. As to the awareness of and compliance with ED protocols, 55% were aware of them, but only 7% always complied.

Conclusion: This study showed that ED guidelines were not always familiar to all health care providers and that there is a need for medical simulation addressing specific topics like critical illness and communication skills. There was a particular preference for *in-situ* simulation in a clinically busy environment like the ED.

ABBREVIATIONS

ED: Emergency Department; KSA: Knowledge, Skills and Attitudes; AUBMC: American University of Beirut Medical Center; IRB: Institutional Review Board; HFS: High-Fidelity Simulation

INTRODUCTION

Medical education has undergone major transformations in how students and established providers are trained and how the intended results of training - proficiency and competency - are measured [1]. The Halsted model, also known as "See one, do one, teach one" has been a pillar of medical education for decades, however, the concept of "learning by doing" has become less acceptable, particularly when invasive procedures and high risk care are involved [2].

Simulation has evolved rapidly and support has grown for its use and practice in various high hazard industries such as the military and aviation. Over the last two decades, medical simulation has gained popularity in hospital-based health care [3]. Medical simulation has changed health care education, especially in emergency medicine and critical care [4]. As

simulation recreates the "experience" of patient care, it gives participants the opportunity to practice a range of skills and to reflect on their performance in a safe environment via feedback from experienced practitioners during debriefings [4]. Under realistic settings, simulation has provided learners with a safe educational experience in patient care, as it includes, but is not limited to, pre-procedural evaluation, decision making, visual and motor performance, team dynamics, as well as recognition and management of complications [1].

It has been suggested that simulation be utilized at the individual, team, work unit, and organizational levels to improve and ensure patient safety and quality of care [5]. While effective medical team performance requires excellent individual work, this alone is not adequate to resolve dynamic crisis situations; teamwork skills are also required [6-8]. This is particularly true in the rapid paced environment of the emergency department [ED]. Emergency medicine practice differs from other more controlled environments such as the operating room because of the large volume of patients, chaotic and distracting ambient conditions, and the constantly changing team compositions [9]. Simulation based training provides an alternative venue to improving team

interaction and dynamics with the aim of ultimately enhancing safety and performance.

Research in the military and the aviation industry yielded, among other things, the recommendation that the development of simulation based team training programs be guided by an a priori team task analysis to establish the knowledge, skills and attitudes [KSA] needed for effective team performance in a given domain [10,11]. A key component of team task analysis includes performing a needs assessment survey to determine specific training objectives required for effective team performance [11].

This work presents a building block towards designing and implementing an effective and efficient interdisciplinary in-situ simulation training program. To our knowledge, it is the first needs assessment survey preceding such a training project in a developing country. The primary goal of this work is to assess and compare knowledge, skills and attitudes regarding high-fidelity simulation training among personnel in the ED of a tertiary care university-based center in Beirut, Lebanon. This needs assessment will uncover knowledge gaps and will help us devise targeted simulation scenarios. Furthermore, we plan on designing in-situ simulation scenarios that will test medical staff knowledge of, and compliance with, evidence-based protocols that are already implemented and should already be in use in the ED.

MATERIALS AND METHODS

This research did not receive any specific grant from funding agencies in the public, commercial, or not for profit sectors.

Study design and population

This is a web-based survey of attending physicians, fellows, residents, medical students, registered nurses, practical nurses and staff of auxiliary services working at the American University of Beirut Medical Center [AUBMC], a tertiary university-affiliated and trauma medical center in Beirut, Lebanon.

Institutional Review Board [IRB] approval was obtained before the survey link was emailed to participants, and the requirement for informed consent was waived because consent was implicit in survey completion. Anonymity and confidentiality of all participants was maintained, as there were no identifiers included in the survey questions.

Survey Content and administration

The main purpose of this study is a needs assessment for high-fidelity simulation in the ED setting. The survey consists of five demographic and 15 content questions (Data Supplement S1). Content questions are related to clinical guidelines and protocols, as well as teaching and learning modalities in the ED setting. A final section allows open-ended comments on high-fidelity simulation both in the ED and outside.

The survey was distributed using web software [Lime survey] [12] to potential participants. Using the total design method, participants were sent the web link to the survey in an email, followed by three reminder emails spaced one week apart.

Data outcome and Analysis

Survey responses were exported from the online survey en-

gine [Lime survey] to SPSS software [SPSS Corp.] before analysis. Descriptive statistics were used to summarize the data. Chi square tests were performed to examine the significance of association between the participant groups' [attending physicians, residents and students] satisfaction and knowledge of, and need for the different types of teaching methods [didactic vs. high-fidelity simulation] used in the ED. Response to these dimensions was based on three four-point Likert scales. Responses to "other" or explanatory questions were thematically categorized and quantified to facilitate the analysis.

RESULTS

The survey was emailed to 1118 employees. Responses were received from 408 [36%] participants overall with 192 incomplete and 216 complete responses. Data analysis was based on the fully completed responses since participants with incomplete responses only completed a small portion of the survey.

The survey had a balanced gender distribution [47% Female and 53 % Male]. The majority of respondents were residents [42%], attending physicians [28%], and students [21%]. The majority was between 20-30 years old [70%] and they had been working at the facility for less than five years (Data Supplement S2).

Four departments were chosen to be included in the analysis because of their high rate of participation in the survey: pediatrics, emergency medicine, internal medicine, and surgery, in addition to nursing staff and medical students.

Almost all participants had around four hours of didactic lectures per week while rotating in the ED, with the highest percentage for ED residents and ED nursing staff [65%]. Chi square tests performed to examine the association between the different levels of participants [attending physicians, residents and students] and their satisfaction with the amount of didactic lectures showed no significant findings [p 0.393] (Table 1). The majority of respondents were satisfied with the amount of didactic lectures [59%] and perceived little need for more didactic teaching or training for specific skills.

Concerning high-fidelity simulation, most residents and attending physicians had heard of it, and were somewhat familiar with it, but had never done it. Students had not heard of high-fidelity simulation. Overall, 55% of respondents had some form of knowledge of high-fidelity simulation. **Emergency medicine residents**, as compared to other participants, received significantly more hands-on training in high-fidelity simulation at a simulation lab [$p < 0.001$] (Figure 1). All participants, especially the ones from surgical specialties, prefer and request high-fidelity simulation in the Emergency Department versus in the simulation lab. Given the familiarity of participants with high-fidelity simulation [p 0.002] (Table 2), when asked if they would prefer in-situ simulation in the ED versus didactic lectures or simulation sessions in a lab, responses showed a highly significant preference for in-situ simulation [p 0.001] (Table 3, Figure 2).

Participants were also questioned about their perceived knowledge gap in the ED. The chi square statistic was significant at the 0.05 level and results showed a significant knowledge gap across all respondents in the following: communication skills [p

0.000], dealing with difficult families [p 0.003], surgery/trauma [p 0.027] and internal medicine [p 0.02].

The survey showed that only 55% of participants were aware of the existence of protocols and guidelines in the ED. Results also demonstrated that residents and registered nurses were more aware of the existence of clinical protocols in the ED, while medical students were not. Attending physicians, fellows, and non-ED residents could mention three out of 15 guidelines/protocols; ED residents cited six and registered nurses were aware of five guidelines/protocols. According to the survey, respondents believed that clinical practice protocols are followed sometimes or most of the time [p<0.001]. Almost all responded that protocols are evidence-based, conversely, 20% of respondents answered that physicians did not agree with the protocol recommenda-

Table 1: Participants role and satisfaction with didactic lectures.

	Satisfaction with the Amount of Didactic Lectures		
	Satisfied	Neither Satisfied Nor Dissatisfied	Dissatisfied
Attending Physician	34	10	7
Resident	51	14	20
Student	24	8	14
Chi- Square 4.097 df 4 Sig. .393			

Table 2: Participants Familiarity with High-fidelity Simulation.

	Familiarity with High-fidelity Simulation			
	Never Heard of It	Heard of it/ Never done it	Somewhat Familiar	Very Familiar
Attending Physician	12	17	17	5
Resident	39	16	20	10
Student	28	3	14	1
Chi- Square 21.284 df 6 Sig. .002				

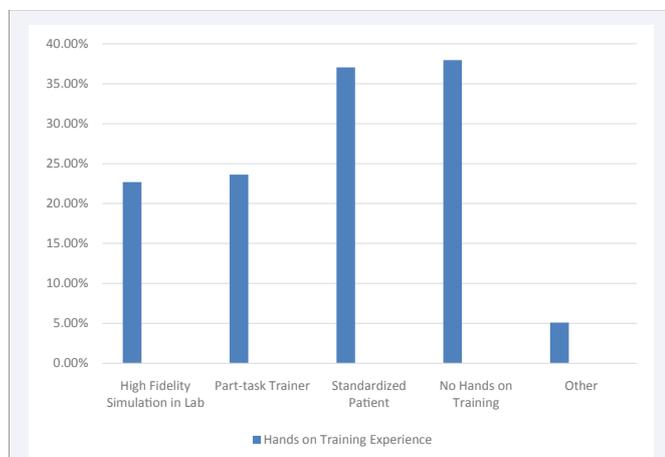


Figure 1 Participants experience with hands on training.

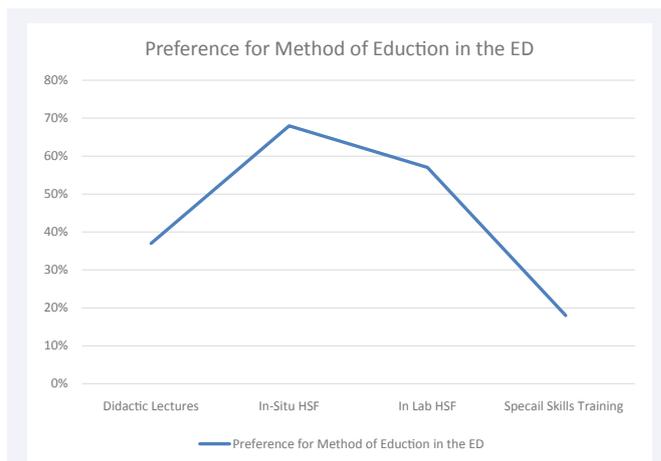


Figure 2 Participants preferences for teaching methods in the ED.

Table 3: Participants wanting more of In-Situ High-fidelity Simulation.

	More of In-situ Simulation	
	No	Yes
Attending Physician	25	26
Resident	20	65
Student	53	129
Chi- Square 14.137 df 2 Sig. .001		

tions. A small group thought that the protocols are too complex [9%] or irrelevant to the population [10%]. Most cited a lack of time and resources to implement the protocols [30%] and, 32% thought these protocols are not being followed because providers are unaware of their existence.

DISCUSSION

Medical simulation has been increasingly used in the education and training of health care professionals in developing countries. The ultimate objective of medical simulation is to reduce errors and reinvigorates health care education and delivery through quality improvement initiatives.

Successful interdisciplinary collaboration and clear communication are essential for delivering quality care to patients [13]. The performance of health care providers plateaus or diminishes over time and subsequently might affect the quality of patient care. Continuing education is vital for quality improvement and knowledge retention however; continuing education in developing countries is often delivered without a pre-designed approach and strategy [14]. Therefore, it is important to conduct a needs assessment before implementing an educational program [15]. This needs assessment survey reveals the importance of simulation-based interventions for professionals in the ED. Consequently, recreating relevant scenarios, based on a perceived need or knowledge gap, will help achieve the required educational objectives for a specific environment and for specific learners.

Although the survey distribution was limited to one teach-

ing hospital and, the complete response rate was low at 20% [an inherent limitation in web-based survey research], our results emphasize that high-fidelity simulation remains a relatively new concept for physicians, residents and students in our institution. ED residents, although more familiar with medical simulation, showed a similar interest to other less familiar respondents in participating in high-fidelity scenarios, particularly if done in-situ.

This survey highlights the perceived knowledge gap of students in different disciplines particularly in psychiatry and critical care, in communication skills and in dealing with difficult families. Therefore, simulation scenarios for this target group should focus on these issues with performance feedback to guarantee an optimal learning experience addressing a verbalized need. Similarly, pediatric residents reported a lack of exposure to surgery and trauma patients; future simulation scenarios will be designed to target this knowledge gap.

Our results further suggest a need for a shift from didactic/lecture-centered learning to a simulation-based curriculum. Regardless of their familiarity with high-fidelity simulation, ED health care providers [including attending physicians] and medical students state a need for and an interest in more simulation-based interventions. Our participants universally preferred in-situ simulation to simulation done outside the ED.

LIMITATIONS

This is a single center study. The complete response rate was relatively low, approximately 20%, an inherent limitation in web-based survey research. Also, only four out of seven departments were included in the overall analysis, due to the comparatively higher response rate. Therefore, the results may not be generalizable across different departments.

CONCLUSION

The current work represents the first needs assessment investigating high-fidelity *In-Situ* [Emergency Department] medical simulation in a developing country. It showed that ED guidelines and protocols were not always familiar to all health care providers. It also showed that the amount of didactic lectures was sufficient, and that there is a need for medical simulation addressing specific topics like critical illness and communication skills. There was a particular preference for in-situ simulation in the Emergency Department. Based on these findings, scenarios are being designed to target existing protocols and to familiarize all health care providers with current institutional ED guidelines. Scenarios will be tested for achievement of learning objectives in an ongoing in-situ simulation project.

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