

Satisfaction Level Of Simulation Experience Among Applied Medical Sciences Students: A Cross-Sectional Study.

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ABSTRACT:

Purpose: Simulation techniques are considered an integral part of Applied Medical Science programs (AMS) education, and it continues to be an essential contribution to clinical practices. A few studies have examined the satisfaction of simulation experience among students from AMS specialities. The aim of this study is to evaluate the AMS student's satisfaction with simulation-based learning.

Method: A cross-sectional study was conducted among undergraduate students in College of Applied Medical Science at King Saud bin Abdulaziz University for Health Sciences - Saudi Arabia during the academic year 2019-2020. Third and fourth-year students from both Respiratory Therapy, Emergency Medical Services, and Anaesthesia Technology programs completed the Satisfaction with Simulation Experience Scale (SSE). The SSE includes 18 items for which the response is measured using a 5-point Likert-scale.

Results: A total of 255 students participated in this study from the three campuses. The majority of students were male (59%) and from Riyadh campus (77%). The overall mean scores for the SSE were 69 ± 16 for study participants. There was a statistically significant difference in the overall mean score of the SSE scale between the three groups and it was higher in the anaesthesia group compared to the respiratory therapy control group ($8.4 \pm 2.4, p=0.002$). Similarly, this was observed in the three subscales of the questionnaire.

Conclusion: The finding from this study suggests that students were satisfied with simulation-based learning, although there was a difference in the satisfaction level between the three programs. Further efforts have to be directed to investigate the challenges of conducting and improving simulation sessions in AMS education.

Keywords:

Simulation; Satisfaction; Experience; Applied Medical Sciences Students.

Abbreviation:

SSES: Simulation Experience Scale

AMS: Applied Medical Sciences

RT: Respiratory Therapy

EMS: Emergency Medical Services

AT: Anesthesia Technology

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INTRODUCTION

The role of applied health professionals have expanded in the last decade and have been diversified to cover most of the health care services worldwide (1). Medical education programs are adopting simulation techniques

as a training and assessment method in their curricula. Moreover, health professionals are required to learn several clinical skills and understand the concept of advanced medical procedures. However, the conventional teaching methods are insufficient (2).

Simulation is defined as a teaching technique in which students are allowed to practice in a clinical case scenario that mimics the real world which had been integrated into high fidelity manikins(3)(4). This experience provides the students a safe, non-threatening, interesting and realistic environment to practice basic and advanced clinical skills and acquire more knowledge(4). A recent study found that simulation-based training is highly recommended in acute care settings such as cardiopulmonary resuscitation, trauma, airway management and mass casualty incidents management(5).

Assessing satisfaction levels in simulation experience on health care settings needs a comprehensive tool to provide an assessment of the impact of simulation-based learning(4). Different tools have been developed to assess the levels of satisfaction among health care students regarding simulation experiences. Levett-Jones et al in 2011 developed the Satisfaction with Simulation Experience Scale (SSES)(4). SSES was tested among (n=344) to explore nursing students' experiences with simulation manikins during simulated-based learning, and this instrument was both valid and reliable (3)(4). In 2012, Williams B, Dousek. et al had conducted a study by using SSES among paramedic students at Australian University to compare their satisfaction level about simulation with Jordanian students and reported that Australian students have higher satisfaction level than Jordanian students(6). A study conducted in the college of medicine at King Saud bin Abdulaziz University for Health Sciences (KSAU-HS) about students' satisfaction in simulation-based learning showed overall satisfaction(2). Based on the previous evidences, data is scarce among researchers who assess the satisfaction level among Applied Medical Sciences (AMS) students, exposed to critically ill patients. For example, Respiratory Therapy (RT) students handle intubated patients in Intensive care units, and Emergency Medical Services (EMS) students usually work with injured patients in and out of hospital settings. Anesthesia Technology (AT) students work in the operation room and provide ample support with respect to surgeries. Therefore, this study aims to assess simulation satisfaction among students in Applied Medical Sciences programs and simulation-based learning comprised of Respiratory Therapy Program, Emergency Medical Services Program and Anesthesia Technology Program by using SSES. Furthermore, this study would compare the satisfaction level among governmental colleges such as College of Applied Medical Sciences (CAMS) at King Saud bin Abdulaziz University for Health Sciences (KSAU-HS) in three different branches Riyadh, Jeddah and Al Hassa - Saudi Arabia.

RESULTS:

Participant demographics

A total of 255 students participated in this study. The background of the participants is described concerning gender, year level, and university campus for all study participants and each speciality. Of the 255 participants involved in the study, the majority of students were male (59%) and from Riyadh campus (77%). The complete distribution of demographic data is reported in Table 1. There was a statistical difference in the distribution of the gender among different specialities (p value < 0.001). For the campuses, chi-square test yields a significant relationship between the campuses and the speciality in which the Cramer's V was equal to 0.29 that indicated little association.

The students' satisfaction with simulation experiences

The primary outcome variable, students satisfaction with simulation experiences were analysed with a one-way ANOVA test to compare the SSE and subscale scores between the participants speciality.

The overall mean scores for the SSE were 69 ± 16 for the study participants. For the Debrief and reflection subscale, the mean score was 34 ± 8 , for clinical reasoning, it was 19 ± 5 , and for clinical learning, it was 15 ± 4 . Table 2 demonstrates the differences in the mean of the SSE subscale scores between students from respiratory therapy, EMS, and anaesthesia technology programs. The one-way ANOVA test for the overall score was different for students with a different speciality as there was a statistically significant difference between specialities ($F(2,252)=6.8, p=0.001$). A Tukey posthoc test revealed that the overall score was statistically significantly higher in the anaesthesia group compared to the respiratory therapy control group ($8.4 \pm 2.4, p=0.002$).

For each subscale, the Debrief and reflection subscale score was different between different speciality ($2,252=3.77, p=0.024$). We performed a Tukey posthoc test revealed that Debrief and reflection were statistically significantly higher in the anaesthesia group compared to the respiratory therapy control group ($3.35 \pm 1.2, p=0.02$). Similarly, for the reasoning score, there was a statistically significant difference between students from different specialities as determined by one-way ANOVA ($F(2,252)=7.6, p=0.001$). The students from anaesthesia program were statistical significantly higher in clinical reasoning score compared to the respiratory therapist control group ($2.3 \pm 0.7, p=0.006$) as determined by a tukey post-hoc test. Similarly, this was significantly higher in the EMS group compared to respiratory therapy control ($2.3 \pm 0.6, p=0.006$). Finally, for clinical learning, the one-way ANOVA (showed that there is a statistical difference in the learning subscale score between the specialities $F(2,252)=10.6, p=0.000$). A Tukey posthoc test revealed that score clinical learning subscale was statistical significantly higher in the anaesthesia group compared to Rt control group ($2.7 \pm 0.6, p=0.000$).

Similarly, this was significantly higher in the EMS group compared to RT control ($2.1 \pm 0.6, p=0.002$).

Background variable	All	Speciality			
	N(%) 255	Respiratory therapy N=95(%)	EMS N=85(%)	anaesthesia N=75	
Gender					<0.001
Male	150(59)	35(37)	68(80)	47(62)	
Female	105(41)	60(63)	17(20)	28(37)	
Year Level					<0.001
Third Year	128(50)	21(22)	49(57)	58(77)	
Fourth Year	127(50)	74(78)	36(42)	17(23)	
Campus					<0.001
Riyadh	197(77)	57(60)	66(78)	74(98)	
Jeddah	39(15)	30(32)	8(9)	1(1.3)	
Al-Hassa	19(7)	8(8)	11(13)	0(0)	

Table 1: Demographic variables for study population and each speciality. Table 2: Comparison of SSE Scale and Subscales between the three specialities

Variables	All participants	Respiratory Therapy	EMS	Anaesthesia	P-value
SSE scale	69(16)	64(18)	71(14)	73(13)	0.001
Debrief and reflection subscale	34(8)	33(9)	35(7)	36(7)	0.024
clinical reasoning	19(5)	17(5)	19(4.3)	20(4.4)	0.001
clinical learning	15(4)	13(4)	15(3)	16(3)	<0.001

DISCUSSION:

The use of simulation techniques in the teaching of various medical specialties is necessary since it is not only cost-effective but also provides real-life experiences needed for practical applications in the real world. While this is the case, the effectiveness of this technique is not uniform across all specialties as professionals and students from these fields express varying levels of satisfaction in the use of simulations in teaching. The Satisfaction with Simulation Experience Scale (SSES) is a valuable tool in the assessment of various levels of satisfaction among these students. It adds on several factors such as reflection, clinical reasoning, and learning into consideration before making conclusions. In this study, this tool was particularly useful in the comparison of the levels of satisfaction between three groups of participants. As such, it helps conclude as to which discipline is best suited to use study simulations.

An essential factor to consider in the study results above is the marked differences in the demographics of the study sample. Foremost, the gender distribution varied both in the overall group and in the individual cohorts. 59% of all the participants were male while the reason behind this discrepancy is beyond the scope of this study, probable causes include the relatively higher number of males in learning institutions as compared to their female counterparts. Additionally, while EMS and AT cohorts recorded a higher percentage of male participants, RT cohort had a female dominance.

Other important demographics that showed a significant difference were the level of study of the participants and their institutional affiliation. Most of the participants in EMS and AT cohorts were in their third year of study while those in RT group were in their fourth year of study. Pointedly, Riyadh campus had the most participants in all the three cohorts followed by Jeddah campus in the number of participants in RT and AT groups but was the least in EMS group. Al-Hassa campus recorded the second-highest number of participants in EMS group, and the third in RT cohort, however there are no participants in the AT group as the program has not commenced yet in this branch. Notably, these differences in participation were significant and can be used to account for the differences in satisfaction level among members of the three groups.

The average SSEs for all the participants was 69(16), which indicated that most of the students were satisfied with the use of simulations to enhance their learning experiences. However, this average was different for the participants in each of the three groups. The AT cohort recorded the highest value, followed by EMS and RT respectively. Of note is that the difference in satisfaction between the three groups was statistically significant. This fact indicated that the participants in the three groups had varying experiences with the use of simulation in learning. In other words, this technique influenced their education differently.

There was also a marked variance in the debrief and reflection subscale in the three subspecialties. The AT cohort had the highest score of the three, followed closely by EMS group. Notably, the two recorded results were above average for the entire study sample. Moreover, the lowest results were recorded by RT group. Of note is that the differences between these groups towards this end were statistically significant. This highlights the fact that the use of simulations methods such as mannequins in teaching leads to different levels of debriefing and reflection in the three subspecialties.

Another variable that showed significant differences in the effectiveness of the use of simulations in the teaching of the three subspecialties is clinical reasoning. Notably, participants in the AT specialty recorded the highest average in clinical reasoning as compared to the others. EMS cohort came in second with a value that was equal to the group average for this aspect. However, the variance from the mean in this subspecialty was slightly lower than that for the whole group. RT subspecialty recorded the lowest value. The differences in this aspect also had a statistical significance indicating that the use of simulations did not equally impact clinical reasoning for the three subspecialties.

The impact of the use of simulations in clinical learning in the three subspecialties was the last aspect of this study. There were remarkable differences between the three groups in this regard. The AT recorded the highest average, indicating that this form of teaching had the highest impact on clinical learning on this group as compared to the other two groups. EMS cohort came in second with a value similar to that of the group average. However, the deviation from the group mean was higher in the entire group as compared with this subspecialty. RT group came in last with the value below that of the group average. However, there was no statistical significance between these two groups in terms of clinical learning, indicating that the use of simulations in teaching had the same effect in this regard in the three groups. These findings are in line with those of Levet-Jones, et al., (2011) who highlighted the fact that nursing students were satisfied with the use of mannequins in their teaching as improved their learning experience.

In light of the study findings, it is evident that the AT group benefits the most from the use of simulations in teaching than the other two. This fact is protracted in the debriefing & reflection and the clinical reasoning subscales, where there are significant statistical differences in the effectiveness in the use of simulations in learning. However, since the clinical learning experiences in the three subspecialties are near similar, simulation methods such as mannequins should be used to enhance learning. These findings are similar to those of Agha et al., (2015) who demonstrated the fact that conventional learning techniques are inadequate in

teaching complex procedures to various specialties of medical sciences.

CONCLUSION:

In conclusion, the use of simulations in learning promotes the experiences of students and, subsequently, improves their outcomes greatly. This is particularly so in technical subjects such as health sciences that require hands-on skills to develop subject mastery. However, it is essential that the students hadn't benefited equally from this initiative. This fact is brought out in this study, wherein the anesthesia cohort recorded the highest results in the different subscales of the test. As such, simulations should be used objectively to achieve specific results that aren't otherwise attained through the use of conventional techniques in teaching.

Declarations:

Ethics approval and consent to participate:

The study was approved by the Institutional Review Board at King Abdullah International Medical Research Centre, Riyadh, Saudi Arabia (protocol number **RYD-19-419812-184111**).

Written consent form was obtained from all the participants before they completed the questionnaires.

Availability of data and materials: The datasets used and analyzed during the current study are available from the corresponding author on a reasonable request.

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Authors' Contributions:

AA proposed the original idea for the study. AA, SS, AA, MM and FO designed the study, interpreted the results, and revised the drafts of the manuscript. FO assisted in planning the analysis and was responsible for data management and statistical analyses. AA and SS wrote the first draft of the manuscript. The manuscript have been read and approved by all authors.

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