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Integration of Simulation in Postgraduate Family Medicine Training Programs in Saudi Arabia

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ABSTRACT
Simulation based education considered one of the teaching modality in medical education that enhance the training and provide safe learning environment for the trainee to practice and master the clinical skills.
Objective: The current study aimed to analyse the use of simulation in Saudi Board Program and the prospective of trainer and trainee about using simulation as education tool in postgraduate family medicine program to achieve different Saudi MEd competencies listed in the curriculum.
Subjects and methods: The current cross-sectional study using convenient sampling technique and the participants were chosen based on the selection criteria. The study involved questionnaire-based data collection *via* online mode.
Results: A total of 38 program directors were provided with questions and the response rate was 60.5%. In our study, most of the respondents did not use the simulation-based programs. Both the trainers (n=138) and trainees (n=164) opted to choose longitudinal with family medicine module as the first best way to integrate simulation in family medicine program. Emergency and family medicine fields ranked top among the other clinical fields, in terms of rotations chose by the trainers and trainees. Most of the trainers and trainees learnt about simulation-based education through their residency program. **Conclusion:** We suggest that the family medicine residency programs should incorporate opportunities for residents to get clinical experience in a simulated setting since it improves students' ability to think critically, as well as the quality and safety of their treatment for patients.
Keywords: Cross-sectional study, Questionnaire, Family medicine residency, Simulation based education, Training programmes.

INTRODUCTION

The integration of simulation in medical education has gained significant attention as an effective tool for enhancing the learning experiences of medical trainees [1, 2]. Simulation-based education (SBE) allows for the replication of real-life scenarios in a controlled environment, enabling trainees to develop clinical skills, decision-making abilities, and professional competencies without the risk [1, 3].

The use of simulation in medical training has been extensively studied and recognized as a valuable component of medical education globally [4]. A popular method of instruction in the field of medicine, simulation-based education allows students to practice and perfect their clinical abilities in a risk-free setting. Simulation-based learning has the potential to bridge the training gap and boost the quality of postgraduate programs in light of the recent proliferation of training facilities and trainees [5].

The main difficulty for the Saudi Board of Family Medicine, which falls under the purview of the Saudi Commission for Health Specialties. It comprises 47 programs in four different regions of Saudi Arabia with a total of 2,604 trainees, is providing enough exposure to a wide range of cases and the ability to perform certain surgical and gynaecological procedures [6].

A medical simulation is an instructional tool used to further the field of medicine and improve patient care and draws attention to the role of simulation as a powerful instrument for enhancing health workers' self-assurance and competence in their professional work. Medical simulation aims to be a virtual reality for real-life disease situations by simulating clinical conditions that are as close to reality as possible, allowing students to practice diagnosing and treating hypothetical medical emergencies and evaluating their own performance in the context of a real-world setting. It also serves to evaluate students' communication and interpersonal skills with patients and other healthcare professionals [4].

The previous literature consistently highlights that simulation has emerged as a crucial component of postgraduate training. It aims to enhance trainees' ability to acquire skills and behaviors that are challenging to learn through traditional methods, to reduce patient risk, and to offer potentially more cost-effective training solutions. However, further advancements are necessary at the graduate level, particularly in areas such as faculty development, curriculum integration, and research, to fully realize the theoretical benefits of simulation [7-9].

In Saudi Arabia, the Saudi Commission for Health Specialties (SCFHS) has emphasized the importance of incorporating simulation into medical training programs, particularly in the Saudi Board Program. The postgraduate family medicine program, under the Saudi Med framework, outlines specific competencies that trainees must achieve. These competencies include medical knowledge, patient care, communication skills, professionalism, and system-

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based practice, among others [5]. Simulation serves as a versatile educational tool that can address these competencies by providing trainees with opportunities to practice and refine their skills in a risk-free environment. Simulation also facilitates the development of non-technical skills, such as teamwork and communication, which are crucial for effective patient care [10,11]. In the context of family medicine, where physicians must navigate complex and diverse clinical scenarios, simulation offers a unique platform for trainees to gain practical experience and prepare for real-world challenges. However, the successful integration of simulation into medical training programs requires careful planning, adequate resources, and continuous evaluation to ensure that it meets the educational objectives and aligns with the competencies outlined in the curriculum [12,13].

Formative and summative tools for all health professions, including medical residency and continuing medical education programs, have been demonstrated in several studies to improve trainee performance in the workplace prior to patient interaction and in the conduct of specific operations. It might be seen as a good indicator of the standard of care and the overall safety of the healthcare system [14]. The current study aimed to analyse the use of simulation in Saudi Board Program and the prospective of trainer and trainee about using simulation as an education tool in postgraduate family medicine program to achieve different Saudi MEd competencies listed in the curriculum.

MATERIALS AND METHODS

Study design: This is a cross-sectional study using convenient sampling technique. The participants were chosen based on the inclusion and exclusion criteria.

Inclusion criteria: Individuals who are trainers, trainees and program directors in postgraduate family medicine program in kingdom of Saudi Arabia.

Exclusion criteria: The trainers and trainees who were not in the postgraduate family medicine program.

Data collection: The study involved questionnaire-based data collection *via* online mode. The questionnaire was self-developed by researchers from relevant literatures and previous similar studies. The questionnaire contained questions, which involves their opinion on using different modalities of simulation in teaching clinical skills to achieve certain competencies in the curriculum along with its associated obstacles, advantages, and other possibilities. The questionnaire was distributed *via* mail and Google forms and the individual responses were obtained and recorded.

Questionnaires preparation

Attitudes simulation-based medical education in family medicine residency program:

The questionnaires contained statements to indicate their level of agreement, ranging from strongly disagree to strongly agree.

(i) Program Directors: Contained questions to explore their opinion, obstacles and feasibility of using different modalities of simulation in teaching clinical skills to achieve certain competencies in the curriculum. The questionnaire had 10 statements.

(ii) Trainee: Contained questions to explore their opinion, obstacles and feasibility of using different modalities of simulation in teaching clinical skills to achieve certain competencies in the curriculum. The questionnaire had 14 statements.

(iii) Trainers: Contained questions to explore their opinion, obstacles and feasibility of using different modalities of simulation in teaching clinical skills to achieve certain competencies in the curriculum. The questionnaire had 15 statements.

The level of agreement was determined using the 5-point Likert type scale. The scoring was as follows: "1 to 1.79" (strongly disagree), "1.80 to 2.59" (disagree), "2.60 to 3.39" (neutral), "3.40 to 4.19" (agree), and "4.20 to 5" (strongly agree).

Ethical approval: IRB APPROVAL NUMBER 20-0248 AT 22 JUNE 2020 was optained . All the participants were explained about the research and how their data would be processed and informed consent was obtained verbally before participation. Ethical clearance was waived as the participants were not involved in laboratory analysis.

Statistical analysis

Major variables in this study were analysed using descriptive statistics. The values were averaged to calculate a mean score for each group of program directors, trainee and trainer. A frequency table was developed to display frequencies of responses to each of the (10), (14) and (15) statements. Ranges and standard deviations were calculated for each group as well. An analysis of variance (ANOVA) was calculated to compare the two groups' post-test scores. The results were used to accept or reject the first null hypothesis. Cronbach's alpha is a measure of internal consistency, the selected program directors (n = 23), trainers (n = 138), and trainee (n = 164) were asked to answer the questionnaire and test for reliability. All the statistical analyses were performed using IBM SPSS statistics for windows, version 20.0 (IBM Corp., Armonk, NTY, USA). The statistical significance level was set at $p \leq 0.05$.

RESULTS

Attitudes simulation-based medical education in family medicine residency program- directors:

A total of 38 program directors were provided with questions and the response rate was 60.5% (23 out of 38), among which 57% were males and 61% had spent more than two years as a program director. Around 60% (14 out of 23) were from western region. Fifteen program directors (65%) answered positively as the simulation program is useful. Among the challenges

faced in applying simulation-based education program, availability of simulation center was the top one, whereas acceptance from trainers were the least challenge.

The other challenges included availability of space for skill lab or sim centre, financial issues, availability of simulation educators, administrative issues or availability of protected time and acceptance from trainee. Figure (1) showed questions regarding the opinions of program directors on simulation-based education program.

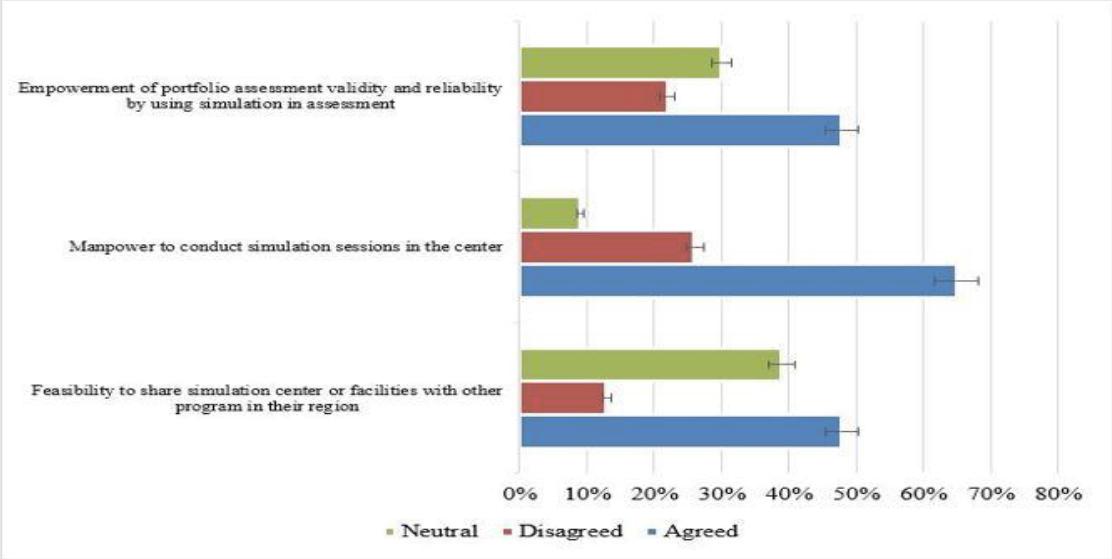

Figure 1. Opinions of program directors on simulation-based education programs

Figure (2) showed the opinions of program directions regarding the best methods of training the trainers on use of simulation-based education programs. With regard to their view of the best way to integrate simulation in the family medicine curriculum, 43% opted "longitudinal with family medicine module", 22% equally agreed to either "added to academic activities" or "short intensive courses" and finally 13% opted "added as simulation module".

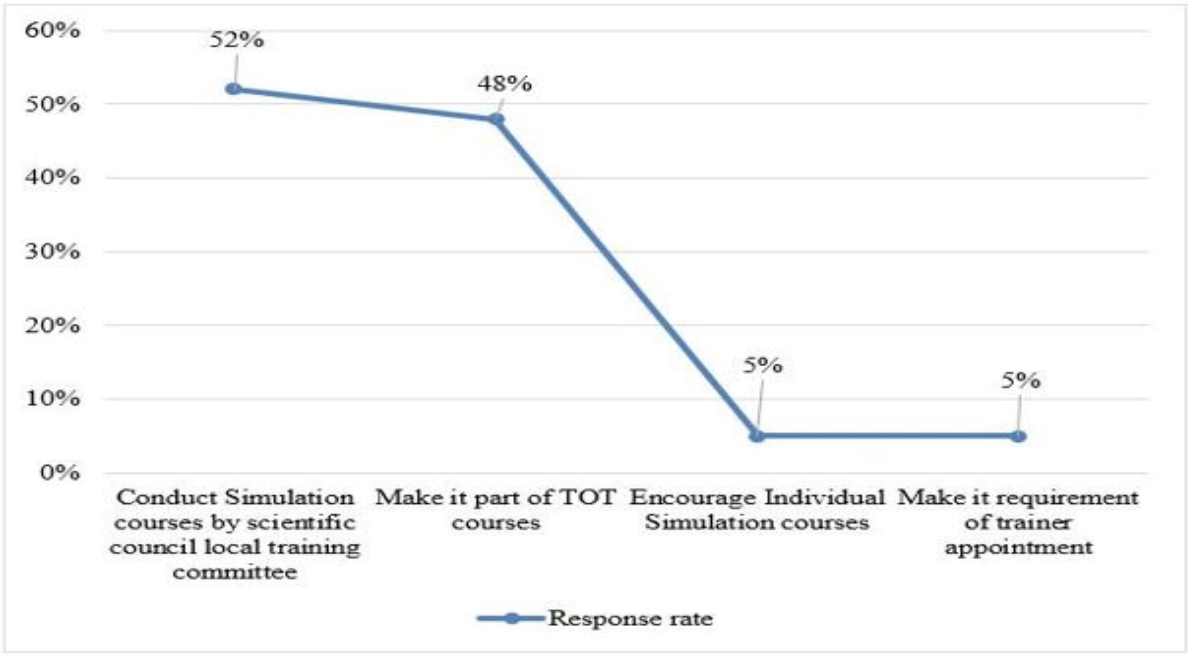

Figure 2. Opinions of program directions regarding the best methods of training the trainers on use of simulation-based education programs

Attitudes simulation-based medical education in family medicine residency program– trainers:

A total of 890 trainers were contacted for the study and the response rate was 15.5% (138 out of 890), among whom 61% were males with around 56% being trainers for ≥3 years. Around 48% (n = 65) were from central region of Saudi Arabia, whereas 23% (n = 32) belonged to southern region, 19% (n = 26) were from western and 11% (n = 15) were from eastern region. Around 88% respondents were aware of simulation-based education program.

Figure (3) showed the responses of the trainers about the platform they have learnt about simulation-based medical education for the first time. Forty-five (36%) of trainers responded that they were not using simulation sessions in training their residents, whereas 27.5% (n = 38) responded using simulation-based education once in a month, 10.9% (n = 15) and 6.5% (n = 9) responded using simulation-based education four to eight times and thrice in a month, respectively. Standardized patients were the top among the type of simulation used in the training, followed by task trainer, manikin-based and virtual reality.

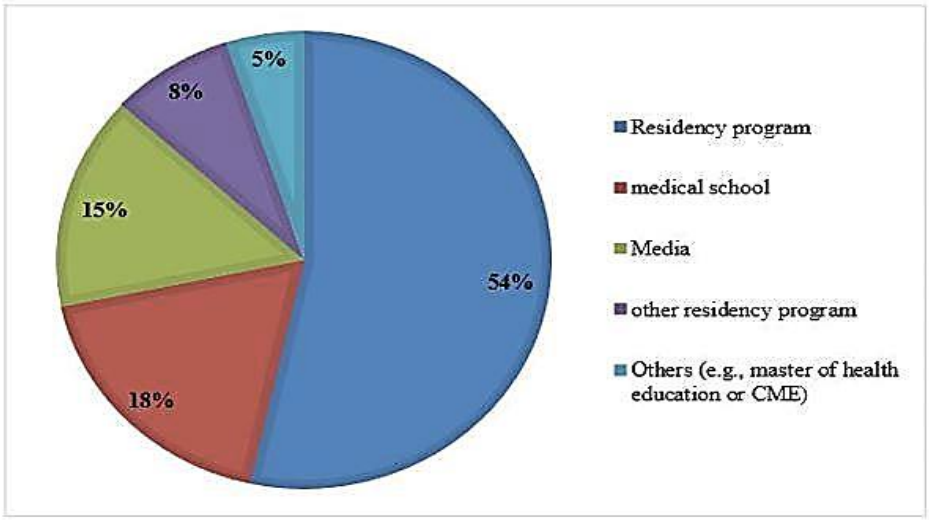

Figure 3. Platforms the trainers learnt about simulation-based medical education for the first time

Figure (4) showed the opinions of trainers on rotation they need for simulation-based education. Around 88% of the respondents would recommend having more simulation sessions in family medicine curriculum. Regarding the respondent's opinion about the importance of simulation in education 84% think it is extremely or very important. Having a mandatory simulation activity in family medicine program were agreed by 81% of the respondents.

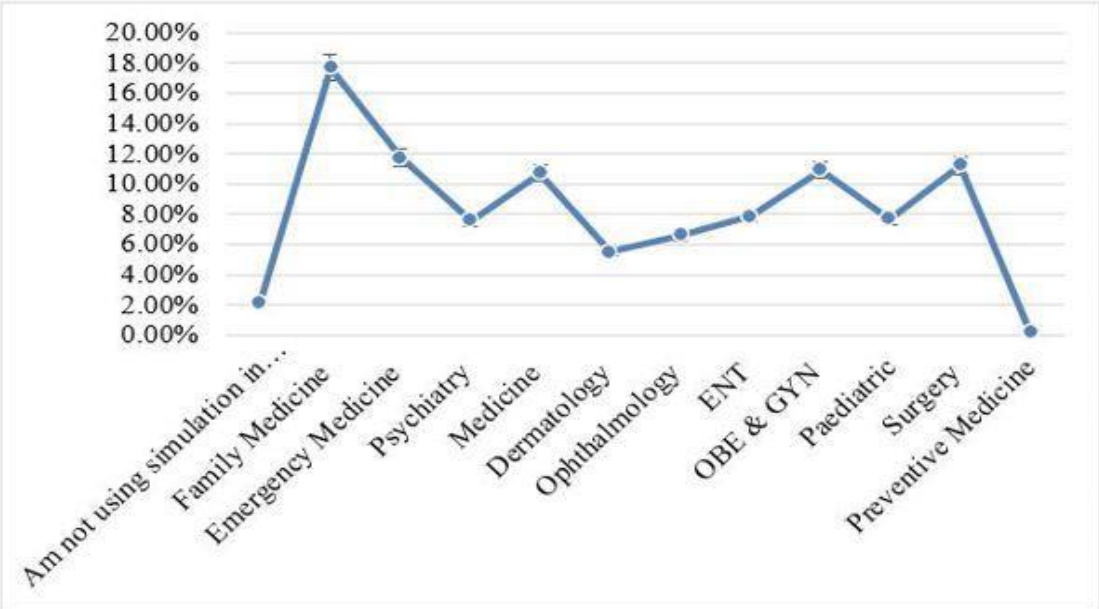

Figure 4. Opinions of trainers on rotation they need for simulation-based education

Table (1) showed the best way to integrate simulation in family medicine program in trainers' opinions. Regarding Saudi MEDS competencies they think best achieved by using simulation-based education where the responses were from most to least as follow: Medical Expert, Professional, Communicator, Health Advocate, Scholar and Manager.

Table (1): Trainers opinion on best ways to integrate simulation in family medicine program

Way	Response (%)
Longitudinal with family medicine module	43%
Added to academic activities	35%
Simulation module	13%
Short intensive courses	5%

Attitudes simulation-based medical education in family medicine (SBME) residency program–trainees: A total of 1499 participants were approached and the response rate was 10.9% (164 out of 1499), among whom 52% were females. Among them, 47.5% (n = 78) were from the western region, 25% (n = 41) were from the southern region, 15.8% (n = 26) were from the eastern region and 11.5% (n = 19) were from the central region.

Around 77% were aware of simulation-based education and regarding the first time learning on simulation-based education, responses were as follows: Residency program (39%), medical school (37%), media (15%), other residency program (6%) and others (3%). Among the trainees, 65% (n = 107) found the simulation-based education useful, whereas only 32% used it once a month, 16% used twice a month, 9% used four to eight times a month and 7% used thrice a month. In case of trainers, task trainer ranked top among type of simulation used in the training followed by standardized patients, manikin-based, "I don't know" and virtual reality. Figure (5) showed the opinions of trainees on rotation they need for simulation-based education.

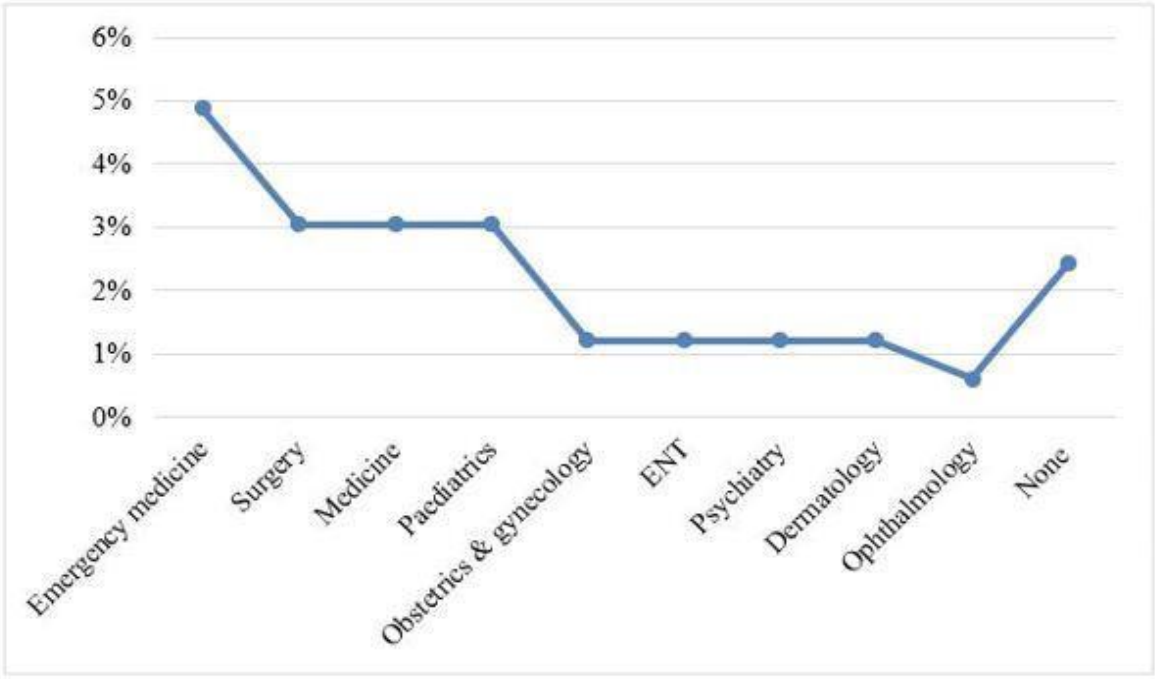

Figure 5. Opinions of trainees on rotation they need for simulation-based education

Around 70% of the trainees recommended having more simulation sessions in family medicine curriculum. Regarding the trainee's opinion about the importance of simulation in education 70% think it is either extremely or very important. Having a mandatory simulation activity in family medicine program were agreed by 57% of the respondents. Table (2) showed the best way to integrate simulation in family medicine program in trainers' opinions.

Table (2): Trainees opinion on best ways to integrate simulation in family medicine program

Way	Response (%)
Longitudinal with family medicine module	38%
Added to academic activities	34%
Simulation module	15%
Short intensive courses	10%

DISCUSSION

Our study focused on the attitudes of program directors, trainers, and trainees on the simulation-based medical education in family medicine residency program. The majority of family medicine residency program directors who participated in the 2019 CAFM Educational Research Alliance study said they used simulation in their classrooms for both instruction and evaluation. The program directors also mentioned having places set aside specifically for using simulation-based medical education. Most family medicine residency simulation programs focus on improving students' clinical abilities and medical understanding [15].

In the current study awareness (88%) of simulation-based education programs among respondents is promising. This is higher than what was reported in other studies. For example, a study by **Boonmark *et al.*** [16] found that trainers aware of simulation-based education programs. The greater awareness in the current study could be due to increased focus and implementation of simulation-based programs in Saudi Arabia or more effective dissemination of information about these programs compared to other regions. Moreover, the high awareness level aligns with global trends towards increasing the use of simulation-based education in healthcare. For instance, a systematic review highlighted the growing emphasis on simulation-based training in medical education worldwide, which could contribute to the observed high awareness in this study [17].

We found in the current study that the 77% awareness of Simulation-Based Medical Education in Family Medicine (SBME) among trainees align with global trends towards increased recognition of simulation in medical education. A study reported that awareness of simulation-based education has been increasing among medical trainees worldwide [18]. The sources of first exposure to SBME in this study, with residency programs and medical schools being predominant, are consistent with findings from other research. A study also found that medical education and residency programs were key sources of exposure to simulation-based learning [19].

The finding that 65% of trainees found SBME useful is in line with other studies that have highlighted the perceived value of simulation in medical training. One of previous published study found that a majority of medical trainees recognized the benefits of simulation-based education for improving clinical skills [20]. However, the relatively low frequency of use reported (e.g., 32% using SBME once a month) is consistent with previous published study, which indicated that while trainees acknowledge the utility of simulation, regular usage can be limited due to logistical and time constraints [21]. A study by **Tenegra *et al.*** [7] reported that no family medicine residency program directors have reported employing simulation-based medical education to impact professionalism and executive leadership, or competence in systems-based practices such as addressing patient safety, despite the fact that such benefits have been emphasized in other domains and research. Simulation is also being utilized effectively in undergraduate medical education to instruct students in the art of working together across disciplines. In our study we suggest that program directors chose simulation-based medical education as longitudinal with family medicine module, to be added to academic activities, short intensive courses, and may be added as simulation module, which is contrasting to the previous studies.

A study by **Florea *et al.*** [22] reported that simulators are helpful, but they cannot take the place of solid bedside instruction with actual patients, since only 65% of trainers said they were outstanding compared to patients. **Ahmed *et al.*** [23] highlighted the good perspective and attitude of medical directors and trainers about the introduction of simulation-based programs in undergraduate curriculum in Saudi Arabi. In our study, 84% of trainers and 70% of trainees recommended having the simulation-based educational programs, which is consistent with the previous findings.

In our study, most of the respondents did not use the simulation-based programs, whereas the most frequent period of other individual using the simulation-based programs ranged from once a month to three times a month. Both the trainers and trainees selected longitudinal with family medicine module as the first best way to integrate simulation in family medicine program. Emergency and family medicine fields ranked top among the other clinical fields, in terms of rotations chose by the trainers and trainees. Most of the trainers and trainees learnt about simulation-based education through their residency program, which is consistent with previous reports.

CONCLUSION

Based on our findings of this survey, we suggest that program directors, trainers, and trainees recommended simulation-based education in family medicine and the response rates were positive. We suggest that the family medicine residency programs should incorporate opportunities for residents to get clinical experience in a simulated setting since it improves students' ability to think critically, as well as the quality and safety of their treatment for patients.

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