Needs Assessment: Integrating Medical Simulation in Residencies Programs in Saudi Arabia

Usamah Alzoraigi (dr.usamah@gmail.com)
King Fahad Medical City, Riyadh

Research Article

Keywords: Research priority, need assessment, simulation curriculum, SCFHS, skills, and behavior

Posted Date: February 3rd, 2022

DOI: https://doi.org/10.21203/rs.3.rs-1316475/v1

Abstract

Objectives

The use of simulation in the curricula of training programs has expanded significantly over the last decade. This study conducted a simulation needs assessment on diverse ongoing residency training programs supervised by the Saudi Commission for Health Specialties (SCFHS) in Saudi Arabia. The goal was to introduce a standardized methodological approach to integrate simulation as a teaching tool for any ongoing training programs.

Method

a mixed-methods approach is used in four steps to focus on top educational needs and integrate simulation within the curriculum. In the first step, thirty-eight residency training programs underwent a selection process using the scoring criteria tool. Nine residency training programs were selected to be target programs. This step was followed by champions recruitment, where two faculty representatives from each specialty were oriented about the steps to be process facilitators. The third step is targeted audience needs assessment, consisting of four phases: curriculum review, targeted audience survey, a focus group of stakeholders' interview, and selecting the top identified educational needs. A metrics-based approach was used to rank the list of skills and behaviors by invited stakeholders. The last step was to build common themes using an integration simulation sheet to facilitate integrating simulation into the program curriculum.

Results

Out of 38 programs, nine top-ranked specialties completed the process, and their roadmaps were developed. A critical appraisal facilitated by champions and simulation experts helped the stakeholders to identify the top needed skills and behaviors in each of the nine specialties. The final score proportion for each skill and behavior of the entire combined list was calculated then ranked. The proportion of top needed list of skills and behaviors were obtained as followings: Obstetrics and Gynecology 10 skills and behaviors concluded out of 84 (10/84), Emergency Medicine (ER) 80/242, Intensive care unit (ICU) 20/139, Internal Medicine (IM) 37/102, Pediatric 82/125, Ear Nose Throat (ENT) 49/125, General Surgery (GS) 55/114, Plastic Surgery 24/165, and Family Medicine (FM) 59/168.

Conclusions

Findings from this process could provide a standardized approach to supervising bodies at a country level and support decision-makers with prioritizing criteria to be used in the needs assessment to integrate simulation in any other ongoing residency training programs.

Introduction

Postgraduate medical education, particularly residency training programs, is undergoing a significant transition. Many countries introduce competency-based training with outcome-based approaches as well as competence-dependent certification rather than time-dependent. In the 1990s, the CanMEDS framework (Canadian Medical Education Directives for Specialists) [1], followed by the Outcome Project of the ACGME (Accreditation Council for Graduate Medical Education in the USA) [2–3], were created with ongoing improvement. In 2005, the introduction of the "Entrustable professional activity" (EPA) came about, which gave a trainee the ability to be self-sufficient enough for unsupervised practice [4–6].

This transition expanded the need for simulation in these programs, whether additional supportive or essential critical needs. Besides the amount of simulation needed in every program, matching ongoing residency training programs with a variant level of mastering competencies during the training period and immediately after graduation is a challenge[7]. Simulation training helps residents' practice and perform basic skills and behaviors they need with a high level of accuracy before they step into a real-life clinical scenario.

Moreover, simulation can be integrated into residency programs to enhance complex medical management and crisis resource management. [8]. Residency training programs are usually supervised by national healthcare regulatory bodies that monitor educational standards. The Saudi Commission for Health Specialties (SCFHS) is the national body that supervises more than 38 residency training programs. Over the last decade, the SCFHS has been affected by the transition from traditional medical education to competency-based training. So much so that it is in the process of working to implement the entrustable professional activity (EPA) education program [9–10].

Multiple factors provide challenges for integrating simulation-based education into residency programs for the SCFHS. For example, introducing simulation activities to the current residency curricula that have never implemented simulation before, transforming part of ongoing training activities into simulation-based activities, aligning simulation-based activities with the Entrustable Professional Activities (EPA) system, and competency-based training all create challenges for a new transformation. Many needs assessment methodologies were described in the literature that fills the training gaps and targets specific specialties like interviews, surveys, focuses group discussions, and workshops. On the other hand, mixing these methods is recommended to accurately represent the gap and be relevant to the learners' needs. Designing a needs assessment that fits multiple diverse specialties is a national challenge [11–12].

The SCFHS started an initiative to integrate simulation in ongoing residency training programs between 2018 and 2019. The initiative targeted training gaps in every specialty and allowed ongoing training continuity for different specialties. Therefore, this manuscript aimed to build a structured methodology to conduct a simulation needs assessment on the ongoing residency training programs belonging to the Saudi Commission for Health Specialties in Saudi Arabia, prioritizing top needed specialties. As part of gradual implementation, the focus was on nine selected specialties to identify target audience gaps in skills and behaviors in the current curriculum, whether on an individual basis within the specialty or shared gaps between multiple specialties. Any regulatory or national body may utilize the steps in this structural approach of integrating simulation in residency programs [13–22].

Method

As a national training umbrella, the Saudi Commission for Health Specialization supervises 38 Residency Training Programs all over Saudi Arabia. Each program has a scientific council responsible for building a curriculum and ensuring its implementation will be maintained with a high level of training. These programs have different simulation needs ranging from additional supportive needs to essential critical needs. The needs assessment methodology used in this study contains four steps, and four direct simulation needs assessment phases with the same sequence. Table 1 showed a summary of methodology steps with roles and responsibilities to facilitate conduction.

Step 1: Selecting targeted specialties:

A brainstorming panel of three physicians with more than five years of experience in simulation-based education used nominal group discussion to identify the criteria to maximize the chances of selecting the best target specialties. The panel members came up with nine criteria against a linear scale from 1-10 where ten indicate high/strongly agree while 1 indicate the reverse., The criteria were: Was simulation in this specialty applicable and simulation resources available? Was simulation internationally used in this specialty? Did psychomotor skills in this specialty are highly needed? Did the chances for skills training are limited in the form of clinical exposure? Were clinicians in specialty dealing with high patients' acuity? Were clinicians in specialty dealing with crises? Did this specialty has a significant impact on patient safety? Was this specialty need strong interprofessional skills? Was this specialty need strong communication skills?

Each program of the 38 specialties was reviewed based on each panel member's voting rank (1-10). Nine specialties (24%) out of 38 SCFHS programs scored high and were included in the study (Table 2). The panel considered five specialties targeted in stage one (first year) based on a large number of residents like Obstetrics and Gynecology, IM, and Pediatrics. Also, they considered acute care patterns of practice like ER and ICU. The remaining four specialties were considered in stage two (second year). The study project for achieving this aim was conducted between 2018-2019 and supervised by three physicians with experience in simulation-based education.

Step 2: Selecting targeted champions

For better engagement, it is essential to involve specialty content experts. As a national reference body, SCFHS created a list of champions in each specialty from their data, then the specialty's scientific council nominated three names then the panel of simulation experts selected 2 of them. The process ended up with two champions representing each specialty. The criteria for selection in all steps were based on one or more of the four following criteria: specialty content qualification, simulation qualification, medical education qualification, and being an instructor in the trainer's courses. A detailed description of champions' tasks was explained in an orientation workshop then handled. Each champion received electronic folders organized in a sequence of numbers with a folder labeled as an orientation package, including a curriculum folder, an electronic survey list, focus group information, and integration simulation sheet and submission document (Table 3).

Step 3: Targeted Audience Simulation Need Assessment:

The needs assessment conducted followed a chronological sequence of four phases. The first three phases ended with a product that contained a list of skills and behaviors. These initial three phases aim to expand skills and behaviors to a larger number so as not to miss any important training gaps. The phases are: Curriculum review, targeted audience survey, and focus group of stakeholders' interviews. The last phase aims to narrow the number of skills and behaviors to a smaller number that is more relevant to be implemented.

Step3. Phase 1: Curriculum Review

Simulation champions extracted the first list of skills and behaviors by reviewing current curricula after the panel of simulation experts reviewed it. The review process aimed to produce the first broad objective-based list of skills and behaviors.

Step3. Phase 2: Targeted Audience Survey:

A simple survey consists of open-ended questions developed by the panel members, including demographic data, skills that impact the residents with limited clinical exposure, the most critical behaviors needed for residents with limited opportunity to practice, and inter-professional skills and behaviors (Table 4). The survey questionnaire was distributed to the new graduates, program directors, and practicing consultants. Recent

graduates and program directors might recall exam performance reflecting training gaps while practicing consultants might recall incidents in daily clinical practice. The Number of responses per each specialty were variant and they are listed in Table 5.

Step 3. Phase 3: Focus Group of Stakeholders' Interview:

The specialty champions conducted a half-day focus group meeting for targeted consultants, program directors, and final-year residents of each of the nine targeted specialties separately. Champions facilitated the meeting by asking structured questions to the participants to obtain more information on needed skills and behavior changes for each specialty. The meeting included three round table discussions. The first-round table aimed to add skills and behaviors not addressed in curriculum analysis and survey results. By the end of round 1, the expanded list of skills and behaviors (Divergent) is completed.

Step 3. Phase 4: Selecting the top-ranked list of skills and behaviors:

During the same interview, the second-round table discussion focused on the ranking list of skills and behavior from the curriculum, survey, and first round table discussion. The focus group ranked each item from (1-10) using google form as an electronic scoring system. The third-round table discussion focused on re-arraigning skills and behaviors from higher needed to lower needed to be followed by agreement on an imaginary line (threshold line) that include all skills and behavior will be concluded and funded above this line. The champions facilitated the discussion and negotiation to reach an agreement for the threshold line. For focus group discussion workshop curriculum, you can look to Table 6.

Step 4: Building common themes using integration simulation sheet:

The panel members established a roadmap integration template to guide specialty champions in integrating simulation to the final ranked list integration. The sheet has five primary columns: Themes, needs assessment objectives, type of current delivery method of these objectives, if any, suggested future simulation delivery method, where to fit new suggested simulation activities in the academic calendar, and any remarks or ideas (Figure 1) and (Table 7). The panel members also suggested a drop list to help champions plan for suggested future delivery methods and fit new suggested simulation activities in the academic calendar (Table 8). A final list of skills and behaviors was inserted into the roadmap integration simulation sheet from the top-ranked skills and behaviors obtained from the above three phases. Table 9 include a summary of the number of skills and behaviors extracted from every specialty in step 3 (Simulation Need Assessment Methodology) and Step 4 (Development Integration Simulation Sheet).

Results

At the end of the initiative, nine specialties completed the process, with nine roadmaps completed and submitted to their scientific councils as the higher national supervising body for specialty training. In addition, roadmaps are all standardized with similar titles, and these titles preceded methodology into practical steps. Table 10 include components of submission roadmap documents.

In Table 9, a stepwise summary of each number of skills and behaviors in each specialty was conducted and correlated to the corresponding educational themes. Interestingly, we found communication issues with patients (e.g., consent taking, breaking bad news, and patient counseling, etc.) and between staff (e.g., crisis recourse management, team-based training) presented as a training gap theme in all specialties except plastic surgery, which focuses on skills mainly. The panel members describe the threshold line that produces the final ranked list for each specialty out of the combined list of skills and behaviors required for each specialization.

Discussion

Needs assessment is an essential step for the implementation of any simulation curriculum. Suppose we select Obstetrics/Gynecology specialty as an example to explain the process. After reviewing the curriculum, their champions listed 49 skills and behaviors, then they added five skills and behaviors not mentioned in the curriculum after survey analysis. When champions conducted focus group discussion (Phase 3), the participants listed an additional 30 skills and behavior after the first round table discussion and came up with 84 as a combined list. After the third-round table brainstorming, participants agreed to have ten skills and behaviors above the agreed imaginary threshold line and will be concluded and worth funding. The champions used Integration Simulation Sheet and divided the final ranked list into 3 themes as step 4. See Table 9 to compare other specialties.

Moreover, the panel developed the specially designed train the trainers (TOT) guidelines on conducting the simulation process. These guidelines include many areas related to the instructor's qualifications (see Table 11 for TOT guidelines), such as developing the course objectives, design, and facility. The TOT simulation education program aims to create a safe learning environment for residents that will help them understand essential concepts and gain the knowledge and on-the-job training experience to help them increase positive patient outcomes. Trainers who participate in this program must have a healthcare background, be registered with the SCFHS, and hold a qualification in healthcare simulation. More importantly, they must prove they have experience in the Train the Trainers (TOT) simulation course [23-27].

Many works of literature described using multi-sources to collect training gaps' information to facilitate defining more accurate training gaps. Mann and Chaytor described conducting a large-scale survey and then focus group discussion as a needs assessment methodology to assess a specific group of physicians [28-29]. The authors used the chronological sequence of reviewing the curriculum, conducting the survey, and then the focus group discussion.

We found in the sequence of targeted audience simulation needs assessment that the curriculum might not cover some skills and behaviors that are sometimes taught individually in scattered activities. On the other hand, sending a simple targeted audience survey through emails could identify critical learning gaps, and the focus group of stakeholders' interviews added additional learning gaps not addressed by earlier methods. Interestingly, several skills and behaviors showed similar trends in most of the nine specialties in all phases: total combined list and final ranked list (Table 9).

Salzman et al. and his group used a six-step approach to establish a standardized proposal submission and evaluation mechanism. They targeted 190 training programs and 1136 trainees. Their approach was based on recruiting simulation experts to build a structural format to review curricula. Then they recognized those curricula might benefit from simulation experts mentoring and supporting by making proper decisions regarding funds [30].

Moreover, Wehbi et al. published a needs assessment methodology for simulation-based training focused on a single-specialty (i.e., emergency medical practice) to build customized curricula targeting on-site training using mobile units in rural areas to cover training gaps [31].

The methodology sequence started with a focus group, conducted surveys, and analyzed results. As a comparison, the needs assessment gap in our work started with a curriculum review of ongoing structural training programs, followed by an open-ended question survey, then a focus on specialized group workshops. It would be worth comparing emergency medicine themes from our work with Wehbi et al. work to find overlapping areas which is out of this paper's scope.

A previous work of Arab A et al. was found using other approaches in assessing simulation in anesthesia residency training programs in Saudi Arabia [32]. The author set an implementation plan to be staged gradually between 2014-2018. It started by implementing mandatory standardized workshops that matched specialty curriculum and ongoing training activities [33]. Because of that implementation plan, we exclude Anesthesia from our work. We described an approach that has not been previously implemented in Saudi Arabia. Nine medical programs were included in this process and described as a national standardized needs assessment that can be used for different postgraduate specialties. Therefore, the allocation of the existing training programs under the umbrella of the SCFHS was our first step in this study to facilitate the standardized communication between simulation experts and specialty content experts (specialties scientific councils).

One of our limitations in this study was retrieving the process retrospectively. That was related to the process pattern, which is based on reflective learning until we reach a mature process. Another limitation was listing skills and behaviors in the survey without writing structural objectives, which might not reflect the exact meaning of the gap, e.g., communication with the patient might be related to breaking bad news or dealing with difficult patients... etc. This gap was raised and managed during focused group discussion by participants and filling up the integration simulation sheet by specialty champions. Also, we found in sending the survey in Step 2 that we missed the exact number of targeted groups to calculate the response rate. It happened because we sent the survey to all specialty stakeholders without confirming receiving or counting sent surveys.

The needs assessment detailed gaps in every specialty regarding a list of objectives, themes, modules, suggested educational activities, and others that were not addressed in this paper since it is out of scope. Going deep into these details in every specialty might help content experts review these gaps and support their decisions and future publications. It will be interesting to measure secondary outcomes from applying described methodology on training programs, e.g., level of graduates' competencies or patient safety [34]. Many previous studies elsewhere illustrated the importance of assessing the secondary outcomes for any methods used in establishing simulation needs assessment, particularly for required skill and behaviors [35-39].

Implementation Challenges:

The approach used and described in our study was a creative idea supported by previous needs assessment work. We described some challenges for better learning in the future and might support the simulation community [11], [40-41].

1- Time and space

For example, the regular meetings conducted between the simulation experts' panel and champions had enriched the feedback on the process used. There were mainly developed to obtain a concurrent reflection, and they reported immediately after each step with review and feedback. Consequently, significant modifications and reviews of ongoing processes were done, which challenged the speed of the process and prolonged the required time to finish the process. However, we can affirm that our approach would reduce the required time for practicing this needs assessment method for simulation at any program. It would take no more than 10 - 12 weeks to complete each cycle and develop a specialty road map without overstretching involved champions and stakeholders.

2- Champion commitment

One of the challenges was champion commitment. Two of the champions were replaced because of no response. At the same time, another specialty needed a third additional champion to re-do part of their work because it does not follow the same methodology.

3- Variation in required skills by specialties

Other challenge we found was the variation between specialties regarding the pattern of training and method of delivering their education activities. For example, surgical specialties had more skill-based activities. Another example was emergency medicine; they had a long list of required skills and behaviors. Their training was usually based on joined rotations with other specialties.

4- Logistics and Accreditation

For successful implementation, practical steps need to be addressed within the scope of this initiative, such as readiness of simulation centers, availability of equipment, and level of educators in terms of using simulation tools. The panel of three physicians with experience in simulation-based education at SCFHS studied infrastructure preparedness to ensure proper and smooth implementation of the initiative. Consequently, summary road map reports were submitted to simulation centers and program directors, asking for feedback. The feedback focused on the availability of similar training centers, the possibility of creating new activities, and the cost required for establishing such a site.

Conclusion

We think lessons learned from this work can add to any group planning for similar work. As an example: 1) compare literature needs assessment having different chronological sequences with our work in terms of primary outcome 2) support any organizations or national level umbrella with suggested needs assessment methodology and prepared guided forms 3) learn from challenges during this process 4) awareness of cost-effective needs assessment methodology that focuses on implementing what is needed 5) provide solutions for logistics and how it affects our needs assessment implementation.

We offer medical practitioners interested in implementing the concluded approach in simulation needs assessment to be approachable and easily practiced with a standardized method following the Needs Assessment method (steps and phases).

In this work, we found that implementing this descriptive methodology might help target the training gaps and support organizations and decision-makers to properly supervise residency training programs and enhance the required integration of simulation into ongoing residency training programs in the country.

Declarations

Acknowledgments:

The authors thank all program directors of the nine programs for their kind cooperation in the different stages of this work.

Authors' Contribution:

UA, Sh A, A Al, and SA participated in study concept and design, data acquisition, analysis and interpretation of data, and statistical analysis. They were involved in administrative, technical, and material support and study supervision. All the authors read and agreed on the critical revision of the manuscript.

Declaration: The research was approved by the Institutional Review Board at King Fahad Medical City, Riyadh, Saudi Arabia. IRP registration number: (21-420)

Patient consent for publication: Not required

Conflict of Interests: No conflict of interest to declare.

Funding/Support: This study did not receive funds from any funding agency in public, commercial or not-for-profit sectors.

Data Availability: The datasets generated and/or analyzed during the current study are not publicly available due to the ownership of data by SCFHS but are available from the corresponding author on reasonable request.

References

1. Frank JR. The CanMEDS 2005 physician competency framework: Better standards, better physicians, better care. Ottawa: Royal College of Physicians and Surgeons of Canada; 2005.

2. Swing SR. The ACGME outcome project: retrospective and prospective. Med Teach. 2007;29(7):648–654. DOI:10.1080/01421590701392903
3. Ten Cate O. Competency-Based Medical Education and its Competency-Frameworks. In: Mulder M (Hrsg). Competence based vocational and professional education Bridging the Worlds of Work and Education. Cham, Schweiz: Springer International Publishing Switzerland; 2017. S.903–929. DOI: 10.1007/978-3-319-41713-4_42
4. Ten Cate O. Entrustability of professional activities and competency-based training. Med Educ. 2005;39(12):1176–1177. DOI: 10.1111/j.1365-2929.2005.02341.x
5. Pangaro L, ten Cate O. Frameworks for learner assessment in medicine: AMEE Guide No. 78. Med Teach. 2013;35(6):e1197- 1210. DOI: 10.3109/0142159X.2013.788789
6. Olle ten Cate. Competency-Based Postgraduate Medical Education: Past, Present and Future. GMS Journal for Medical Education 2017, Vol. 34(5), ISSN 2366–5017
7. McGaghie WC, Kristopaitis T. (2015) 19 Deliberate practice and mastery learning: origins of expert medical performance. Researching medical education:219
8. Sam J, Pierse M, Al-Qahtani A, Cheng A. (2012) Implementation and evaluation of a simulation curriculum for paediatric residency programs including just-in-time in situ mock codes. Paediatrics & child health;17(2):e16-e20 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3299361/
9. Entrustable professional activity plan in SCFHS Curricula https://www.scfhs.org.sa/en/MESPS/Pages/EPA-.aspx
10. SCFHS. (2020) Professional Classification and Registration Requirements Riyadh, KSA. Saudi Commission for Health Specialties. https://www.scfhs.org.sa/en/registration/Regulation/Pages/professional-registration-requirements-.aspx
11. Azzam K, Wasi P, Patel A. (2012) Designing and implementing a comprehensive simulation curriculum in internal medicine residency. Canadian Journal of General Internal Medicine;7(3).http://10.22374/cjgim.v7i3.130.
12. Kern DT, PA. Hughes, MT. (2009) Curriculum development for medical education: a six-step approach. Baltimore: Johns Hopkins University Press; 2009
13. SCFHS Family Medicine Curriculum: https://www.scfhs.org.sa/MESPS/TrainingProgs/TrainingProgsStatement/Documents/Family%20Medicine%202020.pdf
14. Otolaryngology Head and Neck Surgery Curriculum: https://www.scfhs.org.sa/en/MESPS/TrainingProgs/List%20graduate%20programs/Documents/ENT.pdf
15. Plastic Surgery Curriculum: https://www.scfhs.org.sa/en/MESPS/TrainingProgs/List%20graduate%20programs/Documents/Plastic%20Surgery.pdf
16. Pediatrics Curriculum: https://www.scfhs.org.sa/en/MESPS/TrainingProgs/List%20graduate%20programs/Documents/Pediatrics.pdf
17. Emergency Medicine Curriculum: https://www.scfhs.org.sa/en/MESPS/TrainingProgs/List%20graduate%20programs/Documents/Emergency%20Medicine.pdf
18. Obstetric and Gynecology Curriculum: https://www.scfhs.org.sa/en/MESPS/TrainingProgs/List%20graduate%20programs/Documents/OBSTETRICS%20AND%20GYNECOLOGY.pdf
19. Critical Care Medicine Curriculum: https://www.scfhs.org.sa/en/MESPS/TrainingProgs/List%20graduate%20programs/Documents/Adult%20Critical%20Care.pdf
20. Internal Medicine Curriculum: https://www.scfhs.org.sa/en/MESPS/TrainingProgs/List%20graduate%20programs/Documents/INTERNAL%20MEDICINE.pdf
21. General Surgery Curriculum: https://www.scfhs.org.sa/en/MESPS/TrainingProgs/List%20graduate%20programs/Documents/GENERAL%20SURGERY.pdf
22. Chacko TV. (2017) Simulation-based medical education: Using best practices and curriculum mapping to maximize educational benefits in the context of shift toward competency-based medical education. Archives of Medicine and Health Sciences;5(1):9
23. Kolb DA. (1984) Experience as the source of learning and development. Upper Saddle River: Prentice Hall
24. Osterman KF, Kottkamp RB. (1993) Reflective practice for educators: Improving schooling through professional development: ERIC; 1993.0803960476
25. Rosenthal SL, Stanberry LR. (2011) A framework for faculty development. The Journal of pediatrics;158(5):693–694. e2.http://10.1016/j.jpeds.2011.01.009.
26. Gaba DM. Simulations that are challenging to the psyche of participants: how much should we worry and about what? In: LWW; 2013.
27. Noureldin YA, Lee JY, McDougall EM, Sweet RM. (2018) Competency-based training and simulation: making a "valid" argument. Journal of endourology;32(2):84-93
28. JANE TIPPING, MAEd, Focus Groups: A Method of Needs Assessment, The Journal of Continuing Education in the Health Professions, Volume 18, pp. 150–154. Printed in the U.S.A. Copyright 0 1998 The Alliance for Continuing Medical Education, the Society of Medical College Directors of Continuing Medical Education, and the Council on CME, Association for Hospital Medical Education

29. Mann KV, Chaytor KM. Help! Is anyone listening? An assessment of learning needs of practicing physicians. Acad Med 1992;67(Suppl 10): S4-S6. Johnston
30. Salzman DH, Wayne DB, Eppich WJ, Hungness ES, Adler MD, Park CS, et al. (2017) An institution-wide approach to submission, review, and funding of simulation-based curricula. Advances in simulation;2(1):9.http://10.1186/s41077-017-0042-5.
31. Wehbi NK, Wani R, Yang Y, Wilson F, Medcalf S, Monaghan B, et al. (2018) A needs assessment for simulation-based training of emergency medical providers in Nebraska, USA. Advances in Simulation;3(1):22.https://doi.org/10.1186/s41077-018-0081-6.
32. Arab A, Alatassi A, Alattas E, Alzoraigi U, AlZaher Z, Ahmad A, et al. (2017) Integration of Simulation in postgraduate studies in Saudi Arabia: The current practice in anesthesia training program. Saudi Journal of Anaesthesia;11(2):208
33. SCHS. (2015) Saudi Board: Anesthesia Curriculum. Riyadh. KSA: Saudi Commission for Health Specialties; 2015. [https://www.scfhs.org.sa/MESPS/TrainingProgs/TrainingProgsStatement/Documents/Anesthesia.pdf]
34. Janet Grant, Learning needs assessment: assessing the need. BMJ VOLUME 324 19 JANUARY 2002
35. Barsuk JH, Cohen ER, Feinglass J, McGaghie WC, Wayne DB. (2009) Use of simulation-based education to reduce catheter-related bloodstream infections. Archives of internal medicine;169(15):1420-1423
36. Wayne DB, Didwania A, Feinglass J, Fudala MJ, Barsuk JH, McGaghie WC. (2008) Simulation-based education improves quality of care during cardiac arrest team responses at an academic teaching hospital: a case-control study. Chest;133(1):56–61
37. Dawe SR, Pena G, Windsor JA, Broeders J, Cregan PC, Hewett PJ, et al. (2014) Systematic review of skills transfer after surgical simulation-based training. British Journal of Surgery;101(9):1063–1076.https://doi.org/10.1002/bjs.9482.
38. Zendejas B, Cook DA, Bingener J, Huebner M, Dunn WF, Sarr MG, et al. (2011) Simulation-based mastery learning improves patient outcomes in laparoscopic inguinal hernia repair: a randomized controlled trial. Annals of surgery;254(3):502-511
39. Barry Issenberg S, Mcgaghie WC, Petrusa ER, Lee Gordon D, Scalese RJ. (2005) Features and uses of high-fidelity medical simulations that lead to effective learning: a BEME systematic review. Medical teacher;27(1):10-28
40. McLaughlin S, Fitch M, Goyal D, Hayden E, Kauh C, Laack T. (2008) SAEM Technology in Medical Education Committee and the Simulation Interest Group. Simulation in graduate medical education 2008: a review for emergency medicine. Acad Emerg Med;15(11):1117-29.http://0.1111/j.1553-2712.2008.00188.x.
41. So HY, Chen PP, Wong GKC, Chan TTN. (2019) Simulation in medical education. Journal of the Royal College of Physicians of Edinburgh;49(1).http://10.4997/JRCPE.2019.112.

Tables

Table 1. Summary of methodology steps with roles and responsibilities to facilitate conduction:

Step Name	Phase Name	Roles and responsibilities
Step 1: Selecting Targeted Specialties		Panel of simulation experts established criteria to facilitate Selection through umbrella body
Step 2: Selecting Targeted Champions		Panel of simulation experts established criteria to facilitate champions selection and Orientation Package as a guide with supportive tools
Step 3: Targeted Audience Simulation Need Assessment	Phase 1: Curriculum Review	Champions reviewed the curriculum extract Skills and Behaviors
	Phase 2: Targeted Audience Survey	Champions will conduct targeted audience survey
	Phase 3: Focus Group of Stakeholders' Interview:	Panel of experts built a curriculum for champions to conduct structural focus group discussion for specialty's stakeholders (Table 6)
	Phase 4: Selecting the top ranked list of skills and behaviors	Stakeholders will vote to narrow the list of skills and behaviors to most needed
Step 4: Building common themes using integration simulation sheet (Figure 1)		Champions translated list of skills/behaviors to Themes/Objectives/Courses for proper future delivery method and facilitate writing final road map

Table 2. Results of specialties voting rank by panel members

Specialty	Score of Voting (Out of 90)
General Surgery	62 (69%)
Obstetric/Gynecology	58 (64%)
ER	56 (62%)
ENT	55 (61%)
ICU	54 (60%)
FM	48 (53%)
Plastic Surgery	47 (52%)
IM	46 (51%)
Pediatric	45 (50%)

ER: Emergency Medicine, ICU: Intensive Care Unit, IM: Internal Medicine, ENT: Ear Nose and Throat, FM: Family Medicine

Table 3. Orientation Package

Variable	Description
Curriculum Folder	Contains original specialty curriculum and another file with the first list of skills and behaviors, which the Curriculum development department at SCFHS extracts
Electronic Survey List	Contains excel sheet ready to be sent to collect survey responses for the second list of skills and behaviors
Focus Group	Contains excel sheet which will be used during the focus group brainstorming during the workshop to collect the third list of skills and behaviors
Integration Simulation Sheet	This excel sheet helps champions translate all collected skills and behaviors to educational objectives and trying to link current suggested methods of delivering these objectives with future methods
Roadmap Submission Document	This Word document has the broad lines and titles for the final document, which will be submitted to the Scientific Council for Approval

Table 4: Survey Questions

Surevey Questions:
1- In your opinion, what are the most skills that have high impact on the residents with limited clinical exposure currently? (List all skills that residents need to improve)
2- From your previous skill list, how are these skills taught?
3- In your opinion, what are the most important behaviors needed for residents with limited opportunity to practice? (List all the behaviors)
4- “Better teamwork between health professionals improves patient outcomes” In your opinion, what are the situations that are shared with other specialties (Inter-professional skills and behaviors)?

Table 5: Number of responses per each specialty:

Specialty	Number of responses
Obstetric/Gynecology	23
ER	7
ICU	6
IM	39
Pediatric	43
Plastic Surgery	12
ENT	10
General Surgery	67
FM	93

ER: Emergency Medicine, ICU: Intensive Care Unit,
IM: Internal Medicine, ENT: Ear Nose and Throat,
FM: Family Medicine

Table 6: Focus Group Discussion Workshop Curriculum

Workshop Agenda:	- Agree on a list of skills and behaviors that was identified from expert curriculum review & survey analysis - Brainstorming for additional skills and behaviors not identified during curriculum review & survey analysis - Identify skills & behaviors related to different specialties
Target Group:	- Programs Directors - Scientific Committee representatives - Qualified/interested in Simulation in selected programs - Resident's representative
Round table discussion (1):	Think about essential skills and behaviors needed for residents and **not** addressed in curriculum analysis and survey results?
Round table discussion (2):	Using Ranking Survey, rank the combined list of skills and Behaviors from the previous three lists according to the level of mastery (Competencies, minimum requirements, Limited exposure, and high acuity) NOTE: using a scale from 1-10, mark (10) if the skill has not been mastered upon graduation, while mark (1) if the skill has been mastered or it is not essential for specialty upon graduation. Notes for Scoring: 1- It is at the level of graduated residents 2- Score according to the need, not the importance 3- Think about the national level, not at the level of the institution 4- Standardization for future formal training 5- Residency level (not subspecialty level)
Round Table Discussion (3):	After ranking, the average ranks will be taken for every skill/behavior. All skills and behaviors will be re-arranged and prioritized based on total marks (higher above and lower below). All attendees brainstorm and agree on one imaginary line (threshold line) after discussing different opinions, including minimum skills and behaviors that need to be involved and funded above this line.

Table 7. Structural Development of Integration Simulation Sheet

Skill 1	Objective 1 Objective 2	Current Delivery Method	Suggested future simulation delivery method
Skill 2	Objective 1 Objective 2	Current Delivery Method	Suggested future simulation delivery method
Skill 3	Objective 1 Objective 2	Current Delivery Method	Suggested future simulation delivery method

Table 8. Drop list for suggested future activities

Suggested future simulation delivery method	Where to fit new suggested simulation activities in the academic calendar?
Standardized patient	Workshop/ Courses
Partial Task Trainer	Educational sessions
High Fidelity Simulation	Morning activities
Hybrid simulation (Mixed Modalities)	Ground round
Virtual Reality	Journal club
Computerized	Bedside
Others (write in remarks)	Half-day academic activities
	Full day academic activities
	Others (write in remarks)

Table 9: Summary of the number of skills and behaviors in every specialty in step 3 (Simulation Need Assessment Methodology) and Step 4 (Development Integration Simulation Sheet):

		First Stage Specialties (First Year)					Second Stage Specialties (Second Year)			
		Ob/Gyn	ER	ICU	IM	Pediatric	ENT	GS	Plastic	FM
Step 3	Phase 1: Curriculum Review	49	205	62	80	103	118	75	53	80
	Phase 2: Survey Analysis (Added to above list)	5	8	18	16	11	4	25	15	41
	Phase 3: Focus Group (Added to above list)	30	29	59	6	21	3	14	97	47
	Total for a combined list (Total number)	84	242	139	102	135	125	114	165	168
	Phase 4: Final Ranked List (Above the imaginary threshold line)	10	80	20	37	82	49	55	24	59
Step 4	Number of Themes (after merging in Integration Simulation Sheet)	3	13	4	7	11	5	5	13	5

Ob/Gyn: Obstetric and Gynecology, ER: Emergency Medicine, ICU: Intensive Care Unit, IM: Internal Medicine, ENT: Ear Nose and Throat, GS: General Surgery, FM: Family Medicine

Table 10: Components of Submission Roadmap document:

roduction:

- Why simulation in the specialty (objectives)
- Current specialty practice
- An ongoing specialty simulation activity
- Was simulation used in an assessment?

eed assessment methodology:

- Description of the process (simulation Needs Assessment method “Phases”)
- Creating a table to summarize and group needs assessment skills and behaviors list

ailed integration Simulation **Roadmap Table** includes:

Need assessment Objectives

Type of current delivery method of this objective if existing

Suggested future simulation delivery method

Where to fit new suggested simulation activities in the academic calendar

Additional ideas and remarks

Instructional methods:

(retrieved from **Roadmap Table** above):

Detailed integration logistics (roadmap table):

Summary:

Table 11: Simulation Train the Trainers (TOT) Courses Guidelines

TOT Courses' Instructors should have:

- Healthcare Background (not necessarily same specialty or profession of attendees)
- Valid registration in SCFHS
- Qualification in Healthcare Simulation
- Has previous prove that he/she was involved in instructing Simulation Train the Trainers courses before

Course Objectives should include the following areas:

- Importance of Train the Trainers courses and faculty development in simulation
- Concept of Safe learning environment in simulation
- Important adult learning theories and simulation
- Main curriculum components
- Writing a simulation-based scenario in the proper template
- Practicing different debriefing modalities
- Knowing essential concepts in a simulation like standardized patient (SP), Task trainers, Virtual reality, high fidelity, ıoulage,
- Techniques of Surgical procedures teaching

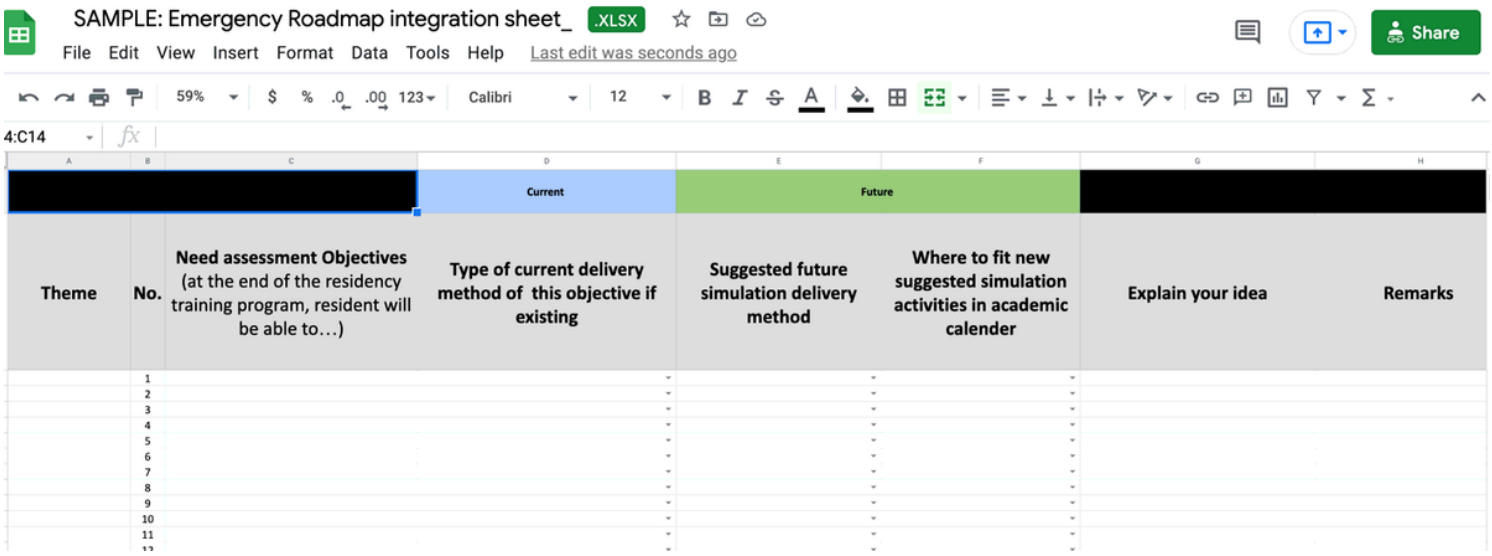
Course Design and activities should include:

- Well written curriculum including a clear timetable
- Building safe learning environment for attendees (Introduction > or = 5%)
- Discussion based course (lectures should be < 40%)
- Hands on practice with effective feedback (e.g. writing a scenario and practice debriefing in safe learning environment etc.)
- Exposure to simulation environment (high fidelity, task trainers...etc.)
- Having center tour with enough time for discussion and answering participants questions
- Instructor/participant ratio should not exceed 1/6
- Clear course evaluation process
- Enough breaks and time for food and prayers

Course Facilities:

- Should be done in a simulation center with (at least):
  - a- High fidelity room and equipment
  - b- Debriefing room with proper setting
  - c- Task trainer's room and equipment
- Should have a proper lecture room that:
  - a- located at the exact center building
  - b- fits the planned course attendees' number
  - c- has good lightening
  - d- has proper audiovisual
  - e- not lecture-based chair setting (round setting or small groups)
- Bathrooms and setting area out of lecture room
- Catering during breaks and lunchtime

Figures



SAMPLE: Emergency Roadmap integration sheet_ .XLSX

File Edit View Insert Format Data Tools Help Last edit was seconds ago

Share

4:C14

			Current	Future			
Theme	No.	Need assessment Objectives (at the end of the residency training program, resident will be able to…)	Type of current delivery method of this objective if existing	Suggested future simulation delivery method	Where to fit new suggested simulation activities in academic calender	Explain your idea	Remarks
	1						
	2						
	3						
	4						
	5						
	6						
	7						
	8						
	9						
	10						
	11						

Figure 1

Sample Roadmap Integration Simulation Sheet