Value of simulation as a means of evaluating learning on the management of patients with COVID19

Intérêt de la simulation comme moyen d'évaluation d'un apprentissage portant sur la prise en charge des patients atteints de la COVID19

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Abstract

Introduction: Medical simulation is a crucial educational tool for training healthcare professionals, renowned for its effectiveness in learning. However, its application as an assessment tool remains uncommon.

Aim: To evaluate simulation as a tool for assessing training in the management of COVID-19 patients.

Methods: This descriptive cross-sectional study was conducted in June 2021 at the Department of Pediatrics, Sahloul University Hospital in Sousse, Tunisia. All medical and paramedical staff in the department underwent comprehensive training in the management of COVID-19 patients, including video training for donning and doffing protective equipment when in contact with infected patients. A simulation-based assessment of these procedures was carried out among the department staff having received this training.

Results: Our study included a total of 67 participants, comprising 28 medical staff (41.8%) and 39 paramedical staff (58.2%). During the assessment scenario, over 50% of participants successfully completed the main steps for both donning (8 out of 11 steps) and doffing procedures (10 out of 11 steps). However, there were instances of incorrect execution in some critical steps. In the doffing test, only 16.4% of participants performed the fitcheck correctly, with a notable difference between paramedical staff and medical staff (25.6% vs 3.6%, p=0.02). The practice of double gloving was observed in only 38.8% of cases, with higher adherence among physicians compared to paramedical staff (57.1% vs 25.6%, p=0.009). Regarding the doffing procedure, we observed that not all staff performed hydroalcoholic friction adequately. Similarly, only 22.4% of participants followed the recommended sequence of gestures, with a significantly higher compliance rate among doctors compared to paramedical staff (50% vs 2.6%, p<0.001).

Conclusions: Simulation is a swiftly expanding assessment tool. In our study, it helped reveal specific skill deficiencies that would have gone unnoticed in written or oral assessments.

Key words: Assessment; Simulation; learning; COVID-19

Résumé

Introduction: La simulation médicale est devenue un outil pédagogique incontournable dans la formation des professionnels de santé. C'est un outil d'apprentissage bien connu. Cependant, son utilisation comme outil d'évaluation demeure rare.

Objectif: Évaluer la simulation comme outil d'évaluation d'un apprentissage portant sur la prise en charge des patients atteints de la COVID19.

Méthodes: Il s'agissait d'une étude transversale descriptive menée au sein du service de Pédiatrie du CHU Sahloul de Sousse (Tunisie) au cours du mois de juin 2021. Tout le personnel médical et paramédical de ce service a reçu une formation sur la prise en charge des enfants atteint du COVID 19. Cette formation a comporté des vidéos des procédures d'habillage et de déshabillage lors du contact d'un patient atteint de cette infection. Par la suite, une évaluation par simulation de ces deux procédures a été réalisée. Tout le personnel soignant ayant bénéficié de cette formation a été inclus.

Résultats: Au total, 67 participants ont été inclus dans notre étude : 28 personnels médicaux (41,8%) et 39 personnels paramédicaux (58,2%). Au cours du scénario d'évaluation, plus de 50 % des participants ont validé les principales étapes des procédures d'enfilage (8 étapes/11) et de retrait (10 étapes/11). Cependant, certaines étapes importantes de ces deux procédures n'ont pas été réalisées correctement. En effet, lors de l'épreuve d'habillage, le Fitcheck n'a été observé que dans 16,4 % des cas ; cette étape était plus validée par le personnel paramédical (25,6 % vs 3,6 %, p=0,02). Le port des doubles gants n'a été observé que dans 38,8% des cas ; c'était plus significatif chez les médecins (57,1 vs 25,6 %, p=0,009). Lors de la procédure de déshabillage, nous avons constaté que la friction hydroalcoolique n'était pas suffisamment réalisée par l'ensemble du personnel traitant. De même, l'ordre des gestes recommandés n'a été respecté que par 22,4% des participants ; une plus grande observance de la séquence recommandée a été notée chez les médecins (50 % vs 2,6 %, p<0,001).

Conclusion: Dans notre étude, la simulation, utilisée comme moyen d'évaluation, a permis de mettre l'accent sur certaines lacunes dans les compétences demandées. Une évaluation du même apprentissage par une épreuve écrite ou orale n'aurait pas abouti aux mêmes résultats.

Mots clés: Évaluation; Simulation; apprentissage; COVID-19

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INTRODUCTION

Assessing learner achievement is a critical component of the learning process, serving both formative and summative purposes (1,2). When it comes to assessment, the common question is 'how to assess,' which involves selecting the appropriate assessment tool. This decision is complex due to the various assessment instruments available. Simulation-based medical education has rapidly evolved as a highly effective method for enhancing the training of healthcare professionals in both technical and non-technical skills (3,4). However, the utility of simulation extends beyond learning and can also address other aspects of learning planning, including assessment.

Only a limited number of studies have explored the educational aspect of simulation (5–7). In our research, we have chosen to investigate the potential of simulation as an assessment tool within the context of the current global health crisis, COVID-19. The pandemic has created a significant global health challenge, demanding dedication, careful planning, and unwavering commitment from healthcare professionals. Various health institutions have developed protocols and training programs to ensure the optimal care of COVID-19 patients and the protection of healthcare staff from infection risks (8). Surprisingly, there has been a lack of assessment for these training programs.

The objective of our study is to assess the feasibility of using simulation as an assessment tool for training in the management of COVID-19 patients.

METHODS

Type and location of study:

This descriptive cross-sectional study was conducted in the Pediatrics Department of Sahloul Hospital in Sousse, Tunisia, in June 2021

Study population:

To be included in this study, participants should meet the following criteria:

Being a medical or paramedical health care professional of the Department of Pediatrics during the study period and having received a comprehensive training on the management of patients with COVID-19. This video-based training, carried out in collaboration with the hygiene department of our university hospital, focused on how to put on, take off, and dispose of their personal protective equipment (PPE); and on how to perform the nasopharyngeal swab for polymerase chain reaction (PCR) testing. The training took place one month before the assessment, and no other videos covering these procedures were provided to the participants.

The exclusion criteria were: healthcare professionals within the Department of Pediatrics during the study period who had not received training in the management of COVID-19 patients, individuals who declined participation in the study, and staff members who were absent during the study period due to leave.

Protocol:

The assessment was carried out through a simulation scenario involving a 15-year-old COVID-19 patient who was hospitalized in an isolation unit. We prepared a room with a low-fidelity mannequin representing a large child to serve as an isolation room, equipped with all the necessary items for the scenario.

Before the simulation session, candidates completed an anonymous form, providing their epidemiological data, including age and sex. Subsequently, each participant was invited to enter the isolation room and examine the child after taking the necessary precautions by correctly donning appropriate PPE. Upon exiting the room, participants were expected to safely doff their PPE. We developed two assessment grids (see Appendix A and B) to evaluate the PPE donning and doffing procedures, with reference to the guidelines they had previously received. Each participant received a score based on these predefined assessment grids.

Appendix A. Donning PPE Competency Validation Checklist

Procedure done before entering the isolation room	Done/ not done	Sequence	Score
Putting on protective footwear			1 point
Rubbing hands with a hydro alcoholic solution			1 point
Putting on the gown / the disposable Protective Coverall			0.5 point
Putting on the overboots if gown used			0.5 point
Putting on the hair cover			1 point
Putting on a Mask FFP2			1 point
Carrying out a fit-check			1 point
Putting on goggles/ face shield			1 point
Putting on the hood if coveralls used			0,5 point
Putting on the first pair of gloves			1 point
Putting on the outer pair of gloves			1 point
Respect of sequence			1 point
Final Score			10 points

Appendix B. Doffing PPE Competency Validation Checklist

Procedure	Done/ not done	Sequence	Score
Before leaving the isolation room			
Peeling off the gloves into the yellow waste bin			1 point
Removing the gown / the disposable Protective Coverall			1 point (if it is a coverall suit)/ 0.5 point (if it is a gown)
Removing the overboots			0.5 point
Rubbing hands with hydro alcoholic solution			0.5 point
After Leaving the Isolation Room			
Rubbing hands with hydro alcoholic solution			0.5 point
Removing the face shield or the goggles and placing them in a detergent- water mix			1 point
Removing the FFP2 mask from behind			1 point
Removing the hair cover from behind			1 point
Taking off the Shoe Covers			1 point
Peeling off the inner pair of gloves			1 point
Rubbing hands with a hydro alcoholic solution			0.5 point
Respect of the sequence			1.5 point
Final Score			10 points

At the end of the simulation session, we assessed participants' perceptions using an anonymous questionnaire (see Appendix C). This questionnaire consisted of five questions that evaluated the realism of the

session, the level of stress experienced, and the perceived usefulness of the scenario as a training and assessment method. Participants responded to these questions by providing a score on a scale of 1 to 10.

Appendix C. Scenario Evaluation Questionnaire

1. Does this scenario contain elements that can actually happen to you in your practice? Give a score /10 that estimates this:.....
   0: cannot happen in my practice
   10: always happens in my practice

2. Are the events included stress factors in the clinical setting, give a rating/10 that estimates the degree of stress in this scenario:.....
   0: not stressful
   10: very stressful

3. Will this scenario improve your performance in the clinical setting, give a score/10 that estimates your response:.....
   0: does not improve
   10: will significantly improve

4. Can this scenario be used as a training tool? Give a score/10 that estimates your answer: .....
   0 : no, it cannot be useful
   10: will be very useful for training

5. Can this scenario be used as a means of evaluating our practices? Give a score /10 which estimates your answer: .....
   0 : no, it cannot be useful
   10: will be very useful for evaluation

Statistical analysis:

The collected data were analyzed using the SPSS statistical package (version 20.0, SPSS Inc, Chicago, IL, USA). Quantitative variables were presented as median values with 25th and 75th percentiles, while categorical variables were expressed as numbers and percentages. To compare data between medical and paramedical staff, we used the Fisher's test for qualitative variables and the Mann-Whitney test for quantitative data. A significance threshold of $P<0.05$ was applied for all tests.

RESULTS

Our study involved 67 participants, with 28 (41.8%) being medical staff and 39 (58.2%) paramedical staff. Among the medical staff, 19 (67.9%) were interns, and 9 (32.1%) were residents. The paramedical staff included 26 nurses (66.7%), 10 senior pediatric technicians (25.7%), one senior emergency technician (2.6%), one nurse aide (2.6%), and one physical therapist (2.6%). The participants had a median age of 30 years, with an interquartile range of 25-35. Females dominated the participant group, accounting for 55 individuals (82.1%), resulting in a sex ratio of 0.2. Thirty percent of participants had a prior history of COVID-19 infection. However, only 38.8% had received vaccination against the virus, with the majority being medical staff (71.4%).

During the donning process, the majority of participants successfully donned the following items: Disposable isolation gown or disposable protective coverall, hair cover, FFP2 mask, goggles, the first pair of gloves.

Only 16.4% of participants performed a fit-check, with a higher proportion among paramedics. Double gloving was observed in just 38.8% of participants, and this was more common among physicians (57.1% vs. 25.6%, p=0.009). Additionally, only 13.4% of participants followed the correct sequence for PPE donning. The median final score was 6.5, with a slight but non-significant advantage for medical staff. Table 1 provides a summary of the percentage of validation for each step of the donning procedure in both caregiver groups, along with the final score awarded to each group.

Table 1. Percentages of validation of each step of the donning procedure in the two groups of caregivers as well as the final score attributed to each group.

Standard operating procedures prior to entering the room	Total Number (%)	Medical Personnel (%)	Paramedical Personnel (%)	P
Hand Washing (n=67)	46 (68.7%)	17 (60.7%)	29 (74.4%)	0.23
Putting on Shoe Covers (n=67)	55 (82.1%)	27 (96.4%)	28 (71.8%)	**0.009**
Hand rubbing with alcohol-based solution (n=67)	29 (43.3%)	18 (64.3%)	11 (28.2%)	**0.003**
Putting on the gown/ disposable Protective Coverall (n=67)	67 (100%)	28 (100%)	39 (100%)	-
Wearing overboots if gown used (n=37)	19 (51.4%)	7 (30.4%)	12 (85.7%)	**0.002**
Wearing a hair Cover (n=67)	65 (97%)	27 (96.4%)	38 (97.4%)	1
Wearing a FFP2 mask (n=67)	67 (100%)	28 (100%)	39 (100%)	-
Carrying out a fit-Check (n=67)	11 (16.4%)	1	10 (25.6%)	**0.02**
Wearing goggles/ face shield (n=67)	65 (97%)	27 (96.4%)	38 (97.4%)	1
Putting on the first Pair of gloves (n=67)	63 (94%)	28 (100%)	35 (89.7%)	0.13
Putting on the outer gloves (n=67)	26 (38.8%)	16 (57.1%)	10 (25.6%)	**0.009**
Respect of the sequence (n=67)	9 (13.4%)	8 (28.6%)	1	**0.003**
Final Median Score [25th -75th percentile]	6.5[5.5-7.5]	7 [5.5 – 8]	6 [5.5 – 7]	0.060

During the doffing procedure, 92.3% of participants removed their gowns and the first pair of gloves inside the infected room. More than 50% of participants completed the remainder of the doffing procedure outside the infected room. However, healthcare personnel did not perform adequate hand rubbing with alcohol-based solutions, either inside or outside the infected room. Similarly, only 22.4% of participants followed the recommended sequence of procedures, with a significant difference between the two groups. Physicians had a higher compliance rate with the recommended sequence. The median final score for assessing compliance with the recommended PPE doffing protocol was 8 [7-8.5], with no significant difference between the two groups. Table 2 summarizes the percentage of validation for each step of the doffing procedure in both caregiver groups, along with the final score awarded to each group.

Doffing scores were higher than donning scores, with no significant differences observed between the two caregiver groups in either donning or doffing scores (Figure 1). Post-test questionnaires completed by participants indicated overall satisfaction with the simulation scenario. The median score for scenario realism was 8 [7- 9], and participants found the scenario useful for both training and assessment, with a median score of 8 [7- 10]. Additionally, all staff believed that the scenario could positively impact their performance, with a median score of 7 [5-9]. Notably, candidates' stress levels were not significant, as reflected by a median score of 4 [2-7]. However, it's worth mentioning that medical staff consistently scored lower than paramedical staff, as shown in Figure 2.

Table 2. Percentages of validation of each step of the doffing procedure in the two groups of caregivers as well as the final score attributed to each group.

Procedure	Total Numbe (%)	Medical Personnel (%)	Paramedical Personnel (%)	P
Before leaving the isolation room				
Peeling off the outer pair of gloves and placing them in the yellow dustbin (n=26)	24 (92.3%)	15 (93.8%)	9 (90%)	1
Removing the gown / the disposable Protective Coverall (n=67)	62 (92.5%)	23 (82.1%)	39 (100%)	**0.01**
Removing overboots if gown used (n=19)	16 (84.2%)	4	12 (100%)	**0.036**
Rubbing hands with a hydro alcoholic solution (n=67)	30 (44.8%)	9 (32.1%)	21 (53.8%)	0.078
After leaving the isolation room				
Rubbing hands with a hydro alcoholic solution (n=67)	38 (56.7%)	18 (64.3%)	20 (51.3%)	0.28
Removing goggles/ face shield and placing them in a in container with a detergent / water mix (n=65)	61 (93.8%)	24 (88.9%)	37 (97.4%)	0.29
Removing the mask from behind (n=67)	62 (92.5%)	24 (85.7%)	38 (97.4%)	0.15
Removing the hair cover from behind (n=65)	62 (95.4%)	24 (88.9%)	38 (100%)	0.06
Removing Shoe Covers (n=55)	51 (92.7%)	23 (85.2%)	28 (100%)	0.05
Removing the inner pair of gloves (n=26)	25 (96.2%)	15 (93.8%)	10 (100%)	1
Rubbing hands with a hydro alcoholic solution (n=67)	38 (56.7%)	19 (67.9%)	19 (48.7%)	0.119
Respect of the sequence (n=67)	15 (22.4%)	14 (50%)	1	**<0.001**
Final median score	8 [7- 8.5]	7.75 [7 – 9]	8 [7 – 8.5]	0.842

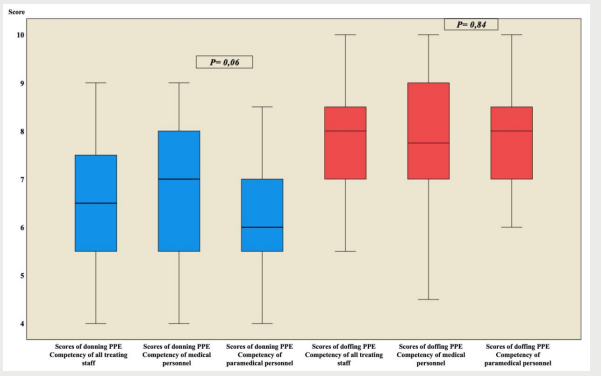

Figure 1. Donning and doffing PPE Competency scores

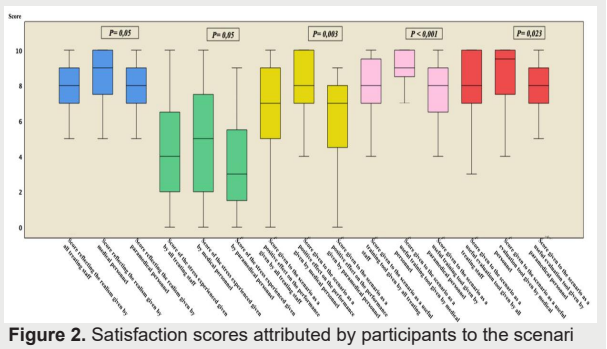

Figure 2. Satisfaction scores attributed by participants to the scenari

DISCUSSION

Simulation is a widely recognized educational tool in the training of healthcare professionals. In our study, its use as an assessment tool allowed us to identify certain shortcomings in the execution of donning and doffing procedures, despite participants' prior theoretical training. During the doffing test, only 16.4% of participants performed a fit check, and just 38.8% practiced double gloving. In the doffing procedure, we observed that not all treating staff adequately performed hydroalcoholic friction. Furthermore, only 22.4% of participants followed the recommended sequence of gestures.

Simulation is a tool that is perfectly suited to both formative and summative assessment. It is a versatile tool, well-suited for both formative and summative assessment. Formative assessment through simulation supports the learning process by providing students with valuable feedback, allowing them to identify their strengths and weaknesses. It also aids learners in progressing toward their training objectives (1). This type of assessment not only evaluates students' skills but also helps diagnose any learning difficulties that may require attention (1). On the other hand, summative or certifying simulation-based assessment typically occurs at the end of the learning process. It primarily focuses on measuring outcomes and the achievement of objectives, thereby determining the learners' level of competence. Its purpose is to certify the acquisition of specific skills, often through grading or ranking (1). Selecting simulation as an assessment tool should align with specific criteria. Firstly, the assessment's purpose should involve 'showing how' and 'doing it,' meaning it assesses learners' performance, representing the highest level of competence in Miller's pyramid (9). These competencies cannot be adequately assessed through traditional written methods, which primarily evaluate cognitive aspects and theoretical knowledge but often fall short in evaluating practical skills. In our study context, assessing practices related to the management of COVID-19 patients, such as PPE donning and doffing, cannot be adequately achieved through simple written or oral tests.

Wiel et al. (7) conducted a study on the benefits of realistic simulation in assessing difficult intubation for emergency physicians. Despite having received theoretical training in difficult intubation during their courses, they discovered limitations in this training, particularly gaps in the written assessment. The written assessment conducted at the end of the training remained subjective and did not adequately assess candidates' competence in emergency situations they might encounter in the field (7). To address this, the authors carried out both a written assessment and a simulation-based assessment six weeks after theoretical and practical training in adult difficult intubations. They observed a discrepancy between the theoretical and simulation assessments, with participants expressing difficulties during the simulation, particularly in prioritizing techniques for managing difficult intubation. Weinger et al. (10) assessed the performance of board-certified anesthetists in managing critical events commonly encountered in their daily anesthesia practice. They used scenarios such as systemic local anesthetic toxicity, hemorrhagic shock due to occult peritoneal bleeding, malignant hyperthermia in the post anesthesia care unit, and the acute onset of atrial fibrillation with hemodynamic instability followed by ST-segment elevation myocardial infarction. Their findings were concerning, as they revealed that 30% of the 284 practicing anesthesiologists were unable to manage these scenarios effectively. This underscores the notion that theoretical knowledge acquisition does not always translate to competence in practical situations on a realistic simulator. The use of simulation as an assessment tool provides the advantage of evaluating performance in an environment closely resembling real clinical practice conditions (7). In the context of the COVID-19 epidemic, training in the management of contagious patients primarily focuses on

safeguarding healthcare providers from infection risks. Any slight error in these procedures not only endangers the safety of caregivers but also exposes them to the risk of infection. These procedures, falling within the psychomotor educational domains of Miller's pyramid, cannot be adequately assessed through simple written tests. Success in a written assessment does not guarantee competence and could potentially lead to failures and the risk of infection when caregivers perform these procedures in front of infected patients. Therefore, simulation emerged as the most suitable assessment tool, allowing us to evaluate the genuine skills of caregivers within a context that closely mirrors real hospital situations. The realism of our scenario was well-received by the majority of participants, as indicated by their responses in the scenario assessment questionnaire. The median scores reflecting the realism of the scenario and its impact on performance were 8 [7-9] and 7 [5-9], respectively. Simulation not only assesses learners' attainment of objectives but also enables the selection of learners based on their skills. Lebuffe et al. (11) demonstrated that simulation-based assessment effectively distinguishes between the performance levels of different learners.

In this study, the simulation revealed differences between junior interns (1st and 2nd years) and seniors (3rd and 4th years). However, both groups exhibited management errors without significant differences. Henrichs et al. (12) conducted an assessment of anesthetists and nurse anesthetists using eight scenarios, each lasting five minutes. Physicians had a significantly higher overall success score, but defects in diagnosis and therapy initiation were observed in both groups. Our study found no significant difference between medical and paramedical staff in the final score for both donning and doffing procedures. However, some critical steps were not executed correctly. In the donning procedure, fit-checks were performed by only 16.4% of participants, most of whom were paramedical staff. Double gloving was observed in only 38.8% of participants, with a higher incidence among physicians. In the doffing procedure, hand sanitizers were not used sufficiently by all treating staff. Similarly, only 22.4% of participants adhered to the recommended sequence for PPE donning and doffing, with a significant difference between the two groups. Doctors exhibited a higher compliance rate with the recommended sequence. While numerous studies emphasize the utility of simulation as an assessment tool, its integration into formal assessment processes is still in its nascent stages. Various academic organizations have incorporated standardized patient simulation (SP) stations into the Objective Structured Clinical Examination (OSCE) to enhance OSCE realism and enable task-based clinical performance assessment (13–15). A study conducted on the American Board of Anesthesiology certification process revealed that certain candidates attained certification, even though their residency program directors expressed reservations about personally allowing these trainees to administer anesthesia (16). Certification examinations primarily focus on knowledge assessment rather than evaluating actual skills and performance. Given these shortcomings, simulation-based assessment has garnered interest from national examination boards, leading to its inclusion in accreditation, licensing, and certification programs (13,17). For instance, simulation-based assessment is utilized in the American Board of Medical Specialties maintenance of certification program (13). The American Board of Internal Medicine has proposed formative assessment using a cardiac catheterization simulator as an option for interventional cardiologists (18). Practically, simulation as an assessment tool can be applied using various modalities, such as low-fidelity mannequins (as in our scenario), high-fidelity mannequins with computerized scenarios, standardized patients (SP), virtual reality simulators, partial task trainers, electromechanical mannequins, and more (19,20). Multiple scenarios can be employed, and not every scenario necessitates debriefing (12).

While simulation-based assessment offers numerous advantages, it is essential to acknowledge its limitations:

- First, the prospect of being evaluated can be daunting for some learners, particularly when they encounter a realistic simulator for the first time (7).

- Simulation does not inherently provide a comprehensive assessment of the learner's thought process. To address this limitation, candidates may be required to articulate and explain their decisions and actions out loud. However, in certain clinical situations, especially those involving life-threatening emergencies, learners may encounter difficulties in verbalizing their reasoning (12).

- The cost of simulation equipment, especially in high-fidelity mode, can be prohibitively high (21).

- There is often a shortage of instructors, trainers, and evaluators with expertise in this field, compounded by time constraints due to their dual roles as clinicians in the hospital and faculty trainers.

- Simulation may not assess the entirety of competencies comprehensively.

- Some candidates may not appreciate the punitive nature of the test.

- Finally, a significant challenge in simulation-based assessment is the development of an effective assessment grid.

Strengths of the Study:

Our study is unique in its focus on the use of simulation as an evaluation tool. It addresses a timely and relevant subject, namely the management of COVID-19 patients. Learners expressed a high level of satisfaction with the scenarios.

Limitations of the study :

Our study has two primary limitations. First, the sample size was small. Second, we did not compare our results with those that could have been obtained through written or oral evaluations. Despite these limitations, simulation remains a promising assessment tool. In the future, its use in learning institutes for summative assessment may extend beyond simple OSCE stations to include more sophisticated tests using high-fidelity simulators.

CONCLUSION

The use of simulation as an assessment tool in the context of managing COVID-19 patients has revealed gaps in the necessary competencies. Our study demonstrates that simulation is a valuable tool for evaluating technical skills. We strongly recommend the integration of simulation into the assessment process in our institutes, encompassing both technical and non-technical skills.

Abbreviation:

COVID-19: coronavirus disease 2019
OSCE: Objective Structured Clinical Examination
PCR: polymerase chain reaction
PPE: personal protective equipment
SP: standardized patient simulation

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Ethical concideraions:

The study protocol was approved by the local ethics committee (the Ethics Committee of Faculty of Medicine Ibn Al Jazzar, Sousse, University of Sousse, Tunisia) and the institutional review board (CEFMS 106/2022).

REFERENCES

1. Wiel É, Nunes F, Cluis E, et al. Intérêts et limites de la simulation pour l'évaluation certificative des professionnels de santé. In: Boet S, Savoldelli G, Granry J-C, editors. La simulation en santé: De la théorie à la pratique. Paris: Springer; 2013.p.245–55. https://doi.org/10.1007/978-2-8178-0469-9_26
2. Kechida M, Daadaa S, Safi W, et al. Apprentissage par simulation chez les étudiants de médecine interne. Tunis Med. 2021; 99(04):409-415. https://www.latunisiemedicale.com/index.php/tunismed/article/view/3878
3. Galland J, Abbara S, Terrier B, et al, Fournier JP, et al. Simulation-based learning and internal medicine: Opportunities and current perspectives for a national harmonized program. Rev Médecine Interne. 2018;39(6):414–20. https://doi.org/10.1016/j.revmed.2017.11.011
4. Ghazali H, Ouaness I, Zaouch K, et al. Rétention des compétences suite à l'apprentissage par simulation dans le syndrome coronarien aigu versus arrêt cardiaque. Tunis Med. 2022;100(07):491-497. https://www.latunisiemedicale.com/index.php/tunismed/article/view/4151
5. Traynor D, Lydon A, Hickerson KA, et al. Development of Simulation-Based Assessment for Pediatric Intensive Care Nurse Orientation. Clin Simul Nurs. 2021;56:37-45.e7. https://doi.org/10.1016/j.ecns.2021.01.003
6. Ali AA, Chang WTW, Tabatabai A, et al. Simulation-based assessment of trainee's performance in post-cardiac arrest resuscitation. Resusc Plus. 2022;10:100233. DOI: 10.1016/j.resplu.2022.100233
7. Wiel E, Lebuffe G, Erb C, et al. Mannequin-based simulation to evaluate difficult intubation training for emergency physicians. Ann Fr Anesth Réanimation. 2009;28(6):542–8. https://doi.org/10.1016/j.annfar.2009.04.005
8. Carlotti AP de CP, de Carvalho WB, Johnston C, et al. COVID-19 Diagnostic and Management Protocol for Pediatric Patients. Clinics. 2020;75:e1894. doi: 10.6061/clinics/2020/e1894.
9. Dornan T. Medical education theory and practice. Edinburgh: Elsevier; 2011. https://www.eu.elsevierhealth.com/medical-education-theory-and-practice-e-book-9780702049866.html
10. Weinger M B, Banerjee A, Burden AR, et al. Simulation-based Assessment of the Management of Critical Events by Board-certified Anesthesiologists. Anesthesiology. 2017;127(3):475–89. https://doi.org/10.1097/ALN.0000000000001739
11. Lebuffe G, Plateau S, Tytgat H, et al. Interest of mannequin based simulator to evaluate anaesthesia residents. Ann Fr Anesth Réanimation. 2005;24(3):260–9. https://doi.org/10.1016/j.annfar.2004.11.020
12. Henrichs BM, Avidan MS, Murray DJ, et al. Performance of certified registered nurse anesthetists and anesthesiologists in a simulation-based skills assessment. Anesth Analg. 2009;108(1):255–62. https://doi.org/10.1213/ane.0b013e31818e3d58
13. Holmboe E, Rizzolo MA, Sachdeva AK, et al. Simulation-Based Assessment and the Regulation of Healthcare Professionals. Simul Healthc J Soc Simul Healthc. 2011;6(7):S58–62. https://doi.org/doi.org/10.1097/SIH.0b013e3182283bd7
14. Schwartz RW, Witzke DB, Donnelly MB, et al. Assessing residents' clinical performance: Cumulative results of a four-year study with the Objective Structured Clinical Examination. Surgery. 1998;124(2):307–12. DOI:https://doi.org/10.1016/S0039-6060(98)70135-7
15. Probert CS, Cahill DJ, McCann GL, et al. Traditional finals and OSCEs in predicting consultant and self-reported clinical skills of PRHOs: a pilot study. Med Educ. 2003;37(7):597–602. https://doi.org/10.1046/j.1365-2923.2003.01557.x
16. Slogoff S, Hughes FP, Hug CC Jr, et al. A demonstration of validity for certification by the American Board of Anesthesiology. Acad Med J Assoc Am Med Coll. 1994;69(9):740–6. https://doi.org/10.1097/00001888-199409000-00020
17. Alsulimani LK, Al-Otaiby FM, Alnofaiey YH, et al. Attitudes Towards Introduction of Multiple Modalities of Simulation in Objective Structured Clinical Examination (OSCE) of Emergency Medicine (EM) Final Board Examination: A Cross-Sectional Study. Open Access Emerg Med OAEM. 2020;12:441–9. https://doi.org/10.2147/OAEM.S275764
18. Lipner RS, Messenger JC, Kangilaski R, et al. A technical and cognitive skills evaluation of performance in interventional cardiology procedures using medical simulation. Simul Healthc J Soc Simul Healthc. 2010;5(2):65–74. https://doi.org/10.1097/SIH.0b013e3181c75f8e
19. Ryall T, Judd BK, Gordon CJ. Simulation-based assessments in health professional education: a systematic review. J Multidiscip Healthc. 2016;9:69–82. https://doi.org/10.2147/JMDH.S92695
20. Boulet JR. Summative assessment in medicine: the promise of simulation for high-stakes evaluation. Acad Emerg Med Off J Soc Acad Emerg Med. 2008;15(11):1017–24. https://doi.org/10.1111/j.1553-2712.2008.00228.x
21. Sibert L. Simulation with limited resources: unlimited educational possibilities. Pédagogie Médicale. 2020;21(2):61–3. https://doi.org/10.1051/pmed/2020037