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RESEARCH ARTICLE

Debriefing in Computer Simulation: Real Activity and Perspective

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Abstract:

Introduction:

Digital simulation has reached a place of importance in nursing education. Debriefing is a crucial step in this experience. However, the practices of teachers remain little explored.

Objectives:

This research aimed to explore and describe virtual simulation debriefing practices by faculty in the basic education of undergraduate nursing students.

Methods:

This was a qualitative study with exploratory and descriptive objectives. A mixed-methods approach was used, incorporating audio-visual recordings and self-confrontation interviews. Three teachers participated in the study.

Results:

Concerning the pedagogical approach to the debriefing process in digital simulation, we highlighted the place of teachers in managing the debriefing environment, structuring the debriefing and managing the group dynamic interactions. Other attributes of digital debriefing have been derived from this study: performance evaluation support, ensuring learners are all protagonists, group dynamics and learning traceability.

Conclusion:

Some teacher activities fit the requirements of digital debriefing. However, other attributes of this type of debriefing need to be adopted. This calls for further engagement of trainers and more investigation of these innovative activities.

Keywords: Nursing education, Debriefing, Digital debriefing, Digital simulation, Nursing faculty, Student nursing.

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1. INTRODUCTION

Health simulation has proven its value in the training of nurses [1]. It has seized the opportunity of massive developments in technology, developing new, highly qualified forms. Digital simulation is among those forms that have demonstrated their ability to meet health care learning needs [2,3]. This success could not occur without well-structured and well-founded pedagogical organisation. Debriefing is a crucial component in the organisation of the simulation process, considered the key element of learning. Many studies have documented the structures and benefits of debriefing [4, 5]. The practices of the trainers who lead it have not been investigated independently, particularly the new forms in full extensions, such as digital simulation. From this viewpoint, enhancing the quality of debriefing incites rethinking these modalities and particularities in the new forms of simulation. The objective of this study was to explore debriefing practices in virtual patient digital simulation.

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2. LITERATURE REVIEW

2.1. Debriefing in Simulation

Debriefing is a crucial step in the simulation experience [6, 7]. Historically, this concept has its roots in the military domain, generally used to examine a critical situation and draw lessons for subsequent missions [8, 9]. It has become routine practice in various fields such as aviation, security, health and education [10, 11]. Several definitions have been proposed for this concept [12]. The French National Authority for Health defines it as "the time for analysis and synthesis that follows the simulated situation. It is the major time of learning and reflection of the simulation session" [13]. During the debriefing, the simulated situation is examined in depth. The learners' conscious reflection on their actions allows them to explicitly state their actions and discuss them to clarify the path of the action [12]. It is a thought-provoking activity that encourages the exploration of the learners' thought processes to identify and close gaps [14]. This analysis emphasises the cognitive aspect mobilised during learning. Beyond the individual aspect, debriefing can be defined from the perspective of social practice. It can be considered a space for sharing collective experience around simulated actions [15]. Debriefer-guided conversations are a central element in debriefing, providing an opportunity for all learners to be involved in the learning activity [16]. This pedagogical technique is based on a participatory and active approach that allows learners to identify and correct their mistakes.

Regardless of the theory concerning debriefing, the core of simulation remains optimising clinical learning. The literature has highlighted its contribution to facilitating the transfer of learning into clinical practice and performance development [5].

2.2. Structuring from Debriefing

To optimise the effectiveness of the debriefing and maximise its impact, certain elements must be respected [5, 15, 17]. Studies have emphasised the importance of well-structured debriefing in simulation [18, 19] and suggested structures for organising it. Some authors have proposed a three-phase model of the debriefing process: reaction, analysis and summary [17]. Others have recommended four to seven phases. These models add phases depending on the specificities of the debriefing. The Promoting Excellence And Reflective Learning in Simulation (PEARLS) model extends Rudolph's model with a description phase [20, 21].

Although the phases described by the proposed models may have different names, the three phases remain at the heart of any debriefing process [10]. The initial phase, reaction, allows the protagonists to reveal their feelings towards the simulation experience [20]. This is important because it informs about the relevance of the situation [10] and the degree of involvement of the learners [7]. Similarly, it serves as an introduction to the active analysis of the simulated activity [22].

Secondly, the decontextualisation stage, which some authors call the analysis phase, is the central pivot of debriefing and even learning [10]. The trainer tries to understand the reasons behind each action of the learners. They guide learners' reflections to explore and interpret the reasoning mobilised during the action. Reviewing the events allows one to understand the situation and becoming aware of one's mistakes to structure the learning process. Finally, the recontextualisation or synthesis stage leads to a readjustment of learning and the generalisation of knowledge for possible preparation of transfer to the real practice environment [23].

Notably, each debriefing is unique. Its effectiveness depends on the expertise and skills of the trainers who manage it, along with their ability to harmonise between learners' expectations, pedagogical objectives, and debriefing structures and styles.

2.2.1. Debriefing Method and Strategies

Debriefing is a stage where maximum learning is required, and to be successful, trainers must mobilise several strategies rather than adopting a fixed one [21]. The literature describes a wide range of models on how to guide a debriefing and make it as effective as possible. The task of the trainer is to adapt these strategies according to the learners' needs, the predetermined objectives and the simulated scenarios [5].

Eppich et Cheng [15] organised these strategies into three categories to support trainers. (a) Learner self-assessment: a strategy for involving participants in the evaluation of their performance. This participatory approach promotes and facilitates problem identification. The facilitator usually uses the questions "what happened?" and "what would you do differently?" [12, 17, 21]. (b) Directive feedback: also known as feedback, this consists of the unidirectional top-down transmission of information, commenting and clarifying learning elements, focusing on necessary corrections. (c) Reflective analysis: this takes the form of a discussion to identify a behaviour through an explicit exploration of the learner's thought processes, one of the strategies that promote reflective learning [12, 17, 21].

2.3. Virtual Simulation

With the development of technology, virtual simulation has reached a place of importance in nursing education [24], especially during the COVID-19 pandemic [25]. It provides access to many students and facilitates collective interactions [26]. The exploitation of these different forms of training (including virtual games, computer simulation on screen and virtual patients; VPs) has significantly improved learning outcomes [27]. Among these forms, the VP is a learning modality that takes the form of computerised programs simulating real clinical cases in a virtual environment. Learners can perform clinical examinations, analyse data, make diagnoses and make decisions [28]. The interaction with the models offered allows for repeated experiences [29] and thus the development of clinical reasoning and decision-making skills [3, 29]. This training modality combines several learning dimensions: cognitive, emotional and clinical reasoning [3, 27]. Several empirical studies have supported its effectiveness in nursing learning [30], which has created a significant trend towards the integration of VPs in training curricula [27].

2.4. Debriefing in Virtual Simulation

Virtual simulation has undergone significant expansion, which has multiplied these forms. Investigations in this field have contributed to the extension of the modalities of virtual debriefing [31, 32]. More recent studies have provided some recommendations adapted to these attributes. Usually, debriefing begins right after the implementation of the simulated situation, so in virtual simulation, it can be accomplished the day or week after. In addition, debriefing in virtual simulation can take several forms: in-person debriefing, self-debriefing, and synchronous or asynchronous debriefing [31, 32]. The physical presence of the trainers and protagonists is not mandatory for digital debriefing [33].

Although the standards of debriefing in simulation have been virtually documented [33], teachers' practices in this new perspective remain little explored. Therefore, this study aimed to describe and explore the practices of debriefing a virtual simulation patient case by teachers in the context of the Higher Institute of Nursing and Health Techniques (ISPITS).

3. MATERIALS AND METHODS

3.1. Design

This was a qualitative study with an exploratory and descriptive purpose. Our objective was to describe the debriefing process in a computer simulation. A mixed-methods design was used to meet this objective, incorporating observation and interviews.

3.2. Background and Study Participants

The study was conducted at ISPITS during the year 2022/2023. The participants included three tenured ISPITS teachers who volunteered to participate in this study. The second category of participants was students (n=50). The selection criteria for students were (a) not receiving one of the simulation sessions as part of the teaching module, (b) access to a computer and the internet, and (c) willingness to be registered and participate in the study.

3.3. Context of the Simulation Sessions

3.3.1. Educational Content

The simulation sessions met the objectives of the course: conceptualisation and care planning. This course is composed of two parts: theoretical and simulation. The simulation sessions focussed on digital clinical case studies, with scenarios that focussed on developing learners' abilities to formulate nursing diagnoses.

3.3.2. Simulation Tool

The scenarios were implemented on a digital platform. The sessions created by the trainers allowed for broadcasting one or several simulated situations for a group of students for a determined duration. The choice of this tool was privileged by the different supports it presents for the creation and diffusion of pedagogical paths.

3.3.3. Description of Observed Sessions

The simulated lessons took place in the classroom because the simulation tool is online. Three teachers guided these sessions. Each lasted an average of two and a half hours, divided into four sequences: pre-briefing, briefing, the simulated situation and debriefing. To become more familiar with the platform, the learners were given information on how to use it and its features. The debriefings began right after the end of the simulated online situations.

3.4. Data Collection

In this study, we opted for a qualitative approach combining audio-visual recordings and self-confrontation interviews. The data collection instruments were developed based on the literature on good practice in simulation debriefing [13, 31, 32, 34] and the Debriefing Assessment for Simulation in Healthcare (DASH) [35]. These resources define the recommended competencies for debriefing practitioners and the rules of good conduct for this exercise. The interviews were conducted 48 hours after the recordings.

3.5. Data Analysis

The data from the recordings were transcribed in the form of an organised table and categorised according to the DASH grid [35]. A column was added for the verbalisation data of the individual self-confrontation interviews carried out during the visualisation of the recordings. This approach constitutes a re-situation to describe, explain or complete the information on certain actions, a kind of reflection on the services [36]. Because observation of the activity is not detached from its context, attention was paid to the description of certain elements of the organisation of the session.

3.6. Ethical Considerations

Our research protocol followed certain ethical considerations. The first was approval from ISPITS management for the conduct of the study. Voluntary and informed consent was obtained from each participant beforehand. To ensure the confidentiality and anonymity of participants, teachers were assigned an identification code. Similarly, we informed the participants that they retained the right to withdraw from the study at any time without justification and that any instruments they used in the study would be destroyed immediately.

4. RESULTS

We intended to explore trainers' activities during debriefing in a computer simulation. A total of three debriefing sessions were observed, each for first-year undergraduate nursing students. The speakers who guided the debriefing were teachers with experience in the practices of the simulation learning process. After a briefing and a virtual situation, the learners were invited to form a debriefing group. For optimal analysis, the collected data were grouped into categories. This categorisation followed the process described in the DASH, with two items added relating to organisational learning management.

4.1. Organisational Management of Debriefing

4.1.1. Group Layout

In the computer simulation experiment, the layout of the learners was U-shaped with the trainer in the centre, whereas in the debriefing, the trainers chose a circle layout. According to one interviewee, "This arrangement allows a total vision of the learners, and it facilitates interaction with the group..." (video 1, interviewee 1). Similarly, another teacher said, "This arrangement changes the framework of the classic course and puts us back into the framework of simulation" (video 2, interviewee 2). This organisation of space favours the dynamic management of the group.

4.1.2. Debriefing Time Management

The average time taken for the two debriefings was a substantial 45 minutes. For one recording sequence, the debriefing time was short due to a technical problem (an internet outage during the simulated situation).

4.2. Learning Climate

Most teachers established a positive climate for conducting the debriefing. The description of the simulation tool was widely developed. One of the teachers justified this attention: "Working on a platform in class is not the same as on a dummy or something else, you have to emphasise certain technical elements for better management of the group and to be able to finish the tasks at the same time..." (video 3, interviewee 3). Similarly, another said, "We have to make sure to facilitate the exploration of the platform in order to manage the session well... even if it takes up our time but it makes our job easier afterwards" (video 1, interviewee 1). The learning objectives were understood by all the teachers and presented in the scenarios of the clinical situation. Confidentiality and contract fiction aspects were not raised.

4.3. Structure of the Debriefing

All teachers underwent structured debriefing. The model identified was the basic debriefing model consisting of three steps: feeling, analysis and synthesis. (a) Feeling phase: During this first stage of the debriefing, the teachers intended to focus on the learners' emotional behaviour. A roundtable discussion was conducted to describe the learners' emotions. All the participants declared positive emotions, except for some frustrations related to technical constraints. One interviewee emphasised, "This feeling phase was more positive due to the fact that the learners worked simultaneously and there was no observer" (video 3, interviewee 3). However, the transition to the analysis phase was rapid for some trainers, who did not provide the debriefing objectives. Motivation was emphasised during some of the sequences: "This is a first for you... you really surprised me... I congratulate you for your results" (video 2, interviewee 2). (b) Analysis phase: This consisted of reviewing the activities carried out and exploring the process behind them. Several elements were identified during this stage. The first was interactions. The collective report of the simulated situation was analysed step by step, from the beginning of the scenario, going through the elements that composed it. This allowed for raising the key elements of the situation. In this phase, rich interaction was raised. (c) Synthesis: This step was short for one trainer because of time constraints. The other teachers completed the debriefings with a group summary of the session.

4.4. Engagement in the Exchange and Performance Analysis

The nature of the simulated situation and the tool used defined the nature of the interactions well. The dynamics of the group interactions were the strength of these debriefings because the learners were all protagonists and contributed to the discussion. They were invited to reflect on their operations. In terms of the nature of the situation, cognitive skills were dominant, with an emphasis on clinical reasoning. To this end, the teachers guided the exchanges by stimulating the learners' thinking. An interviewee said, "Learners must justify the choice of each answer to formulate nursing diagnoses in accordance with the data collected from the interviews." In addition, the transmissive mode of interaction was very present for one teacher, who took the floor at times to recall the theoretical framework and explain it without involving the learners.

4.5. Identification of Strengths and Areas for Improvement

The point of evaluating the performance gaps emerges from these results. This aspect was identified at the beginning of the debriefing by the motivation and description of the results obtained from the experiment. In addition, the performance evaluation was guided and instrumented. At the end of the simulation, the learners should complete an online quiz, the results of which are compared with a correction sheet predefined on the platform, a way to self-evaluate. A significant point of the digital simulation was that the learners kept track of their learning. A teacher proceeded to correct the quizzes in the group; she commented on this sequence: "The correction in group is richer, it triggers discussions, and it is reassuring for us to know if all the objectives are reached" (video 1, interviewee 1).

5. DISCUSSION

Debriefing is a fundamental element of the simulation-based learning process [31]. In our study, we tried to explore and describe the practical aspect of this activity by trainers during digital simulation.

Based on our results, debriefings are conducted in the classroom in groups and guided by the trainers. The approach used by the majority of trainers was facilitated group debriefing. The other options for debriefing reported in the literature on virtual simulation include synchronous, asynchronous and self-debriefing virtual debriefing options [31, 32]. However, this trainer-led face-to-face option has been called for in several studies [17, 31]. The standards committee of the International Nursing Association for Clinical Simulation and Learning emphasises the importance of the trainer's presence to facilitate interactions and guide debriefing [34]. Nevertheless, debriefing in virtual simulation has exploited technological innovations and offers various ways to facilitate it, which encourages trainers to engage much more with this richness.

The simulation environment plays an important role in the

success of a scenario and the promotion of learning [34, 36, 37]. In this study, the virtual environment allowed the implementation of the simulated situation and allowed the learners to work independently in the same situation. However, the debriefing time allowed the learners to connect through dynamic group interaction. These exchanges were guided by the trainers in stimulating the learners' reflection on the process and results of the simulated experience, a valuable asset to make the situation more constructive. These practices have been supported by the latest recommendations of some scientific committees [32, 38].

The results of this study also showed that the trainers' approach to debriefing was similar to the triphasic model: feeling, analysis and synthesis [39]. The literature includes numerous models for structuring debriefing [17] that vary from triphasic [39, 40] to multiphasic [17]. The right choice relies on the ability of trainers to align these methods with the objectives of the activity and the needs of the learners [4,5].

The results of the study show that digital debriefing is a complex task articulating several dimensions: organisational, strategic, psychological, professional and even social. These match the recommendations of the Communities of Inquiry conceptual framework described by [41] on debriefing in a virtual simulation. The guidelines emphasise three dimensions: social presence, teaching presence and cognitive presence. This prompts a commitment from trainers to orchestrate all of these elements.

CONCLUSION

This study highlighted the place of digital simulation debriefing in nursing learning. It identified a plethora of key elements in the conduct of digital debriefing: the place of organisational debriefing management, the guidance of debriefing activities, dynamic group management, assessment tools developed and facilitated by technology, and active learner participation. Some of these attributes meet the standards of scholarly committees perfectly, whereas others require more commitment from trainers and broadening of the field of investigation in this area.

LIST OF ABBREVIATIONS

PEARLS = Promoting Excellence And Reflective Learning in Simulation

ISPITS = Institute of Nursing and Health Techniques

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Our research protocol followed certain ethical considerations. The first was approval from ISPITS management for the conduct of the study.

HUMAN AND ANIMAL RIGHTS

No animals were used in this research. All procedures performed in studies involving human participants were in accordance with the ethical standards of institutional and/or research committee and with the 1975 Declaration of Helsinki, as revised in 2013.

CONSENT FOR PUBLICATION

Voluntary and informed consent was obtained from each participant beforehand.

STANDARDS OF REPORTING

CORREQ guidelines were followed.

AVAILABILITY OF DATA AND MATERIALS

The data support the findings of this study are available from the corresponding author [F.Z.B], on special request.

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None.

CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

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REFERENCES

[1] Lee U, Choi H, Jeon Y. Nursing students' experiences with computer simulation-based communication education. Int J Environ Res Public Health 2021; 18(6): 3108. [http://dx.doi.org/10.3390/ijerph18063108] [PMID: 33803034]

[2] Consorti F, Mancuso R, Nocioni M, Piccolo A. Efficacy of virtual patients in medical education: A meta-analysis of randomized studies. Comput Educ 2012; 59(3): 1001-8. [http://dx.doi.org/10.1016/j.compedu.2012.04.017]

[3] Bateman J, Allen M, Samani D, Kidd J, Davies D. Virtual patient design: exploring what works and why. A grounded theory study. Med Educ 2013; 47(6): 595-606. [http://dx.doi.org/10.1111/medu.12151] [PMID: 23662877]

[4] INACSL. SimulationSM Debriefing. Clin Simul Nurs 2016; 12: S21-5. [http://dx.doi.org/10.1016/j.ecns.2016.09.008]

[5] Decker S, Alinier G, Crawford SB, Gordon RM, Jenkins D, Wilson C. Healthcare simulation standards of best practicetm the debriefing process. Clin Simul Nurs 2021; 58: 27-32. [http://dx.doi.org/10.1016/j.ecns.2021.08.011]

[6] Neill MA, Wotton K. High-fidelity simulation debriefing in nursing education: a literature review. Clin Simul Nurs 2011; 7(5): e161-8. [http://dx.doi.org/10.1016/j.ecns.2011.02.001]

[7] Bastiani B, Calmettes B, Minville V, Marhar F. Supporting the professionalization of trainers in medical simulation. Edu didactics 2017; 11: 63-79. [http://dx.doi.org/10.4000/educationdidactique.2659]

[8] Morrisson JE, Méliza LL. 1999.https://apps.dtic.mil/sti/citations/ADA368651

[9] Darling M, Parry C, Moore J. Learning in the thick of it. Harv Bus Rev 2005; 83(7): 84-92, 192. [PMID: 16028819]

[10] Fanning RM, Gaba DM. The role of debriefing in simulation-based learning. Simul Healthc 2007; 2(2): 115-25. [http://dx.doi.org/10.1097/SIH.0b013e3180315539] [PMID: 19088616]

[11] Tannenbaum SI, Cerasoli CP. Do team and individual debriefs enhance performance? A meta-analysis. Hum Factors 2013; 55(1): 231-45. [http://dx.doi.org/10.1177/0018720812448394] [PMID: 23516804]

[12] Secheresse T, Mampe-Armstrong H, Usseglio P, Jorioz C, Bonnet-Gonnet JF, Dumas J. Le débriefing postsimulation en santé. Que nous apprend-il et comment? Reanimation 2016; 25(S2): 100-6. [http://dx.doi.org/10.1007/s13546-015-1154-3]

[13] HAS. Health Simulation 2012.https://www.has-sante.fr/jcms/c_930641/fr/simulation-en-sante

[14] Durand C, Secheresse T, Leconte M. Interest of the DASH grid for the

evaluation of the quality of debriefings: study during a simulation program around the resuscitation of the newborn in the delivery room. Arch Pediatr 2017; 24(12): 1197-204. [http://dx.doi.org/10.1016/j.arcped.2017.09.017] [PMID: 29174008]

[15] Kolbe M, Grande B, Spahn DR. Briefing and debriefing during simulation-based training and beyond: Content, structure, attitude and setting. Baillieres Best Pract Res Clin Anaesthesiol 2015; 29(1): 87-96. [http://dx.doi.org/10.1016/j.bpa.2015.01.002] [PMID: 25902470]

[16] Dieckmann P, Molin Friis S, Lippert A, Østergaard D. The art and science of debriefing in simulation: Ideal and practice. Med Teach 2009; 31(7): e287-94. [http://dx.doi.org/10.1080/01421590902866218] [PMID: 19811136]

[17] Sawyer T, Eppich W, Brett-Fleegler M, Grant V, Cheng A. More than one way to debrief. Simul Healthc 2016; 11(3): 209-17. [http://dx.doi.org/10.1097/SIH.0000000000000148] [PMID: 27254527]

[18] Seelandt JC, Grande B, Kriech S, Kolbe M. DE-CODE: a coding scheme for assessing debriefing interactions. BMJ Simul Technol Enhanc Learn 2018; 4(2): 51-8. [http://dx.doi.org/10.1136/bmjstel-2017-000233] [PMID: 35515884]

[19] Tierney S. The utilisation of a structured debriefing framework within the pre-hospital environment: a service evaluation. British Paramedic Journal 2018; 3(1): 8-15. [http://dx.doi.org/10.29045/14784726.2018.06.3.1.8] [PMID: 33328800]

[20] Rudolph JW, Simon R, Raemer DB, Eppich WJ. Debriefing as formative assessment: closing performance gaps in medical education. Acad Emerg Med 2008; 15(11): 1010-6. [http://dx.doi.org/10.1111/j.1553-2712.2008.00248.x] [PMID: 18945231]

[21] Eppich W, Cheng A. Promoting Excellence and Reflective Learning in Simulation (PEARLS): development and rationale for a blended approach to health care simulation debriefing. Simul Healthc 2015; 10(2): 106-15. [http://dx.doi.org/10.1097/SIH.0000000000000072] [PMID: 25710312]

[22] Lederman LC. Debriefing: Toward a systematic assessment of theory and practice. Simul Gaming 1992; 23(2): 145-60. [http://dx.doi.org/10.1177/1046878192232003]

[23] Galland J, Jaffrelot M, Sanges S, *et al.* Introduction to debriefing for internists: how to transform real or simulated clinical situations into learningmoments. J Inter Med 2020; 41(8): 536-44. [http://dx.doi.org/10.1016/j.revmed.2020.03.003] [PMID: 32359818]

[24] Cant R, Ryan C, Kardong-Edgren S. Virtual simulation studies in nursing education: A bibliometric analysis of the top 100 cited studies, 2021. Nurse Educ Today 2022; 114: 105385. [http://dx.doi.org/10.1016/j.nedt.2022.105385] [PMID: 35569265]

[25] Saab MM, McCarthy M, O'Mahony B, Cooke E, Hegarty J, Murphy D, *et al.* Virtual reality simulation in nursing and midwifery education: A usability study. CIN Comput Inform Nurs 2023; 10: 1097.

[26] Cendan J, Lok B. The use of virtual patients in medical school curricula. Adv Physiol Educ 2012; 36(1): 48-53. [http://dx.doi.org/10.1152/advan.00054.2011] [PMID: 22383412]

[27] Dafli E, Fountoukidis I, Hatzisevastou-Loukidou C, Bamidis PD. Curricular integration of virtual patients: a unifying perspective of medical teachers and students 2019.https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6842463/ [http://dx.doi.org/10.1186/s12909-019-1849-7]

[28] Kononowicz AA, Zary N, Edelbring S, Corral J, Hege I. Virtual patients - what are we talking about? A framework to classify the meanings of the term in healthcare education. BMC Med Educ 2015; 15(1): 11. [http://dx.doi.org/10.1186/s12909-015-0296-3] [PMID: 25638167]

[29] Georg C, Zary N. Web-based virtual patients in nursing education: development and validation of theory-anchored design and activity models. J Med Internet Res 2014; 16(4): e105. [http://dx.doi.org/10.2196/jmir.2556] [PMID: 24727709]

[30] Foronda CL, Fernandez-Burgos M, Nadeau C, Kelley CN, Henry MN. Virtual simulation in nursing education: A systematic review spanning 1996 to 2018. Simul Healthc 2020; 15(1): 46-54. [http://dx.doi.org/10.1097/SIH.0000000000000411] [PMID: 32028447]

[31] Verkuyl M, Atack L, McCulloch T, *et al.* Comparison of debriefing methods after a virtual simulation: an experiment. Clin Simul Nurs 2018; 19: 1-7. [http://dx.doi.org/10.1016/j.ecns.2018.03.002]

[32] Verkuyl M, Taplay K, Atack L, *et al.* Virtual Simulation Toolkit for Teachers In: Centennial College 2022.

[33] Verkuyl M, Lapum JL, Hughes M, *et al.* Virtual gaming simulation: exploring self-debriefing, virtual debriefing, and in-person debriefing. Clin Simul Nurs 2018; 20: 7-14. [http://dx.doi.org/10.1016/j.ecns.2018.04.006]

[34] Decker S, Fey M, Sideras S, *et al.* Standards of best practice: simulation standard vi: the debriefing process. Clin Simul Nurs 2013; 9(6): S26-9. [http://dx.doi.org/10.1016/j.ecns.2013.04.008]

[35] Simon R, Raemer D, Rudolph J. https://harvardmedsim.org/debriefing-assessment-for-simulation-in-healthcare-dash/2012.

[36] Theureau J. Self-confrontation and re-examination interviews using material traces and the "course of action" research program. Open Edi J 2010; 2010: 2-4.

[37] Krogh K, Bearman M, Nestel D. "Thinking on your feet"—a qualitative study of debriefing practice. Adv Simul 2016; 1(1): 12. [http://dx.doi.org/10.1186/s41077-016-0011-4] [PMID: 29449981]

[38] Goldsworthy S, Verkuyl M. Facilitated virtual synchronous debriefing: a practical approach. Clin Simul Nurs 2021; 59: 81-4. [http://dx.doi.org/10.1016/j.ecns.2021.06.002]

[39] Rudolph JW, Simon R, Dufresne RL, Raemer DB. There's no such thing as "nonjudgmental" debriefing: a theory and method for debriefing with good judgment. Simul Healthc 2006; 1(1): 49-55. [http://dx.doi.org/10.1097/01266021-200600110-00006] [PMID: 19088574]

[40] Zigmont JJ, Kappus LJ, Sudikoff SN. The 3D model of debriefing: defusing, discovering, and deepening. Semin Perinatol 2011; 35(2): 52-8. [http://dx.doi.org/10.1053/j.semperi.2011.01.003] [PMID: 21440811]

[41] Cheng A, Kolbe M, Grant V, *et al.* A practical guide to virtual debriefings: communities of inquiry perspective. Adv Simul (Lond) 2020; 5(1): 18. [http://dx.doi.org/10.1186/s41077-020-00141-1] [PMID: 32817805]