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Instructional Video of a Standardized Interprofessional Postsimulation Facilitator-guided Debriefing of a Fatality in Plastic Surgery

Konstantinos Gasteratos, MD, MSc*
James Michalopoulos, BA†
Marven Nona, BEng‡
Antonios Morsi-Yeroyiannis, MD§
Jeremy Goverman, MD, FACS¶
Hinne Rakhorst, MD, PhD‖
René R. W. J. van der Hulst, MD, PhD**

Background: Postsimulation facilitator-guided debriefing (PSFGD) is the process of intentional discussion of thoughts, actions, and events that took place during simulation amongst the facilitator(s) and trainees. Despite the significance of delivering high-quality debriefings, there is a lack of evidence-based guidelines. Our study aimed to provide an instructional video demonstration of a PSFGD of a fatality.
Methods: Fifty surgical interns participated in a burn simulation scenario in two groups. Group 1 (control, or "no exposure," n = 25) consisted of residents who received oral postsimulation debriefing from an independent faculty member who had no exposure to our instructional video on how to debrief effectively. Group 2 (intervention, or "exposure," n = 25) consisted of interns who were debriefed by the second faculty member who did watch our instructional video before the simulation and learned about "advocacy and inquiry" techniques. The outcome measures were the Debriefing Assessment for Simulation in Healthcare score and the postdebrief multiple-choice question (MCQ) quiz scores to assess debriefers' performance and interns' knowledge consolidation, respectively.
Results: The "exposure" group presented statistically significantly higher values for the Debriefing Assessment for Simulation in Healthcare score ($P < 0.001$) and MCQ score ($P < 0.001$) compared with the "no exposure" group.
Conclusions: Debriefers who followed the methodology as demonstrated in our instructional video were considered more competent, and the residents achieved higher MCQ scores. The quality of the debriefing ensures improved critical thinking and problem-solving skills. Safer practice and better patient outcomes are achieved by developing debriefing programs for educators. *(Plast Reconstr Surg Glob Open 2024; 12:e5583; doi: 10.1097/GOX.0000000000005583; Published online 7 February 2024.)*

INTRODUCTION

Simulation-based education (SBE) is pivotal in the contemporary medical curriculum. compared with self- or within-event debriefing, postsimulation facilitator-guided debriefing (PSFGD), or "terminal debriefing," is the process of intentional discussion of thoughts, actions, and events that took place during simulation amongst the facilitator(s) and trainees. Healthcare debriefing stems from the military and aviation fields, which have in common team building, crisis resource management, and high-risk situations.[1] Contrary to feedback, which is a unidirectional conveyance of information from the facilitator to the trainees, debriefing is a multidirectional exchange of ideas, viewpoints, thought processes, and intriguing discussions about the events that occurred during the simulation. Debriefing is the cornerstone of experiential learning, knowledge consolidation, reflection, and professional growth through a structured conversation with the

*Formerly of Feinstein Institutes for Medical Research, Manhasset, N.Y.; †Aristotle University of Thessaloniki School of Medicine, Greece; ‡Ryerson University, Toronto, Canada; §Department of General Surgery, Hippokrateio General Hospital of Thessaloniki, Thessaloniki, Greece; ¶Summer M. Redstone Burn Center, Department of Surgery, Massachusetts General Hospital, Boston, Mass.; ‖Department of Plastic Surgery, MST Enschede, ZGT Almelo, the Netherlands; and **Department of Plastic Surgery, Maastricht University Medical Center+, Maastricht, the Netherlands.

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participants.[2] The core characteristics of a debriefing are timing, conversation facilitation, structure, and the essential elements (eg, key learning objectives, educational strategies, psychological safety, shared mental model). As per Gibb's structured debriefing, there are six elements: description of events and feelings, evaluation of experience, analysis, conclusion, and personal action plans.[3] An effective PSFGD allows participants to express their ideas and explore new avenues to improve their clinical practice.

The Debriefing Assessment for Simulation in Healthcare (DASH) score is a rating scale evaluating instructor behaviors during debriefing. The DASH score highlights the pillars of effective provision of healthcare simulation debriefing: engaging learning environment, organized structure, fruitful discussions, identification of performance gaps, and maintenance of competence.[4] The "advocacy and inquiry" method is one of the most popular.[5] Through authentic interest, support, and questioning, the facilitator helps trainees identify and alter unhelpful cognitive frames and actions, thus achieving better patient outcomes.

"Debriefing of the debriefing" is an emerging concept that aims to develop highly skilled debriefers.[6] Facilitators should be prepared to handle difficult debriefings, such as a lack of self-regulation of the participant (quiet, disengaged, dominant, emotional, or defensive), or an unsuccessful simulation leading to patient death. For example, some effective strategies to resolve difficult debriefings may include validation, normalization, generalization, paraphrasing, broadening, and previewing.[7] Despite the significance of the quality of the debriefings, educators currently have little guidance on which are the most effective techniques for debriefing in SBE and how to apply them. There is a lack of strong evidence-based practice in debriefing in simulation settings.[8,9] Novice debriefers mention a lack of resources, mentorship, and formal training.[10]

Our study aims to bridge this gap by providing an instructional video demonstration of a PSFGD of a fatality. The goal is primarily to evaluate the quality of debriefings with the DASH scores, and secondarily to assess residents' knowledge consolidation with the multiple-choice question (MCQ) quiz.

Takeaways

Question: Does the "advocacy and inquiry" method of debriefing in burn simulation make the debriefers and residents more competent?

Findings: The group of debriefers who used the "advocacy and inquiry" methodology as explained in our instructional video demonstration were perceived as more competent by the residents based on the Debriefing Assessment for Simulation in Healthcare scores. Also, these residents achieved higher postdebriefing multiple choice question assessment scores.

Meaning: Following a structured approach to the debriefing ensures improved debriefers' competence and residents' critical thinking and problem-solving skills in simulation.

MATERIALS AND METHODS

Study Design

Following institutional review board approval, 50 interns (first-year residents in plastic surgery, cardiothoracic, orthopedic surgery, neurosurgery, and emergency medicine) were recruited voluntarily. They provided their consent for confidential video recording of their performance for the purposes of our study. Nobody was excluded from the study. Based on a list of random numbers created by the SPSS program, students were randomly assigned to two groups. Group 1 (control, or "no exposure," n = 25) consisted of residents who received oral debriefing from an independent faculty member who had no exposure to our instructional video on how to debrief effectively. Group 2 (intervention, or "exposure," n = 25) consisted of residents who were debriefed by the second independent faculty member who did watch our instructional video only once before the simulation. There were five teams of residents for each study group. Each team consisted of five residents, one from each specialty. The interns had similar previous experiences with SBE.

The outcome measures were the DASH and the postdebrief MCQ quiz scores to assess debriefers' performance and residents' knowledge consolidation, respectively. The MCQ assessment consisted of five brief scenarios relevant to the simulation. The score ranged from 0 to 5 (Fig. 1). Each simulation case lasted 20 to 25 minutes followed immediately by a 30-minute debriefing session. Residents and facilitator sat around a conference table located in the debriefing room outside the simulation suite.

High-fidelity Simulation Scenario

A 45-year-old African American man caught fire in his apartment and jumped off the third floor to escape; he was brought to the emergency room (ER) by the paramedics. The predefined learning objectives included accurate assessment, early diagnosis, and urgent management of the following injuries/ conditions:

1. Inhalation burns: inspiratory stridor
2. Circumferential deep burns to the chest: extensive flame burns (approximately 30% total body surface area, TBSA)
3. Shock
4. Unconsciousness
5. Left chest ecchymoses
6. Left open tibial fracture

Despite the initiation of management of his injuries, the patient had a cardiac arrest in the emergency room. Attempts to resuscitate him proved futile.

We followed the Jeffries simulation model, a well-known simulation framework developed in 2005, which identifies that effective simulation will have the following design features: objectives, fidelity, complexity, cues, and debriefing.[11] To achieve a high-fidelity medical simulation

Which is a criterion for referral to a burns unit?

a. Superficial burns
b. Perineal burns
c. Paediatric burns with appropriately qualified staff
d. Superficial chest burns of 2% TBSA

A patient with TBSA 35% burns to the face, trunk and limbs needs initially:

a. Urgent anaesthetic review
b. Intubation
c. Two large bore cannulas in the antecubital fossae
d. Fluid resuscitation

A 35 year-old previously fit and well male patient sustains extensive flame burns to chest and abdomen and established inhalation burns. The estimated TBSA is 40%. The flame process started at 04:00 and the patient arrives in your A&E at 08:00. You will administer

a. 2.1 litres of Normal saline over 2 hours
b. 8.4 litres over 6 hours
c. 4.8 litres of warm Hartman's over 5 hours
d. The patient does not need fluid resuscitation as previously fit and well

Weight 60 kg

Reconstructive ladder in order of increasing complexity

a. 1-direct closure with dressing, 2-free flap, 3- local flap, 4- skin graft
b. 1-free flap, 2-direct closure, 3-skin graft, 4-local flap, 5- dressing
c. 1- skin graft and dressing, 2-direct closure, 3-tissue expander, 4-free flap
d. 1-dressing, 2-direct closure, 3-skin graft, 4-local flap, 5-free flap

A 55 year old patient (75 kg) sustains TBSA 10% circumferential burns to his chest and is in respiratory distress by the time he arrives in A&E. This patient needs:

a. Urgent fasciotomies
b. An urgent chest x-ray
c. Fluid resuscitation with warmed Hartmann's solution
d. Chest escharotomies

Estimate the TBSA on the following patient:

a. 4.5%
b. 9%
c. 2.25%
d. Unable to comment

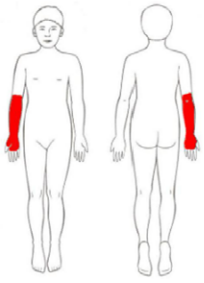

Fig. 1. Scenarios relevant to the simulation in the MCQ assessment test.

of burns and traumatic injuries, a human-like mannequin was used (Fig. 2).

Description of an Instructional Debriefing Video Demonstration

Due to serious omissions and medical errors from the team pertaining to crisis resource management skills (asking for help, effective communication, leadership, role designation, task delegation) and knowledge deficiencies, a fatality occurs that warrants further in-depth discussion and debriefing amongst the healthcare professionals and the debriefer.

The debriefing follows the advocacy and inquiry model.[5,12] The facilitator helps the trainees understand their cognitive frames which lead physicians to clinical actions with specific patient outcomes. This technique

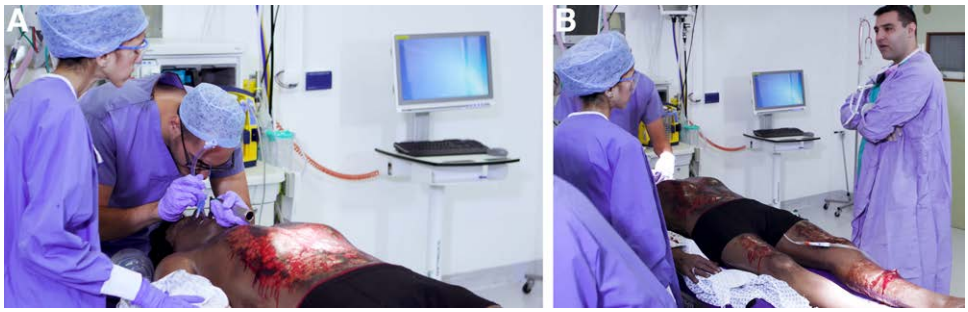

Fig. 2. High-fidelity simulated injuries. A, Deep burns to the chest. B, Open left tibial fracture.

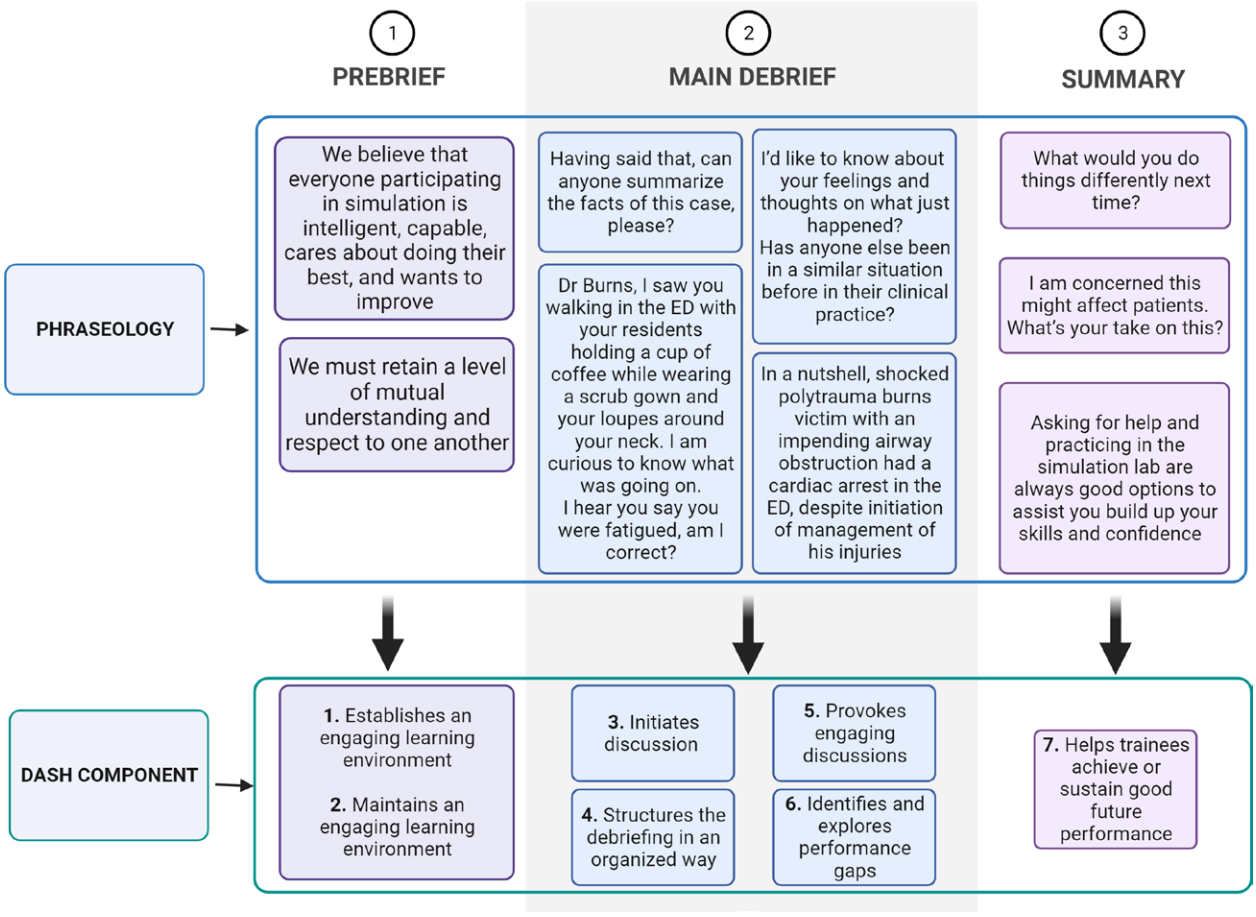

Fig. 3. Diagrammatic illustration of the Debriefing Assessment for Simulation in Healthcare (DASH) components and the specific debriefing phraseology.

requires that the participants are eager to share their experiences and be transparent. A structured approach to the debriefing is used in our instructional video. The different categories of the DASH components along with the specific phraseology and reflective questioning[13] used are illustrated in Figure 3.

The debriefer sets ground rules and then addresses deficient knowledge and skills, safety issues (fatigue, distress), miscommunications, and unprofessionalism. [**See Video 1 (online),** which displays prebrief: setting ground rules and developing an engaging learning environment.] [**See Video 2 (online),** which displays the incorrect ABCDE assessment.]

The debriefer educates on personal protective equipment and standardized protocols for cardiac arrest algorithms and TBSA estimation, ensuring that a summary of learning points is given at the end of the debriefing. [**See Video 3 (online),** which displays the open discussion and systematic analysis of medical errors leading to death.] [**See Video 4 (online),** which displays establishing mutual understanding of cardiac arrest algorithm.] [**See Video 5 (online),** which displays the discussion on differential

diagnosis and fluid resuscitation requirements.] [**See Video 6 (online),** which displays the summary and action plan for future change.]

Specifically, the inefficiencies are lack of reliable recent observations, staff unavailability (anesthetist, orthopedics), inability to intubate by the resident leading to cricothyroidotomy, faulty or unprepared equipment, and administration of the wrong dosage of epinephrine. A detailed root cause analysis is depicted in Figure 4.

Statistical Analysis

Data were expressed as mean ± SD or median (IQR) for quantitative variables. The Shapiro-Wilk test was used for normality analysis of the parameters. The comparison of variables between the two groups was performed using the independent samples *t* test and Mann-Whitney test. All tests are two-sided, and statistical significance was set at a *P* value less than 0.05. All analyses were carried out using the statistical package SPSS vr 21.00 (IBM Corporation, Somers, N.Y.).

RESULTS

The exposure group presented statistically significantly higher values for DASH score ($P < 0.001$) and MCQ score ($P < 0.001$) compared with the no exposure group following both parametric and nonparametric analysis (Fig. 5 and Table 1).

DISCUSSION

Elements of Effective Debriefings

Debriefing should be a standardized procedure that follows the guidance set by the International Nursing Association for Clinical Simulation and Learning and meets the Healthcare Simulation Standards of Best Practice.[14] Two opposing theories exist regarding the debriefer's stance; one suggests that the debriefers should position themselves as co-learners, whereas the other one suggests the debriefers should be experts.

It is widely accepted that a positive faculty attitude, patience, and open communication are keys to successful debriefings.[15] The general principle of debriefing is "make it safe, make it stick, and make it last."[16] The debriefer's behavior during the session is paramount to achieve a shift to higher levels of cognition based on the uPEA model; the debriefer identifies unawareness (u) of issues and problems (P) (eg, knowledge deficiency, core skill incompetency, miscommunication), and proceeds to explanation (E) and provision of alternative strategies/solutions (A).[17] This technique was utilized widely in our debriefing

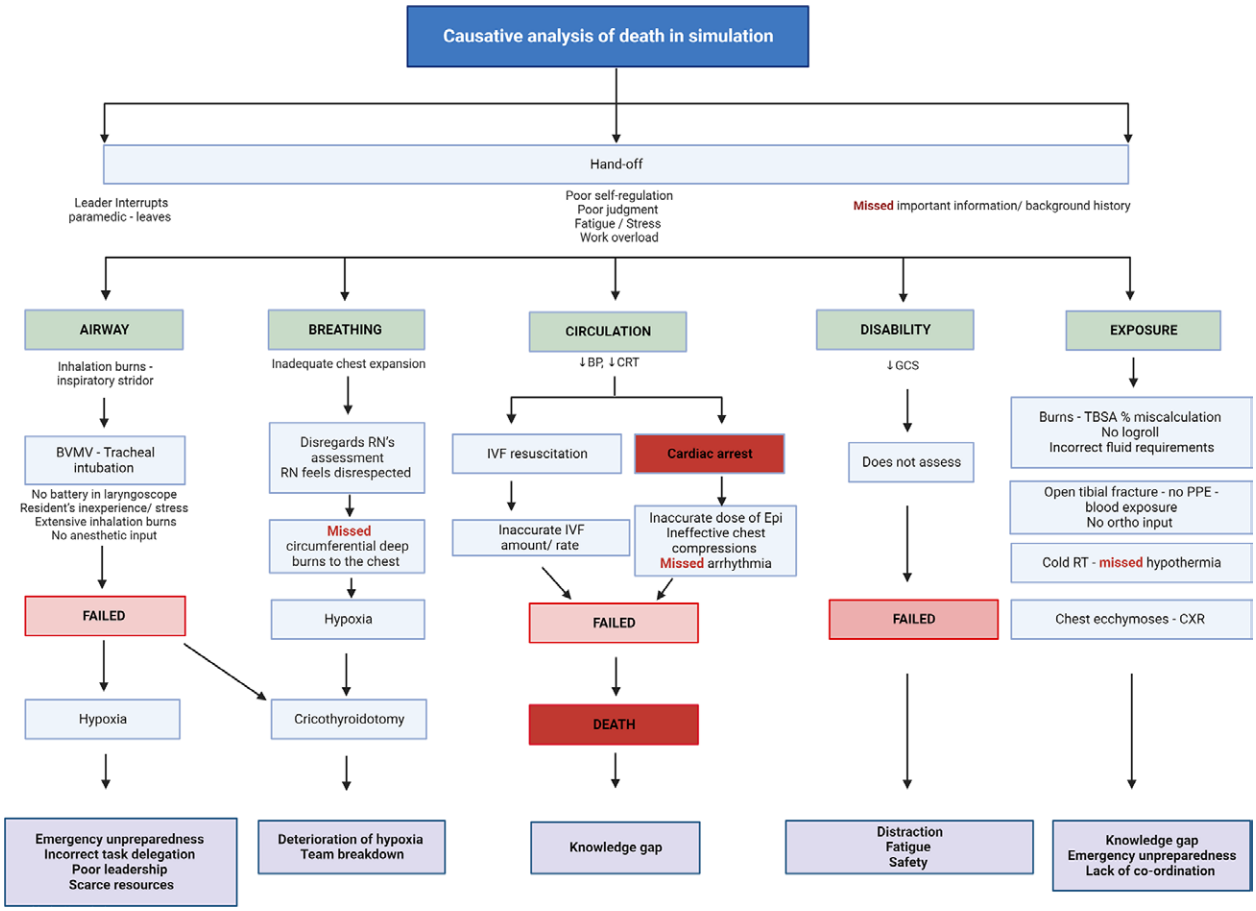

Fig. 4. A detailed root cause analysis of the death in simulation.

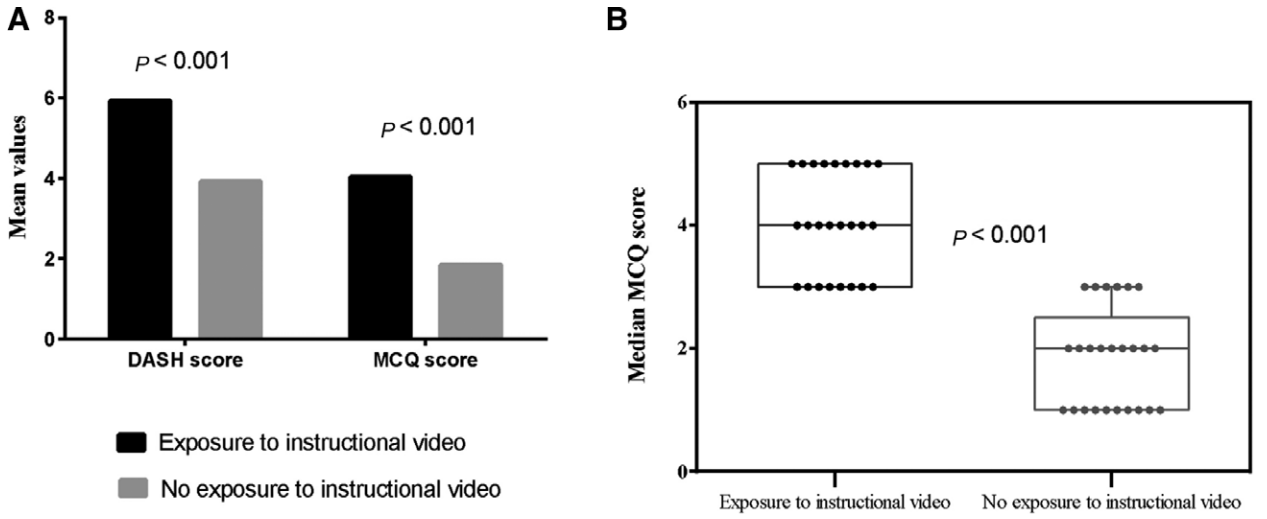

Fig. 5. Results of the statistical analysis based on the DASH (A) and MCQ scores (B).

Table 1. Analysis of DASH and MCQ Score between Groups

		Exposure to Instructional Video	No Exposure to Instructional Video	Dif (95% CI)	*P*
Type of Analysis	**Variables**	**Mean± SD**	**Mean± SD**		
Parametric	DASH score	5.93±0.42	3.93±0.25	2.0 (1.8–2.2)	<0.001
	MCQ score	4.04±0.84	1.84±0.80	2.2 (1.7–27)	<0.001
		median (IQR)	median (IQR)		
Nonparametric	DASH score	6.00 (0.58)	3.83 (0.34)	2.0 (1.8–2.3)	<0.001
	MCQ score	4.00 (2.00)	2.00 (1.50)	2.0 (2.0–3.0)	<0.001

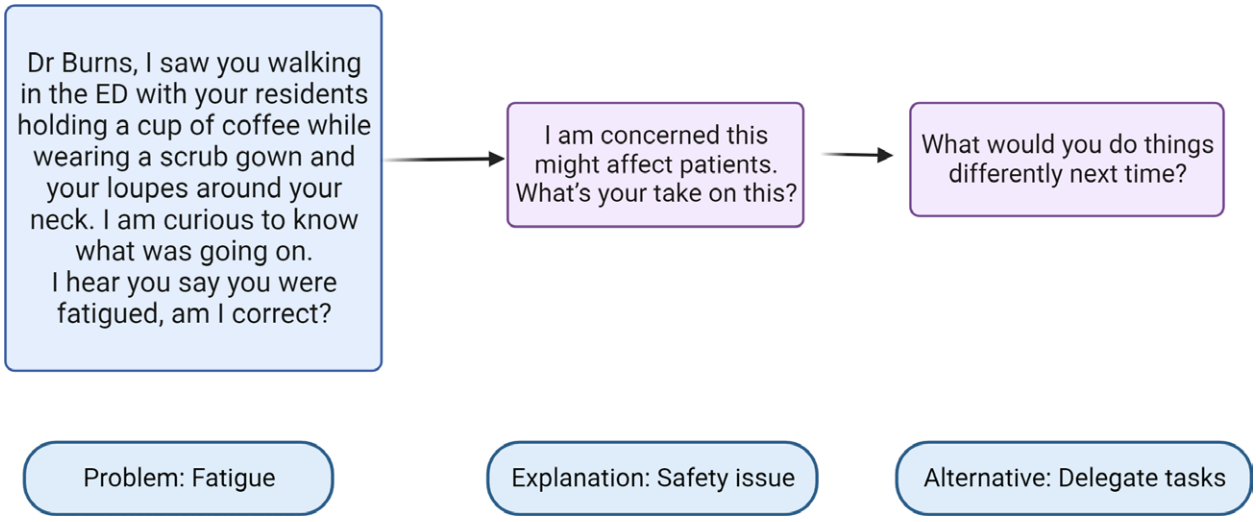

Fig. 6. Example of the uPEA model.

video. An example of this technique is shown in Figure 6. Establishing an environment of psychological safety, drawing on multiple perspectives, conducting debriefing as a reflective conversation, and use of specific facilitation techniques were identified as being critical to learning during debriefing.[15]

In surgical education, an effective debrief consists of positive reinforcement and audiovisual cognitive aids.[18] Using advocacy and inquiry, open-ended questions, paraphrasing, and asking specific questions were proven positive facilitator traits.[19] Reflective practice during and after PSFGD is an integral part of the experiential learning process. The authors highly value the three-phase "advocacy and inquiry" method because of its simplicity, ease of application, and evidence-based data available. There are three types of debriefing: critical incident

stress debriefing,[1] process debriefing, and experimental. All three types have enabled the development of debriefing in the education area. For instance, educational debriefing occurs after an "experiential activity, such as simulation or game,"[20] encourages reflection and involves facilitators helping learners to effectively process their experiences.

The debriefers should choose the segments of videos wisely for further discussion within the group to avoid cognitive fatigue, thereby enhancing surgical training and performance. Surgical Sabermetrics is the advanced analytics of surgical and audiovisual data that aims to provide objective, real-time, digital-based feedback.[21–23]

Debriefing improves students' technical and nontechnical skills, such as raising situational awareness, performing psychomotor skills, cardiopulmonary resuscitation, task management, and teamwork.[24]

Debriefing Models

All debriefings should have at least three key phases: reaction (emotional impact), analysis of events, and application/summary. The GAS method (gather, analyze, summarize) and 3D model (defusing, discovering, deepening) are examples of this three-phase approach. Virtual reality medical simulation allows parties from different locations to engage in learning scenarios, record debriefings, and repeat them as needed to train the trainers. Regardless of the technique, the methodology should encompass an engaging and safe learning environment where performance gaps are identified and new cognitive frames are formed to sustain future clinical outcomes.

Amongst others, the Promoting Excellence and Reflective Learning in Simulation is a four-phase model that provides an additional stage of the description of the events to better accommodate the next phases of the debrief. This extra step allows a shared mental model to be established amongst the participants.[25] For time-limited sessions, the SHARP model is applicable to set learning objectives, address concerns, review learning points, and plan ahead.[26,27] Debriefing for Meaningful Learning is another six-phase method (engage, explain, explore, elaborate, evaluate, and extend) that uses Socratic questioning to challenge assumptions, and promote clinical thinking. By encouraging students to complete worksheets, Debriefing for Meaningful Learning enhances the reflective process.[28,29] because there is no one best method of debriefing in simulation, educators may combine different techniques based on the situation at hand, their preferences, and experience.

Having established how crucial debriefing is in optimizing reflective learning and maximizing the impact of SBE, it is important to train competent and effective educators. Facilitation is a goal-orientated dynamic process, in which participants work together in an atmosphere of genuine mutual respect, to learn through critical reflection. The facilitators will help trainees and clinicians understand their internal processes in decision-making, change their cognitive frameworks, and achieve strong team dynamics and improved patient outcomes.

Measurements of Debriefing Quality: DASH, Feedback Assessment for Clinical Education, Debriefing Experience Scale, Objective Structured Assessment of Debriefing (OSAD) Scores

It has been shown that well-designed, hands-on SBE followed by debriefing accelerate skills acquisition to drastically bridge the gap from theory to practice. Developing a specific set of skills for debriefers as delineated in the DASH score has been instrumental in improving SBE and patient outcomes. The DASH score can be utilized as a self-assessment or peer-to-peer feedback tool, or even as a guide for formal trainer/ instructor development programs.[14,30] The Feedback Assessment for Clinical Education is the DASH's "sibling" instrument to assess feedback conversations in the clinical context.[31] It is the preference of the first author to use the DASH score, as he completed the 5-day instructor training course at the Center for Medical Simulation (Cambridge, Mass.).[30]

The Debriefing Experience Scale has four components: analysis of thoughts and feelings, learning and making connections, facilitator skill, and guidance. This validated scale allows trainees to evaluate their experience during the debriefing.[32] OSAD is another tool that has been used in the context of surgical simulation debriefings.[33] Both DASH and OSAD have similar components and psychometric properties. These instruments help programs stratify their educators as "novice" (low DASH score) or "expert" (high DASH score).

Reflection as a Pre-requisite for Effective Debriefings

For reflection to occur amongst the trainees, the debriefer/ teacher must reflect too. The three levels are: (1) an initial level focused on teaching functions, actions, or skills, generally considering teaching episodes as isolated events; (2) a more advanced level considering the theory and rationale for current practice; and (3) a higher order where teachers examine the ethical, social, and political consequences of their teaching. The term reflective practice incorporates all these levels.

At the level of pedagogical reflection, teachers reflect on educational goals, the theories underlying approaches, and the connections between theoretical principles and practice. Teachers engaging in pedagogical reflection strive to understand the theoretical basis for classroom practice and to foster consistency between espoused theory (what they say they do and believe) and theory-in-use (what they actually do in the classroom). At the level of critical reflection, teachers reflect on the moral and ethical implications and consequences of their classroom practices on students. Critical reflection involves an examination of both personal and professional belief systems. Hence, self-reflection is an embedded dimension of critical reflection.

Self-reflection focuses on examining how one's beliefs and values, expectations and assumptions, family imprinting, and cultural conditioning impact students and their learning. Self-reflection entails a deep examination of values and beliefs, embodied in the assumptions teachers make and the expectations they have for students.[34]

Strengths

To the best of our knowledge, our work on simulation debriefing for burns and polytrauma is amongst the few in plastic surgery literature. Our study is in accordance with others, corroborating that residents were more satisfied with trained versus untrained debriefers,[15] and significantly improved their skills.[35] The results of our study coincide with other studies that suggest debriefing by a trained instructor maximizes SBE success and performance.[36,37]

Our video involves difficult discussions, such as death and poor communication, which are not a common theme in the literature. When death is utilized as the learning outcome for simulation, it can provide useful teaching and experience. The experience of unexpected death in a controlled situation with experienced facilitators would therefore give students the opportunity to discuss and reflect before they encounter this scenario in clinical practice.[38] Our video may be useful as an introduction to "hot" debriefings for cases of in-hospital cardiac arrests[39] and critical incident stress events,[40] to prepare medical students for their future role as doctors,[38] as well as in complex cases in plastic surgery, and/or combined ones with other specialties requiring coordination. Participants felt the code simulations in which a patient died were beneficial to their learning.[41] Debriefing has the potential to positively affect the psychological outcomes of healthcare providers who experience patient death.[42] Significant cardiopulmonary resuscitation quality deficits exist among healthcare providers. Cardiopulmonary resuscitation feedback and debriefing may serve as a powerful tool to improve rescuer training and care for cardiac arrest patients.[43]

Additionally, our video describes occasions where the paramedic's hand-off was interrupted, and the registered nurse felt disrespected by the team. It is a fact that poor collegial relations can cause communication breakdown, staff attrition, and difficulties attracting new staff.[44] The debriefer addresses these issues seriously with the participants. When it comes to reflecting on the complex decisions and behaviors of professionals, confrontation of ego, professional identity, judgment, emotion, and culture, there will be no substitute for skilled human beings facilitating an in-depth conversation with their equally human peers.[45]

Our instructional video may be used as a stand-alone modality for teaching facilitators debriefing technique as well as for providing trainees with valuable guidance. Indeed, research shows that computer-based multimedia instruction is an effective method of teaching nontechnical skills in simulated crisis scenarios and may be as effective as personalized oral debriefing. Multimedia may be a valuable adjunct to centers when debriefing expertise is not available.[46]

Limitations and Future Research

For the purposes of creating a video demonstration, we did not address the psychological implications of death in simulation extensively. However, hospitals and residency programs should have systems in place to address the potential psychological effects of critical incidents.

Understanding the barriers to the implementation of behavioral changes to achieve better debriefing skills is an integral part of any facilitator development curriculum. These obstacles are system-based (eg, work overload, inconsistently changing environment, finances, equipment), and human-based (eg, hierarchy, interdisciplinary communication).[47] Periodic external evaluation of debriefing quality is recommended because debriefers tend to perceive the quality of debriefing far more favorably than external evaluators.[48]

Future research should focus on the correlation between the quality of debriefing and clinical performance as well as what type of debriefing is most effective.[30] Efforts are made to delineate the factors that impact debriefing quality, such as debriefing training programs, duration, and structure.[49] Video-facilitated simulation debriefing has the potential to increase desired clinical behaviors in students in a simulated environment. Further research is needed to determine whether these advantages will transfer to actual practice.[25,50] We aimed to increase fidelity by incorporating an in situ component in future simulations.

CONCLUSIONS

Debriefers who followed the advocacy and inquiry method as demonstrated in our instructional video were considered more competent compared with those who did not. Additionally, the residents achieved higher MCQ scores. The quality of the debriefing ensures improved critical thinking, clinical reasoning and skills, and problem-solving. Safer practice and better patient outcomes are achieved by developing debriefing programs and courses for educators.

René R. W. J. van der Hulst, MD, PhD
Department of Plastic Surgery
Maastricht University Medical Center+
P. Debyelaan 25, 6229 HX Maastricht
The Netherlands
E-mail: r.vander.hulst@mumc.nl

DISCLOSURE

The authors have no financial interest to declare in relation to the content of this article.

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