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Development of a Model for Video-Assisted Postoperative Team Debriefing

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ABSTRACT

Background: Video-assisted debriefing may be a powerful tool to improve surgical team performance. Nevertheless, a true operating team debriefing culture is lacking to date. This study aimed to find evidence on how to debrief the surgical team and develop a model suitable for debriefing using a video and medical data recorder (MDR) in the operating room (OR).

Methods: A review of the PubMed and Embase databases and Cochrane Library was performed. The identified literature was studied and combined with a conceptual framework to develop a model for postoperative video-assisted team debriefing. Thirty-five surgical cases were recorded with an MDR and debriefed with the operating team using the proposed debrief model and a standardized video-assisted performance report. A questionnaire was used to assess the participants' satisfaction with this debrief model.

Results: Debrief models and methods are extensively described in the current medical literature. An overview was provided. The OR team needs a structured debrief model, minimizing resource, effort, and motivational constraints. A structured six-step team debrief model suitable for video-assisted OR team debriefing was developed. The model was tested in 35 multidisciplinary MDR-assisted debriefing sessions and the debriefing sessions were overall rated with a mean of 7.8 (standard deviation 1.4, 10-point Likert scale) by participants.

Conclusions: Debriefing surgical teams using a video and MDR in the OR requires a model on how to use such recordings optimally. To date, no such model existed. The proposed debrief model was tested using a multisource MDR and may be used to facilitate OR debriefing across various settings.

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Introduction

Postoperative team debriefing has shown to be powerful in improving both technical and nontechnical skills such as communication, teamwork, and situational awareness.[1-4] Nevertheless, a true operating team debriefing culture is lacking to date.[2,5] Various reasons, such as fear for punitive measurements, a lack of time, or logistics are often mentioned.

Historically, debriefing originated in the military. It was designed to retrieve all the information from a soldier or pilot after a mission and also to return to regular duties as soon as possible.[6,7] Debriefing, the concept of reflection on an event or activity and subsequent analysis, has proven to be valuable in assessing the individual for personal and team benefits.[8-10]

The terms debriefing and feedback are often used interchangeably in the literature, but there are important distinctions to be made between the two.[11] Feedback may be defined as information about performance provided to participants with the intent to modify thinking and behavior to facilitate learning.[12] Feedback is thus viewed as a one-way conveyance of information to the learner. Debriefing may be identified as a facilitated reflective conversation between facilitator and learner, among learners themselves, or a combination thereof.[12]

Video and medical data recorders (MDRs), more popularly referred to as Black Box, in the operating room (OR) may act as a tool instrumental to team debriefing. Such systems may become a powerful element in quality improvement initiatives.[3,4] The importance of operating team debriefing, augmented with or without video recordings or other data sources, has been emphasized in the current medical literature.[3,13,14] Yet, there is no consensus to date on how to optimally structure the process of team debriefing with the use of these systems.

This study aimed to (1) find evidence on how to structure debriefing for operating teams with the use of video recordings optimally, and (2) develop a standardized debrief model for multidisciplinary debriefing with multisource data from surgical cases recorded with video and MDR.

Methods

This educational study aimed to develop a new model for postoperative video-assisted team debriefing. The problem with the currently available debrief models was identified by a literature search. The local needs were assessed.[15-17] The constructed debrief model is consequently based on evidence-based best practices derived from the literature review, combined with local needs, experiences, and observations.[15] This is outlined in a flowchart (Fig. 1).

Setting

The OR Black Box, a video and MDR, was implemented in one OR at our tertiary referral university medical center to use it as a data-driven quality improvement initiative for multidisciplinary debriefing.[18,19] In this pilot study, 35 laparoscopic abdominal cases were recorded, analyzed, and debriefed with the entire OR team. As the patient was not the main subject of this quality improvement study, institutional review board approval was not required. However, this study was formally approved by the Hospital Directorate and Works Council (staff representation). To ensure the privacy of all participants, the research protocol was checked to be compliant with applicable privacy, legal, and regulatory requirements by conducting an official Privacy Impact Assessment.[20] The study subjects were voluntarily asked to give their formal written informed consent before participation.[19,21] The OR Black Box obtained all intraoperative data feeds, including audiovisual recordings in the OR, and depersonified patient physiological data.[22] The data feed combined views of the surgical field, nursing station, laparoscopic camera, and anesthesia station, including the anesthesia patient-monitoring device. Recording began just after the patient was being put to sleep and ended after skin closure, just before the drapes were removed. The multisource data recorded by the OR Black Box are automatically analyzed with the help of artificial intelligence (AI) and machine learning software.[23] The data, multisource and synchronized on capture, were used to generate the standardized OR Black Box performance report that included video segments of all identified safety threats and resilience support events, coded according to the validated Systems Engineering Initiative for Patient Safety model.[24] The video segments included qualitative descriptions of the event. An example of the original standardized performance report is demonstrated elsewhere.[19] The developed debrief model was used to help lead the video-assisted Black Box team debriefings. The results of the pilot study concerning the satisfaction of the team with the use of the OR Black Box for team debriefing and what was actually discussed during the team debriefings are presented in another study.[19,24]

Literature search and outcomes

First, problems with the currently reported debrief methods were identified by a literature review. A comprehensive search for the peer-reviewed medical literature regarding debriefing for medical teams and in other industries with and without the use of video and medical data recording in a clinical setting was performed and updated on July 17, 2019. The PubMed and Embase database and Cochrane Library were used with the following search terms: debrief, operating room, team, surgical, nurse, trauma, aviation, military, feedback, and training. The exact details of the literature search can be found in the Appendix.

Articles reviewed revealed a broad range of methods, including descriptive or narrative reviews, systematic reviews, and qualitative and quantitative studies using both experimental and semiexperimental methods. Therefore, no attempt was made to validly grade the levels of evidence or perform a statistical analysis.[25] Instead, we hand searched the references of the articles reaching full text review. This was done to identify any articles possibly missed in the initial search and to transparently assess all possible relevant materials to provide a comprehensive overview of debriefing elements, tools, and models in the current medical literature.

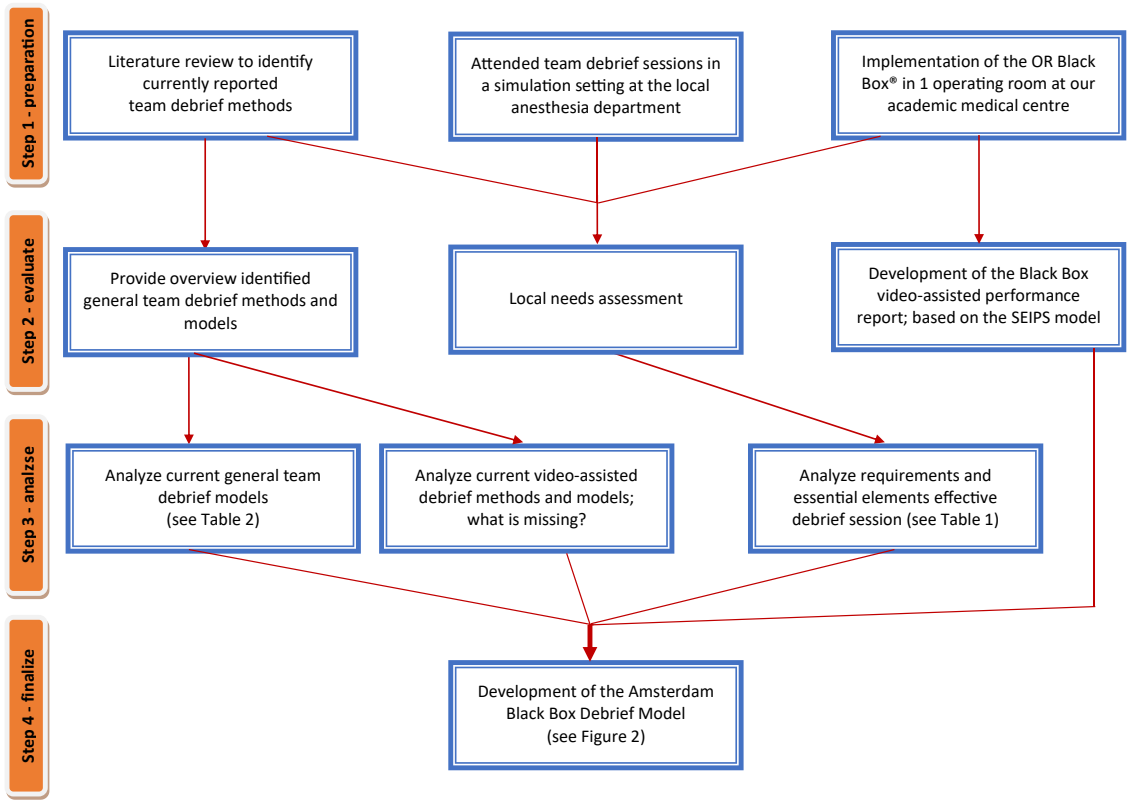

Fig. 1 – Flowchart illustrating the development process of the Amsterdam Black Box debrief model. SEIPS, Systems Engineering Initiative for Patient Safety. (Color version of figure is available online.)

Second, the theories of Thomas *et al.*[16] and Ericsson[17] were combined to build a conceptual framework, which was used to define what a debrief model should include.[15] The authors combined relevant findings from literature, experience with team debriefing in simulation settings, and implementation of the OR Black Box and its performance

Table 1 – Overview of the essential elements of team debriefing.

	References
Engaging learning environment	
Quiet room on "neutral ground" (outside the operating room)	Carlier *et al.*,[32] Dieckmann *et al.*,[46] Akaike *et al.*,[47] Moerkamp[48]
Everybody sitting in a circle and on eye level	Fanning and Gaba,[11] Anderson[8]
Clear learning objectives	Jaye *et al.*,[49] Friedman *et al.*[50]
Correct conditions	
Safety regarding privacy (confidentiality agreement)	Dieckmann *et al.*,[46] Moerkamp[48]
Everybody is treated equally	Dieckmann *et al.*,[46] Moerkamp,[48] Ahmed *et al.*[51]
Structured and organized debriefing sessions	Adler *et al.*,[7] Bredmose *et al.*,[52] Ahmed *et al.*,[53] Amin *et al.*,[54] Bonrath *et al.*,[55] Dedy *et al.* [56]
Effective feedback	
Focus on the good, not the bad	Cooperrider and Whitney,[41] Benammar,[42] Moerkamp,[48] Buxton *et al.*,[57] Dedy *et al.*[56]
Purposeful and specific content	Alexander *et al.*,[58] Hattie and Timperley,[38] van Bommel and Stegen,[39] de Moor Centrum,[59] Abella,[60] Kessler *et al.*,[10] Ahmed *et al.*,[51] Abdool *et al.*[61]
Low level of involvement by an independent "debriefer"	Fanning and Gaba,[11] Boet *et al.*,[14,62] Butteris *et al.*,[41]

Table 2 – Overview of the most often described debrief models.

Phases	Debriefing models		
3 Steps	Plus delta model 1. What went well? 2. What would we like to change? 3. How to change?	GAS model 1. Gather 2 Analyze 3. Summarize	DIAMOND model 1. Description 2. Analysis 3. Application
4 Steps	Experiential learning cycle of Kolb 1. Concrete experience 2. Reflective observation 3. Abstract conceptualizing 4. Active experimentation	Advocacy-inquiry model 1. Observe 2. Comment (advocate) 3. Explore (inquiry) 1. Discover (mutual learning)	Patrenek's 4 Es 1. Event 2. Emotion 3. Empathy 4. Explanation
5 Steps	Hewson's feedback model 1. Orientation and climate 2. Elicitation 3. Diagnosis and feedback 4. Application 5. Review	SHARP model 1. Set objective 2. How did it go? 3. Address concerns 4. Review learning points 5. Plan ahead	Team STEPPs 1. Team and leader assembly 2. Discussion of postoperative plan 3. What went well? 4. What needs improvement? 5. Communicate check-back
6 Steps	EE-CHATS 1. Emotion 2. Experience counts 3. Higher order thinking 4. Accentuate the positive 5. Time 6. Structure	Thiagarajan's six phases 1. How do you feel? 2. What happened? 3. What did you learn? 4. How does this relate to the real world? 5. What if? 6 What next?	

TeamSTEPPS = team strategies and tools to enhance performance and patient safety; SHARP = 5-step feedback tool for surgery.

report to develop a novel model to be used for video-assisted team debriefing.

Finally, the proposed *Amsterdam Black Box debrief model* was tested in 35 multidisciplinary debriefing sessions with the use of the OR Black Box performance report. After every debriefing, the participating team members were asked to fill out a questionnaire to evaluate their satisfaction with the use of the OR Black Box, the performance report, and the debriefing session in general. The results regarding the team's satisfaction with the OR Black Box are presented in another study.[19] Descriptive data, including means (standard deviation [SD]), of the questionnaire answers related to the debriefing sessions itself, are presented in this study to provide more information on the validation of the debrief model.

Results

Evaluation of the debrief methods described in the current literature

The literature search yielded 176 citations from the PubMed database, 173 from the Cochrane Library, and seven from the Embase database. After removing the duplicates ($n = 12$), 354 citations remained. A total of 106 abstracts were excluded with the main reason being irrelevant to the search. Full text screening of 248 articles was performed and of those 134 were excluded with the main reason of not describing the specific debriefing method ($n = 129$). After screening the full text of the remaining articles, 114 were included in this study, of which 30 studies described the *Critical Incident Stress Debriefing* method, mainly used for patients with a posttraumatic stress disorder. Furthermore, about 15 studies described the *advocacy-inquiryandgood-judgment* method, six studies used *experiential learning cycle of Kolb*, and four studies described the *GAS (Gather-Analyze-Summarize) model*. For the complete flowchart of the literature search see the Appendix.

The identified debriefing methods were described across different health care settings, such as after resuscitation or other critical incidents (e.g., posttraumatic stress), on site ("hot debriefing"; e.g., during the operative *sign out*), or later after the event or actions ("cold debriefing"). Additional methods such as video-assisted debriefings (VADs), guidance of an instructor, an individual leader or within-team leader, and use of a checklist (e.g., crew resource management checklist or objective structured assessment of debriefing) were described as well.[1,26-34] Yet, most studies (129 of 134 excluded full text articles) neither described nor followed a structured debriefing approach.

Evaluation of the requirements for postoperative video-assisted team debriefing

The OR team needs a structured debrief model, minimizing resource, effort, and motivational constraints.[15-17] Lederman[35] has identified structural elements of effective debriefing, which include the facilitator, or referred to as "debriefer" and the participants, the experience, the impact of the experience, recollection of the experience, mechanisms for reporting on the experience, and time to process. The essential elements of an effective debriefing session were described as follows: creating the correct conditions, timing, the appropriate environment, the amount of involvement of the debriefer, and the debriefing tools. He has stated that creating the correct conditions is, in fact, the key to a successful team debriefing.

Health care teams are often characterized by powerful status- and role-based hierarchies. Leadership coming from hierarchy and role might be fact of life, sometimes even

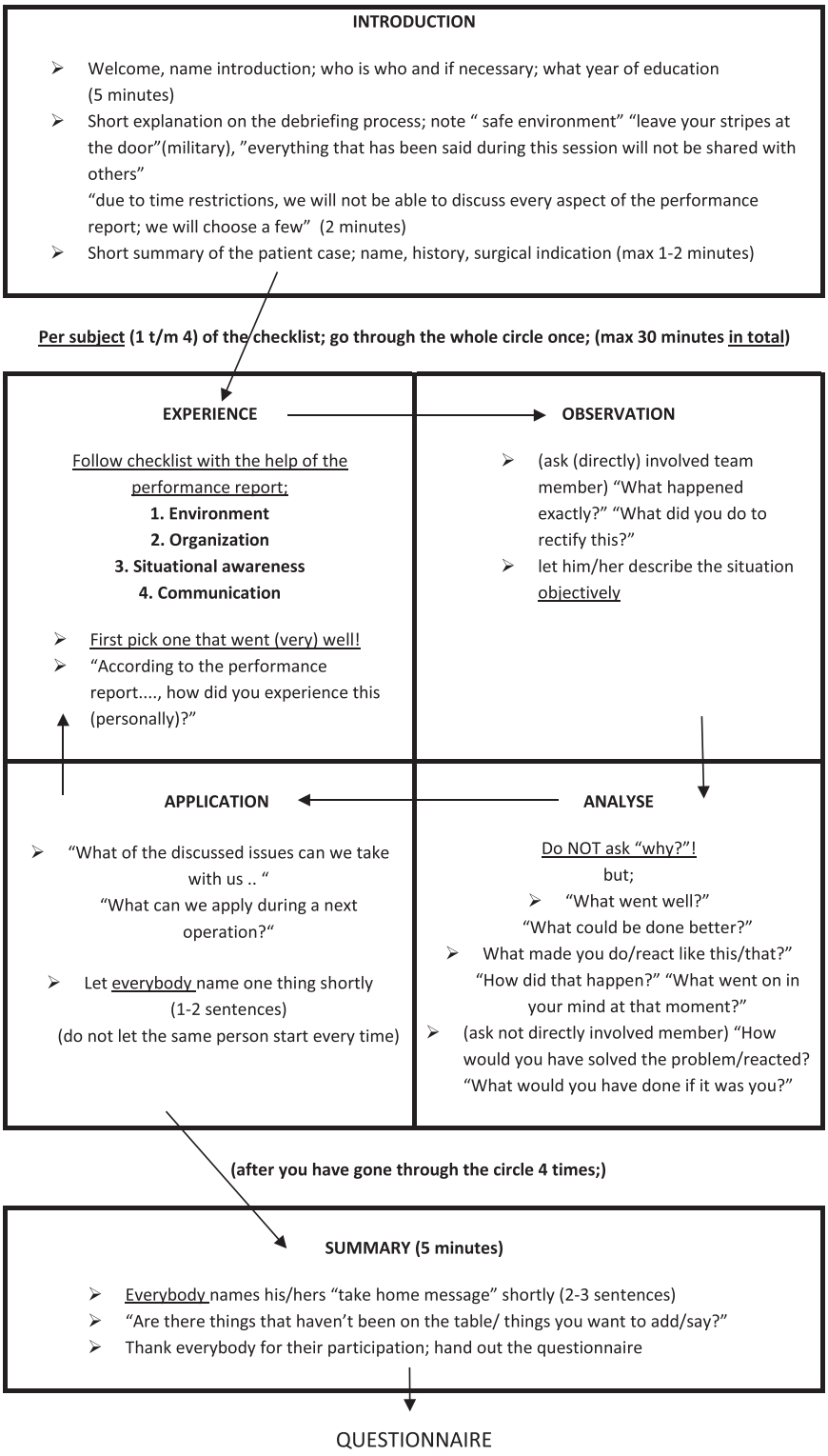

Fig. 2 – The Amsterdam Black Box debrief model.

considered to be a requirement for teams to function value in practicing health care optimally. However, it is important to realize that hierarchy and status may also affect group dynamics negatively in subsequent debriefing.[2,36]

When reflecting on actions, it may be important that participants share the feeling of being safe and respected in their individual roles and privacy. This may help participants to open up and speak their mind freely.[21,37] An

independent moderator to lead team debriefing may be key, safeguarding aforementioned conditions.

When it comes to providing effective feedback, it has been emphasized in the literature that it ought to be purposeful, solution-oriented, and specific.[10,38-40] Cooperrider and Whitney[41] and Benammar[42] describe this as the *appreciative inquiry method*, in which they highlighted the importance of "focusing on the good, not on the bad." The advocacy-inquiry method emphasizes the importance of "debriefing with good judgment." Accordingly, the debriefer provides the feedback as neutral as possible to maintain a trusting relationship with the team.[43] Subsequently, ineffective feedback has been marked by evocative questions, giving hints, judgment, finishing other people's sentences, and giving examples of your own experiences.[38]

The Harvard Center for Medical Simulation developed a tool to assist in evaluating the debriefing: Debriefing Assessment for Simulation in Healthcare. Accordingly, the debriefer creates a positive and safe learning environment, establishes structured and organized debriefings, provokes engaging discussions and encourages reflective practice by all the team members. He or she motivates the team to close the gap between the goals and what to do to attain them in the future.[44,45]

The summarized identified essential elements to be used for Diec *et al.*,[46] , Moerkamp[82], Ahmed *et al.*,[89] structured Adler *et al.*, Bonteam debriefing are presented in Fanning and Gaba,[11] Boet *et al.*[100] , Butteris *et al.*,[41] Table 1.

Evaluation of described structured models for team debriefing in the current literature

Several debrief models have been identified from the literature search. It has been emphasized that adults learn best when they are actively engaged in the process. Also, when they participate, play a role, and experience not only concrete events in a cognitive fashion but also transactional events in an emotional fashion.[11] This type of learning was best described by Kolb as "experiential learning": learning by doing, thinking about it, and assimilation of lessons learned into everyday behavior.[63] Consequently, most of the reported debrief models are adapted from the experiential learning cycle of Kolb, which describes four phases on how to use an experience as a source of learning and development.[63] In this model, it is stated that you first have the concrete experience that results in a reaction and feelings. Second, reflective observation follows, which means objectively describing and discussing what really happened. Third, all the team members analyze and discuss what they believe happened during the event. This is to clarify possible differences in perceptions and to gain insights into why their perceptions might differ. Finally, the team discusses what can be done to improve and how to do it better in the future.[64]

Mitchell and Everly[28] have summarized their view on critical incident stress management and debriefing in a seven-phase model. This model was described in many instances (30 of 114 included studies). It is to be used after a critical incident and accentuates on the psychological aspects of experiencing the particular traumatic event. Hence this model was considered not to be fit to use for (video-assisted) debriefing of operating teams.

The American Heart Association developed the quite similar *Structured and* Supported *Debriefing GAS* model, which stands for gather, analyze, and summarize.[65] The gather phase focuses on the perspectives of the team members, in the analyze phase the team examines the actions ("what went well, what did not?"), and in the summarize phase the team focuses on what should be done differently in the future.

Table 2 presents a complete overview of the identified debrief models.

Evaluation of the described methods for video-assisted team debriefing in the current literature

Studies describing methods to debrief with the use of video recording were sparse. The use of a video or MDR in the OR facilitates in audiovisual and data capture that may be used for VAD.[3,18] An MDR in the OR is, however, still quite a new technological innovation, especially when used for video-assisted structured team debriefing of actual surgical procedures.[19,66] Yet, VAD is an increasingly used component of debriefing in simulation and resuscitation settings and might be a solution for providing objective perceptions of time, space, and use of equipment.[5,67-69]

Previous research has shown that there was a sense that VAD also had benefits of removing the debriefer from the position of the critic who told the learners how to improve. By showing the team a video (''a picture paints thousand words"), the debriefer may present the team an objective view of the situation. This may help the moderator in taking the role of facilitator instead of feedback provider.[5] Furthermore, participants may feel that video presents a more unbiased way of conveying feedback than from the participant's memory.[5]

The value of video to debrief important skills such as communication, teamwork, and situational awareness has been highlighted as well.[5,70] However, the problem is that the team may first need a method to analyze the complete video recordings objectively. Otherwise, valuable time is lost "searching" for relevant feedback moments to discuss during debriefing.[55,71,72]

Several models have been developed to objectively assess the nontechnical skills of the team. The Nontechnical Skills for Surgeons (NOTSS), Scrub Practitioners' List of Intraoperative Nontechnical Skills (SPLINTS), and Anesthesia Nontechnical Skills rating systems have been proven to be effective tools that may be used to rate the nontechnical skills of the operating team when assessing the video recordings.[73-75] The Systems Engineering Initiative for Patient Safety model provides a framework for understanding the structures, processes, and outcomes of the work system in health care and patient safety. It combines the human factor with the system aspects, such as environment (e.g., distraction in the OR) and organization (e.g., schedules, safety culture, or coordination), all influencing team performance.[76]

It is also important to realize that it may neither be realistic nor useful to look back on entire video recording of the surgical case. Both the team and debriefer could be overloaded with a multitude of not very informative data. Debriefing may not be one-way conveyance of information, but rather an

active multiway discussion. The benefit of using a video or MDR is that aggregated and condensed information may be obtained, resulting from actual use. Hence, an output report containing summarized video clips of positive and negative events deemed relevant, rated with the use of validated and objective nontechnical rating scales such as the NOTSS, SPLINTS, and Anesthesia Nontechnical Skills, may be of much help structuring the team debriefing.[77,78]

Development of the Amsterdam Black Box debrief model

According to the flowchart in Figure 1, a structured debrief model that may be used for postoperative video-assisted team debriefing was developed. In Figure 2, this proposed debrief model, named the Amsterdam Black Box debrief model is presented.

The debrief model consists of six steps: (1) introduction, (2) experience, (3) observation, (4) analyze, (5) application, and (6) summarize. This model is presented in Figure 2. An independent debriefer facilitates the debriefing session using the model (i.e., neither the surgeon nor the anesthesiologist). During the short *introduction* (welcome address and thanking the team members), the purpose of the debriefing is stated, the expectations of the participants are set, and it is emphasized that the debriefing session takes place in a safe environment. This means that everything that will be discussed remains confidential, according to the general privacy regulations.[21,79] If possible, first let the team watch the summarized video clip, as part of the *experience* step. The debriefer may then ask them to write down any notes or comments. The debriefer may let the team pick an event demonstrated in the video clip (if possible, with the performance report feedback), according to the predefined important debriefing human factor topics: communication, situational awareness, organization, or environment. If needed, the *observation* step may provide the team the opportunity to add any objective details on the shown event in the video clip (e.g., "what happened exactly?" "what did you do as a respond to the event?"). Next, the debriefer makes start with something positive by asking the team "what went well?" The *analyze* step is furthermore used to ask the team members questions such as "what could have done better?" "What made you act or react like this?" "What would you have done in this situation?" The debriefer is encouraged to not ask any questions starting with "why," because the team members may then feel criticized.[80] During the *application* step, the team may focus on how to apply or perform the discussed issue in the future. After this, the team returns to the *experience* step, in which the team chooses another event shown in the performance report video clip. This circle of steps may be completed about 2-3 times, depending on the time. Last but not least, the debriefer may ask team members to shortly name the "take home message." After this, there may be time for the team to say things that have not been on the table yet, things they wish to add to the discussion. The team is again thanked for their participation and an evaluation questionnaire may be handed out.

Experience with the Amsterdam Black Box debrief model

In total, 35 surgical cases were recorded and analyzed with the OR Black Box and debriefed with the use of the Amsterdam Black Box debrief model. The baseline characteristics of the participating team members were presented by our study group.[19] Some 151 questionnaires were completed. Ideal length of a team debriefing session was stated as 30 min (median, interquartile range 52.5). Overall, the debriefings were rated with a mean of 7.8 (SD 1.4, 10-point Likert scale). The question "How well was this debriefing organized?" was answered with a mean of 8.1 (SD 1.4). The debriefings were considered to be useful (mean 8.1, SD 1.5, 10-point Likert scale) and educational (mean 8.2, SD 1.4, 10-point Likert scale). Finally, the team members felt that their time on attending the debriefings was well spent (mean 8.2, SD 1.3, 10-point Likert scale).

Discussion

A wide range of approaches to team debriefing is available in the current medical literature. Health care professionals of all kinds may arrive to the OR with various sets of experiences, ingrained personality traits, and established relationship patterns. All of them may benefit from team debriefing considerably, but most of them do not yet have sufficient of any experience in structured debriefing.[9,11,43,81]

Although the term simulation was excluded from the search, debriefing techniques were most often reported in the context of simulation training only, not reflecting true clinical workflow. Yet, debriefing may be considered an even more powerful learning experience for the OR team when it takes place following the real clinical setting, such as after surgical procedures.[82,83]

The use of a standardized debrief model for multidisciplinary debriefing has been recommended.[69,84] Using video recordings during the debriefings were also recommended, as they can provide objective feedback and may help teams develop a shared mental model about the situation.[3,85] However, peer-reviewed articles on how to actually debrief with the use of a video and MDR and especially on how to optimally translate it into surgical and clinical practice appear to be lacking. No debrief model suitable for postoperative video-assisted team debriefing was found in the current medical literature. Therefore, the identified approaches, elements, and methods on how to debrief the OR team with the use of a video or MDR were summarized in the structured Amsterdam Black Box debrief model. The participants who experienced the use of this debrief model believed the Black Box debrief sessions were useful and educational, and believed that their time was well spent.

Recommendations

A good team debriefing session is characterized by the establishment of a safe environment, facilitating an open, honest, and positive discussion focusing on an objective view of the situation.[86] Honest participation means that the participants can safely ask themselves and each other "what went well, what could be better, and what should we do differently next time?" The debriefer is only present to guide if needed, by asking open questions, summarizing, and by letting the team members do most of the talking.[87] In that way, all

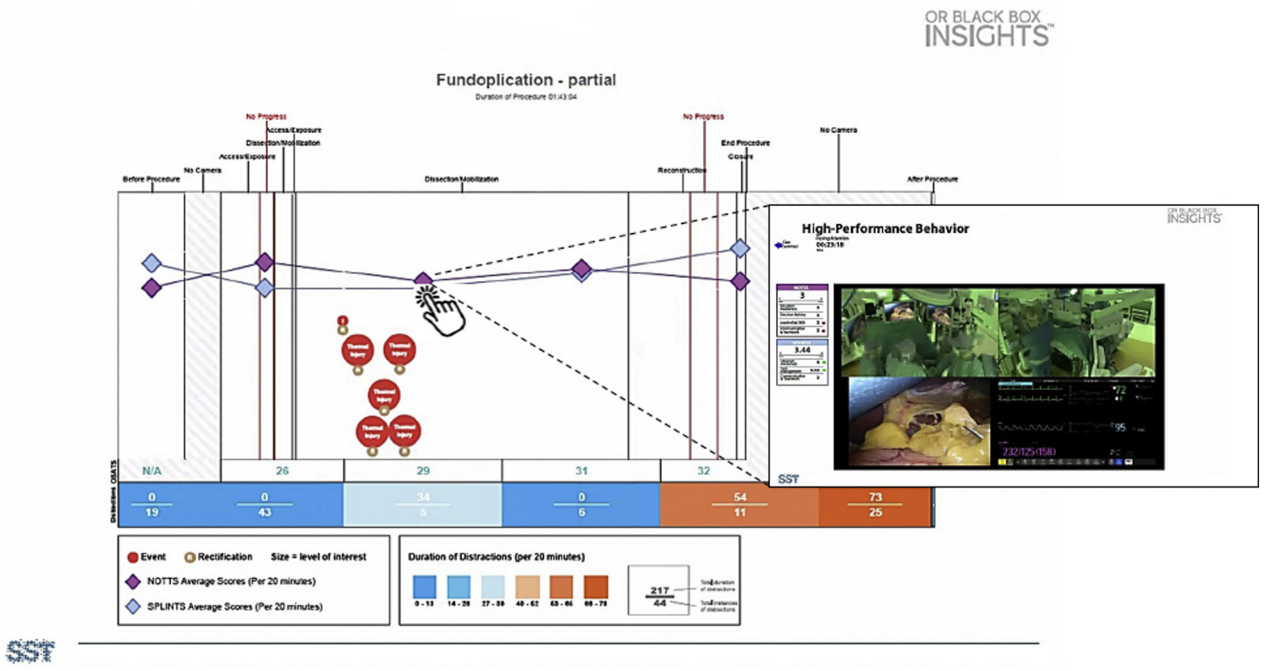

Fig. 3 – New Black Box performance report example. (Color version of figure is available online.)

participants may develop a high level of reflection by creating their own conclusions and motivation for change.[11,88]

It may be advised to schedule debriefings outside the immediate OR environment on a round table setup, so the team can sit comfortably, on eye level, and be on neutral ground with one another.[8,9,11,46] Beepers and telephones might be muted or tucked away. Having a coffee or a snack when debriefing with the team may help to relax and facilitate the atmosphere.

When using an MDR, a summarized performance report based on validated rating scales is recommended for both logistic and informational seasons. Such output may include specific and condensed feedback on all identified relevant positive and negative events.[24,89] It may be recommended to focus on the nontechnical aspects, such as communication rather than individual technical events, as this might be more educational than debriefing individual technical skills.[90-93] The NOTSS and SPLINTS rating scales may be used for this purpose. By integrating AI and machine learning software, the video and medical data output can be largely automatically analyzed, sparing the involved health care professionals' hours of looking back at video footage.[23,94] An example of the new OR Black Box performance report that uses these ratings scales and AI to analyze the video and medical data recordings is demonstrated in Figure 3. The surgical procedure is summarized in one overview slide. By clicking on the purple or blue diamonds or red circles, the video-augmented feedback regarding intraoperative event is shown (see black arrow and popped-up screen).

Hospital directorates who support participation of debriefings can facilitate in allocating time, making it possible to attend the debriefings preferably in normal working hours.

It may also be advised to plan the debriefing not immediately after the surgical procedure, but within a time-span of some days, as direct "hot" debriefing is often not practical in the workplace.[2,44] This time span gives the operating team some time to process and "wind down" and in case of video recording, to optimize the supporting performance report.[31,87,95]

Limitations

This study has some limitations to take into account. This literature review was based mostly on narrative review articles. Therefore, a systematic review and corresponding critical appraisal of the identified articles was not performed. The debrief model was developed based on a summary of the identified debrief methods and experience with debriefing in simulation settings by the authors. Also, this model was only tested in one tertiary referral university medical center and with the use of one version of an MDR. Therefore, no strong conclusions can be made regarding the validation of the debrief model. More empirical evidence across user settings is recommended to better validate the model and to find more evidence on how to implement VAD models for clinical surgical settings. Another limitation is the lack of concrete results regarding actual performance improvement. The survey of the pilot study was only able to evaluate self-reported satisfaction.[19] Future studies should evaluate whether the use of the debrief model in video-assisted team debriefing may actually change the behavior of the participating team members when they face the debriefed events in a similar case. Finally, the use of an MDR may be more expensive than the use of debrief methods without such detailed feedback.

However, external or hospital funding may help support the educational project as the use of an MDR for postoperative team debriefing is a data-driven quality improvement initiative.[21,37]

Conclusions

Although the power of multidisciplinary debriefing has long been highlighted, structured team debriefing of actual surgical cases—with or without the use of an MDR in the OR—is not a common practice to date. Debriefing augmented with information coming from a video and MDR in the OR is believed to be even more objective, effective, and educational. No debrief model fitting the use of a video and MDR in the OR existed to date. The standardized Amsterdam Black Box model was proposed by the authors. The model was tested and may be used in structured operating team debriefings using a video and MDR in the OR. Future studies are needed for adequate validation of the debrief model and to evaluate its impact on the improvement of team behavior and performance.

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Author contributions: A.S.H.M.V.D. conducted the literature search. All authors helped develop the debrief model. T.P.G. provided the data for the debriefings and reviewed the debrief model. M.V.H., J.A.S., and M.P.S. participated in the debriefings. A.S.H.M.V.D. and M.P.S. wrote the manuscript. All authors reviewed and approved the final manuscript.

Disclosure

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Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jss.2020.07.065.

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