In the Search for Evidence-Based Models to Facilitate a Post-Simulation Debriefing in Health Care. An Iterative Co-Creation Process.

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Laurea University of Applied Sciences **Abstract**

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Simulation-based education (SBE) is an effective method of teaching in healthcare. It can help to improve clinical judgement and non-technical skills like teamwork, prioritizing and leadership. Despite the recognition of debriefing as the most important phase of healthcare SBE there is a lack of research on the effectiveness of different debriefing methods and most debriefing models are merely theory-based.

The purpose of this thesis is to list empirically proven structured methods to lead a fruitful post-simulation debriefing in the context of health care. The aim is to benefit the Helsinki University Hospital's Academic Simulation Centre and its instructors with the gained knowledge; to ease the instructors' work and help them provide more homogenous simulation teaching in order to reach more coherent learning results. This thesis takes the form of an iterative co-creation process with a descriptive literature review. The main goal is to find scientific evidence on whether one debriefing framework is superior to another. The focus is on existing debriefing frameworks instead of their elements. Applying evidence-based practice in healthcare leads to better patient outcomes.

Several structured models and approaches for facilitating a post-simulation debriefing exist but actual research for the evidence of only four of them came up in the literature review. Three original studies about TeamGAINS debriefing model were found and one for each of the following: SHARP, Debrief Diamond and PEARLS. These four models and the evidence for them are presented in this thesis. It seems that most debriefing models are still mainly based on theory and few have beed studied in action. Even though supporting evidence for some aspects of the efficacy of the four debriefing models was found, it was limited to individual studies. The most evidence exists about the TeamGAINS framework. The lack of research on other debriefing methods however is not proof of a method's superiority. Obvious need for comparative research between debriefing models and debriefer experience still prevails.

Keywords: debriefing, structured models, health care simulation, facilitation, evidence-based practice

Contents

1 Introduction

Medical errors occur in 9% of cases and they can lead to serious patient harm (de Vries, Ramrattan, Smorenburg, Gouma & Boermeester 2008; Institute of Medicine Committee on Quality of Health Care in America 2000). On top of the human cost, medical errors also strain healthcare systems by increasing expenses (NHS Litigation Authority 2014). In emergency settings the incidence of errors doubles (Berner & Graber 2008; Hautz & al. 2016). It is estimated that 50% of medical errors could be prevented (de Vries & al. 2008). Teamwork and human factors have been recognized as major causes of medical errors (Risser & al. 1999). Therefore, enhancing teamwork skills is vital in increasing patient safety (Hautz & al. 2016; Manser 2009; Risser & al. 1999).

Simulation-based education (SBE) is an effective method of teaching in healthcare (Issenberg, McGaghie, Petrusa, Gordon & Scalese 2009). It can help to develop various skills, such as clinical judgement (Lasater 2007) and non-technical skills (NTS) like teamwork, leadership and prioritizing (Brunckhorst, Khan, Dasgupta & Ahmed 2017; Robertson & Bandali 2008).

Despite the recognition of debriefing as the most important phase of healthcare SBE there's a lack of research on the effectiveness of different debriefing methods and most debriefing models are just theory-based (Cheng & al. 2014; Waznonis 2014). Debriefings can be facilitated with various methods and styles (Tannenbaum & Cerasoli 2013) and their realization may deviate from the ideal practice (Dieckmann, Molin Friis, Lippert & Ostergaard 2009). Fey and Jenkins (2015) evaluated the simulation debriefing practices in US nursing education programs and found that only 31% used a structured model in their debriefings and just 19% assessed instructor competence. According to the study most instructors haven't even been trained on debriefing techniques. Constant evaluation and use of a systemical framework of simulation debriefings is needed (Fey & Jenkins 2015; Waznonis 2015). In 2016 there was not sufficient evidence to define which debriefing model is superior compared to the other ones. It was suggested that the importance lies in the debriefing event itself and choosing a method that the debriefer himself feels confident using. (Sawyer, Eppich, Brett-Fleegler, Grant & Cheng 2016.)

This thesis seeks evidence about the efficacy of different debriefing models for the partner organization, HUH Academic Simulation Centre. It is implemented as an iterative co-creation project utilizing a descriptive literature review. Four debriefing models and the evidence for their use obtained through the process is introduced. Structured debriefing models are the focus of this thesis because they can be more easily repeated by different facilitators than general approaches, thus giving better utility to the partner. Knowledge about suitable

structured debriefing models and cognitive aids to assist their use can help unify the educational content of health care simulations in the partner organization.

2 Theoretical background

2.1 Evidence-based practice developing healthcare

Better patient outcomes throughout different treatment settings and geographic locations are reached when the practices are based on research findings. This calls for closer links between researchers and healthcare workers, healthcare education development and choosing more practice-relevant research topics. The benefits of evidence-based practice include more effective, individualized, dynamic and streamlined nursing care. Often the motivation for developing evidence-based practices comes from financial sponsors seeking reduction of costs but knowledgeable people and easy access to information is also a factor. When research is used to determine the best practices instead of just supporting current ones it can enable nursing practice to take advantage of new information and keep up with the latest improvements in technology. (Youngblut & Brooten 2001.)

2.2 Significance of simulation in healthcare education

Simulation is a widely used method in healthcare education that aims to improve teams' communication skills, clinical decision-making and technical skills (McDougall 2015). This improves patient safety when the professionals' skills are not solely limited to develop with real experiences with live patients. Without the use of simulation it is impossible for health care professionals to gain confidence and practise certain skills to manage rarely occurring events. Through simulation practice it is possible to find gaps of knowledge, assess individual and group behaviour and strenghten one's skills (Voyer & Hatala 2015).

SBE is recognized as the most effective method of training non-technical skills (NTS) (Ounounou & al. 2018; van der Poe & al. 2016.). NTS are commonly grouped into three categories: cognitive skills (situational awareness, decision-making), social skills (teamwork, leadership, communication) and personal resource factors (individual's way of reacting to stressors) (Brunckhorst & al. 2017). Lack of NTS is a major concern in healthcare bringing about 86% of open surgery adverse events (Sridhar, Briggs, Kelly & Nathan 2017; Somasundram & al. 2018). Recommendation for the use of SBE is included in the Helsinki Declaration on Patient Safety in Anesthesiology (Mellin-Olsen, Staender, Whitaker & Smith 2010).

Simulation most commonly consists of three main parts: prebriefing, simulation scenario and debriefing (Rhodes & Curran 2005). The prebrief refers to initial guidance and orientation for the prospective simulation scenario (Page-Cutrara 2014).

2.3 Helsinki University Hospital's (HUH) Academic Simulation Centre

Helsinki University Hospital's (HUH) Academic Simulation Centre provides high-class simulation training for health care professionals in Finland enabling them to practise acute patient situations in their own professional role and as a member of a multi-professional team. Since simulation has been proven to increase patient safety it is important to augment its use in all in-hospital training. HUH Academic Simulation Centre also offers training to third parties. The simulations may include various medical emergencies such as trauma, resuscitation, recognizing a critically ill patient or obstetric and neonatal emergencies. (HUS 2020.) According to HUH resuscitation coordination officer Leila Saari (2020) the Academic Simulation Centre employs some simulation instructors and also enables simulation trainings for professionals around the HUH region with their simulation facilities. The instructors usually go through EUSIM training. In practice, each instructor blends their own style and the given guidlines while leading a simulation debriefing but a consistent policy for the facilitation of one is still lacking. A more uniform, evidence-based way to facilitate a debriefing is called for. (Saari 2020.)

2.4 Debriefing transforms an experience into learning

According to Gardner (2013) the mere participation to an educational simulation scenario doesn't guarantee learning, hence debriefing is needed to aid the participants to analyse, structure and integrate the new insight to develop their future actions. This type of post-simulation discussion is often referred as debriefing, which is an internationally recognized concept. The idea of debriefing is to help participants make sense of their simulation experience through a guided reflective discussion. It helps the participants become more aware of their own reactions in challenging situations and to analyse these reactions. This enables the participants to make a positive change in their own behaviour. (Fanning & Gaba 2007.) To sum up, debriefing is a vital part of simulation since it enables the participants to learn from the experience (Voyer & Hatala 2015).

The debriefing can include feedback and reflection (INACSL Standards Committee 2016). *Feedback* is a form of one-way communication about the participants' behaviour and performance but *reflection* challenges the participant to actively think and evaluate the simulation event (Waznonis 2014). In health care the simulation participants are adults and evidence shows that adults benefit most from the experiential learning style because it promotes reflection. This type of reflection done through experiential learning is believed to lead to life-long learning. (Fanning & Gaba 2007.)

The debriefer guides the conversation to enable the participants to explore and understand the relationships between events, feelings, thoughts, actions and oucomes of the simulation (Fanning & Gaba 2007; Salas & al. 2008). The participants need support to verbalize their experience and learn from it rather than just receiving information whether they did well or not (Dismukes, Gaba & Howard 2006). The instructor's job is to help the trainees to become aware of their mental models and thus make it possible to change them (Rudolph, Simon, Rivard, Dufresne & Raemer 2007). The skill level of the debriefer plays an important part in enhancing reflection and learning (Husebø, Dieckmann, Rystedt, Søreide, & Friberg 2013; Tannenbaum & Cerasoli 2013).

Three main ways of debriefing include self-guided post-event debriefing, facilitator-guided post-event debriefing and facilitator-guided within-event debriefing (Sawyer & al. 2016). A common style is oral debriefing, that includes post-simulation discussions and feedback. Debriefings can also be video-assisted, so that the simulation scenario is audiovisually recorded and analyzed afterwards. Despite the fact that the video-assisted method has been considered ideal, so far the evidence doesn't suggest one is superior to another. (Levett-Jones & Lapkin 2014; Thorley-Dickinson, Purva, Dieckmann, Kasfiki & Omer 2014.) It is important to differentiate structured post-simulation debriefing from critical incident debriefing or defusing. The latter focuses on overcoming difficult emotions and addresses psychological welfare whilst a clinical, simulation-related debriefing is focused on improving future performance. (Zigmont, Kappus & Sudikoff 2011.)

Simulation without debriefing leads to significantly weaker learning results than one with it (Savoldelli & al. 2006; Shinnick, Woo, Horwich, & Steadman 2011). Despite the fact that the debriefing is acknowledged as the most important component of simulation learning, the research dedicated to finding the best practices for its facilitation are surprisingly scarce (Fanning & Gaba 2007; Neill & Wotton 2011; O'Shea, Pugh & Schnieke-Kind 2017). Lack of comparative research of different debriefing techniques, times, venues and debriefer experience has been recognized (Raemer & al. 2011).

2.4.1 Structured debriefing frameworks

The consistent use of structured debriefings has been found to be vital for high-quality OR trainings (Ahmed & al. 2012). Structured debriefing models can be implemented in practice with the use of cognitive aids. Cognitive aids refer to evidence-based information in a structured, easy-to-use form like checklists (Standford School of Medicine 2021.) They can improve learning results after simulations and they are especially useful for novice instructors (Cheng & al. 2013; Kessler, Cheng & Mullan 2015). These types of debriefing scripts reduce the facilitator's cognitive load (van Merrienboer & Sweller 2010).

2.5 Ways to assess debriefing quality

2.5.1 DASH

The Debriefing Assessment for Simulation in Healthcare (DASH) is an instrument for estimating debriefing quality that has shown good reliability and preliminary validity. The tool can be used to evaluate facilitator behaviours that according to theory and evidence are supposed to support experimental learning. Its effective use, however, demands prior training for the DASH-raters. (Brett-Fleegler & al. 2012.) The DASH score sheet is divided into six elements according to which the effectiveness of debriefing is rated. The elements are 1. *Establishes an engaging learning environment*, 2. *Maintains an engaging learning environment*, 3. *Structures the debriefing in an organized way*, 4. *Provokes engaging discussion*, 5. *Identifies and explores performance gaps* and 6. *Helps trainees achieve or sustain good future performance*. (Center for Medical Simulation 2021.)

2.5.2 OSAD

The Observational Structured Assessment of Debriefing (OSAD) tool assesses debriefing quality by rating the facilitator's abilities in eight different categories during the debrief by an outside observer. The categories include 1. *Approach*, 2. *Establishes learning environment*, 3. *Engagement of learners*, 4. *Reaction*, 5. *Descriptive reflection*, 6. *Analysis*, 7. *Diagnosis* and 8. *Application*. (Arora, Ahmed & Sevdalis 2021.) OSAD can help recognize which areas of debriefings need to be improved and thus optimize quality of SBE (Arora & al. 2012).

2.5.3 T-NOTECHS

Modified non-technical skills scale for trauma (T-NOTECHS) is a widely accepted tool to assess non-technical skills in trauma settings. It consists of five performance-assessment domains: 1. *Leadership*, 2. *Cooperation and resource management*, 3. *Communication and interaction*, 4. *Assessment and decision-making* and 5. *Situational awareness and stress-coping*. T-NOTECHS scores correlate with better clinical practice. (Steinemann & al. 2012.) Since one of the main goals of simulation and the debriefing process is to improve NTS, T-NOTECHS could be used as a tool to assess debriefing quality.

3 Purpose & aim

The purpose of this thesis is to list empirically proven structured methods to lead a fruitful post-simulation debriefing in the context of health care. The aim is to benefit the HUH Academic Simulation Centre and its instructors with the gained knowledge; to ease the

instructors' work and help them provide more homogenous simulation teaching in order to reach more coherent learning results.

The thesis is looking for answers for the following questions, with the emphasis on the latter:

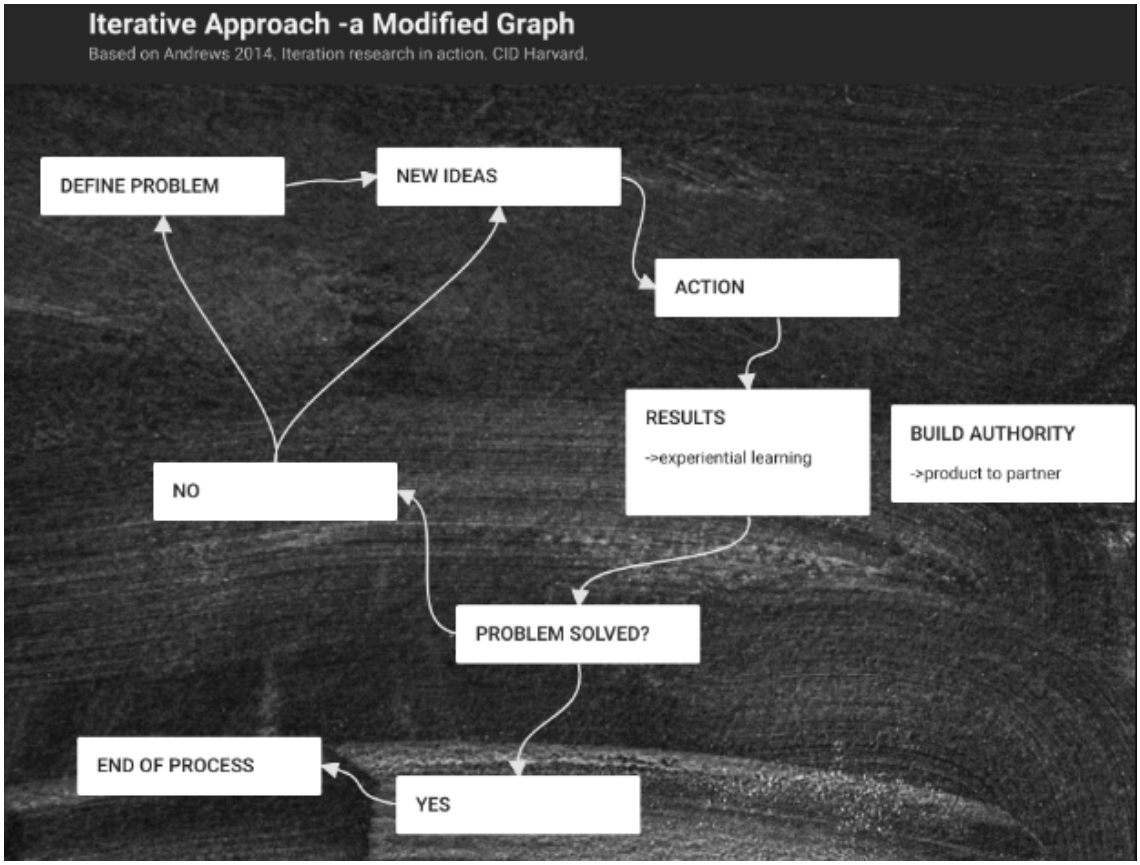
1. Which structured models to lead a post-simulation debriefing in health care already exist?
2. Is there evidence that one debriefing model would produce better learning results than another?

4 Methods

This thesis uses a mixed method. It is functional since it is based on co-creation approach and an iterative development process. A functional thesis includes the development of a product or service (Säteri 2020). This thesis tries to find answers to the essential question that originated from HUH Academic Simulation Centre's needs. Descriptive literature review is implemented to answer that question. The developed service includes both the thesis itself and the presentation of its results to the partner organization in a form of a recorded presentation and a written article.

4.1 Iterative process

Iterative method means repeating the same phases until a needed result is reached (Mattila 2015). It is a process that allows to make changes along the way based on the newly acquired information. With iterative approach you can try something, learn from it and try something new. Each time it is good to reflect what was learned, recognize current challenges and also see whether you could ask for help for those problems. (Andrews 2014.) As a process, this thesis is the quintessence of iteration in the sense that the process kept re-inventing itself while the new information clarified what could be improved. It is important to always circle back to what was asked by the partner: a list of articles providing evidence for the usefulness of different debriefing methods.



Based on Andrews 2014. Modified by Multala 2021.

4.2 Co-creation and co-production

Terms co-creation and co-production describe practices like community involvement, collaborative governance, civic engagement and participation where the end-user of the services are involved in the development process of a product or a service (Brandsen, Steen & Bram 2018, 9-11). This type of bottom-up approach is more modern compared to top-down way of leadership and development. It enables client participation and commitment plus quicker development processes in addition to the extra value brought by the client perspective. Co-creation is a communal effort towards the same goals. (Laurea & Opetus- ja Kulttuuriministeriö 2020.) In co-creation the problem and the solutions are defined together. It's not about just the service developer pleasing the customer but it lets the customer to co-develop the product or service to be useful in their own specific context. It is about continuous dialogue and collaboration. (Prahalad & Ramaswamy 2004.) The starting point of co-creation is a preliminary need of development and the discussion with users. After that the key actors should be identified to be able to become familiar with the daily lives of the users. Also a shared understanding should be established with the partners of the co-creation process. In the planning phase the goals should be defined in collaboration, agreements made and roles divided. The implementation phase includes continuing interaction between the

service developer and the customers. The advancement of work should be constantly evaluated together and it is important to be prepared to make changes. The final evaluation includes evaluation of goals, learning through both challenges and successes and making some kind of action plan for the future. In the end the results should be used and shared and their effectiveness monitored and evaluated. (Hirvikoski, Äyväri, Hagman & Wollstén 2018, 23-25.)

This thesis does not include all the traditional phases of co-creation process described above due to time limitations and the ongoing pandemic. All parties are aware and have been agreed to this. The needs of the HUH Academic Simulation Centre are the starting point, the topic of the thesis came from them. The needs have been clearly expressed and clarified through their contact person Leila Saari with conversations with the author. A list of research articles measuring the effectiveness of debriefing methods was requested but analysis from their point of view is optional. Feedback for this thesis is only asked from the contact person but not the simulation instructors individually. Asking for active participation during the ongoing covid19-pandemic would have been unfair and doomed to fail. So to conclude: this thesis is using a modified co-creation method that has in unison been found to suit the partner's needs and this time's realities the best. Co-creation as a iterative process allows more flexibility than a mere systematic literature review would. In the end, the process evolved into using a descriptive literature review for its purposes.

4.3 Literature review

Literature review is a common method that enables the collection and analysis of the past research on a certain topic (Gough, Oliver & Thomas 2012). Up to 14 different types of literature reviews exist, the classifications of which are not always chrystal clear (Grant & Booth 2009). The three main sub-types include systematic reviews, meta-analysis and descriptive reviews. The latter, which is applied in this thesis, can be divided into integrative and narrative types. Desctiptive literature review can study comprehensive research topics. It also allows more flexibility for the research questions and the data selection criteria. (Salminen 2011, 6–7.) Literature reviews can be used to guide evidence-based practice in healthcare, the systematic reviews in particuliar (Holly, Salmond & Saimbert 2012, 3-13).

The descriptive literature review includes four phases. First, the research question that will guide the whole process is formed. The second part includes choosing the data that answers the research question. Third, the findings will be reported. Again, in a manner that answers the research question the best way possible. The fourth and last part assesses the reliability of the selected sources and suggests future research questions (Kangasniemi & al. 2013: 292–298.)

The earlier, iterative search of the literature gave two articles that discuss common debriefing techniques, which were then used as a starting point to get names of the most common debriefing models for the descriptive literature review. Both studies (Sawyer & al. 2016; Abulebda, Auerbach & Limaiem 2020) listed GAS, 3D, PEARLS, TeamGAINS, Diamond Debriefing and AAR as commonly used debriefing models, so these were selected for the literature review and then basis for manual search. Abulebda & al. (2020) additionally named debriefing structures called Plus-Delta and RAS. Three major healthcare databases were searched: Cinahl / EBSCO, PubMed & ProQuest in respect of the inclusion criteria below. Focus was naturally on original studies and both qualitative and quantitative research was taken into account. Finnish language was left out from the inclusion criteria for clarification, based on earlier searches that gave zero results. The most common basis for exclusion was that the article didn't evaluate a specific debriefing method or spoke of its elements in general.

The end-result gave six articles that studied the efficacy of a debriefing model. Those six research articles covered the total of four structured debriefing models that are introduced in this thesis: TeamGAINS, Debrief Diamond, PEARLS and SHARP. The selection process and the list of the chosen articles can be found in appendices 1 and 2.

Inclusion criteria for articles	
IN	OUT
evaluates a method of debriefing	discusses debriefing in general
context of healthcare	other fields
post-simulation	in-simulation
debriefing face-to-face	video-assisted or online
method can be facilitated by an instructor	only to be facilitated by a peer / other than instructor
English	other languages
published in 2010 or after	published before 2010
peer reviewed	low academic standard
full text available free or with Laurea's access	full text unavailable or requires payment

5 Results

5.1 Structured models for facilitating a post-simulation debriefing

Several structured models and approaches for facilitating a post-simulation debriefing exist (Sawyer & al. 2016; Abulebda & al. 2020) but actual research for the evidence of only four of them came up in the literature review. Three original studies about TeamGAINS were found and one for each of the following debriefing models: SHARP, Debrief Diamond and PEARLS.

phase	TeamGAINS	SHARP	Debrief Diamond	PEARLS
1	REACTIONS narrative: "How did you feel?"	**S**et learning objectives (before scenario)	DESCRIPTION: "So what happened?"	REACTIONS: "How are you?" -leaners vent
2	DEBRIEF CLINICAL PART narrative & advocacy-inquiry: "What happened?" "I noticed that...", guided-team self-correction: "What alternative method you could have used?", systemic-construvist approach: circular question "What would you have recommended to a colleague?"	**H**ow did it go? -"What went well and why?"	ANALYSIS: "How did you feel?", facilitator raises good examples of NTS (possible also some negative), how skills could be broken down in to actions to be used in real life	DESCRIPTION: participant can summarize major medical issues during simulated scenario in order for the group to be on the same page
3	TRANSFER SIMULATION INTO REALITY narrative: "What aspects of this scenario are familiar to you from real life?"	**A**ddress concerns -"What didn't go so well and why?"	APPLICATION: take-home message, what could be applied to clinical environments	ANALYSIS: educational strategy selected by the experience level, the time in use and goal of the debriefing
4	RE-INTRODUCTION OF THE EXPERT MODEL guided team self-correction, narrative, advocacy-inquiry, systemic	**R**eview learning points -"What did you learn about your technical / teamwork skills?"		SUMMARY: ideally the learners' take-home messages, also facilitator can summarize
5	SUMMARY take home message	**P**lan ahead -"What actions can you take to improve your future performance?"		
6	CLINICAL SKILLS PRACTICE IF NECESSARY			
reference	(Kolbe, Weiss, Grote, Knauth & Dambach 2013.)	(Ahmed & al. 2013.)	(Jaye, Thomas & Reedy 2015.)	(Eppich & Cheng 2015.)

5.1.1 TeamGAINS

TeamGAINS (TeamGAINS=Guided team self-correction, Advocacy-Inquiry, Systemic-constructivist) is a systematic healthcare debriefing tool that merges three established debriefing methods into one by integrating techniques called *advocacy-inquiry*, *guided team*

self-correction and *systemic-constructivist* approach (Kolbe & al. 2013). The technique and structure given by the guided team self-correction approach helps the team to self-correct its actions (Smith-Jentsch, Cannon-Bowers, Tannenbaum & Salas 2008). Reflective practice and feedback are combined in the approach called advocacy-inquiry (Rudolph, Simon, Raemer & Eppich 2008; Rudolph & al. 2007). It is more instructor-led than the guided team self-correction enables questioning of participants' assumptions, voicing gaps of performance and sharing expert opinions (Rudolph & al. 2007). Advocacy-inquiry strives for the transparency in thought processes of both participants and instructors (Kolbe & al. 2013). The systemic-construvist approach to debriefing comes from systemic theory and its applications on constuctivism and family systems theory (Anderson & Goolishian 1988; Kriz 2010; Minuchin, Nichols & Lee 2007). It has been suggested to suit well with debriefings by Kriz (2010). These three approaches cannot be fixed into one standardized form because their use is dependent on the goals of the simulation practice and the experience level of both instructors and trainees (Dismukes & al. 2006).

Systemic therapy looks at individuals within their systems focusing on patterns, dynamics, interactions and relationships instead of separate individual behaviour (von Schlippe & Schweitzer 2007). This fits well with the goals of debriefings that include looking into relationships between actions, events and performance outcomes. Common systemic techniques that are also used in TeamGAINS include circular questions and the Reflecting Team. Circular questions can be used to study relationships and behavioural patterns between two or more people from an outside, observant perspective. (Kolbe & al. 2013.) They can help people understand how situations and circumstances may have affected individual behaviour (Gilbert & Malone 1995). The Reflecting Team includes having members of the clinical team behind a one-way glass observing and later commenting on the clinical interview in a supportive, non-accusatory manner that highlights strenghts, offers explanations for behaviours and suggests possible solutions for problems. This systemic technique is commonly used in family therapy. (Anderson & Goolishian 1988.)

TeamGAINS debriefing is divided into six steps:

1. feelings and reactions (release tension to be able to concentrate to the rest of the debriefing and to get information on what mattered to the participants)
2. discussion about clinical issues
3. transfering the simulation phenomena into real life
4. systematic discussion linking behavioural skills into performance
5. summary
6. re-practice of a major clinical skill if necessary

(Kolbe & al. 2013.)

Craft & al. (2015) found that training educators in TeamGAINS approach improved overall debriefing quality, based on improved DASH ratings. TeamGAINS approach is shown to increase leader inclusiveness and psychological safety when applied by experienced debriefers. TeamGAINS enables instructors to give constructive but non-threatening feedback in order to build optimal participant behaviour and narrow performance gaps. The fact that the positive evaluations of the method did not vary depending on participant's role, gender, age or background suggests that TeamGAINS could be effective in debriefing people in various different professional roles and levels of experience. However, these results are based on participant evaluations and cannot be generalized with long-term learning. Comparative or control-group settings were not applied. (Kolbe & al. 2013.) The TeamGAINS method's ability to enhance team performance behaviour was studied by comparing results from "Medical debriefing" and "TeamGAINS debriefing" groups. Actually, the method was partially compared against itself since the medical debriefing consisted of TeamGAINS parts 1, 2, 3 and 6. Both debriefing styles increased participants' cooperative working style. However, preference to work by yourself instead of a team was increased in the medical debriefing group. It is suggested that TeamGAINS debriefing can help identify how non-technical skills and individual behaviour are connected. (Eismann, Palmaers, Tsvetanov, Hagemann & Flentje 2019.) Kolbe & al. (2013) noted that the TeamGAINS debriefing structure as such should for the time being be seen as a tool for intermediate to advanced-level educators and its use by novel instructors is yet to be studied. TeamGAINS showed to be the most studied debriefing method based on this literature review.

5.1.2 PEARLS

PEARLS (=Promoting Excellence and Reflective Learning in Simulation) is a debriefing tool that blends three commonly-used educational debriefing strategies. These include *learner self-assessment*, *facilitating focused discussion* and *providing feedback and/or teaching*. The framework is claimed to assist both experienced and novice educators. PEARLS divides the debriefing session into four phases: reactions, description, analysis and summary. First, the reactions phase allow venting of the participants' emotions that the scenario provoked in them. In the description phase a participant can summarize major medical issues during the simulated scenario. The goal is to get the whole group to the same page on what happened during the simulation. The analysis allows the use of different educational strategies like advocacy-inquiry to be applied. The choice should depend on the experience level, the allocated time and the goals set for the debriefing. Finally, in the summary phase ideally the learners' take-home messages are voiced but also the facilitator can summarize the main learning points for the group. (Eppich & Cheng 2015.)

The use of PEARLS debriefing framework was found to improve communication and interaction skills when the development of non-technical skills were studied pre and post debriefing (Sullivan & al. 2018).

5.1.3 SHARP

SHARP is a five-step debriefing tool that was developed to improve OR performance feedback.

1. **S**et learning objectives (before simulation scenario)
2. **H**ow did it go? –*What went well and why?*
3. **A**ddress concerns –*What did not go so well and why?*
4. **R**eview learning points –*What did you learn about your technical / teamwork skills?*
5. **P**lan ahead –*What actions can you take to improve your future practice?*

SHARP: 5-step Feedback Tool for Surgery was found to be an efficient and effective tool for improving OR simulation debriefings shown both with high OSAD scores and ethnographic observations. It significantly improves debriefing quality and was given high rankings in feasibility, usefulness and comprehensiveness. SHARP is a welcomed tool by surgical educators and trainees. (Ahmed & al. 2013.)

5.1.4 Debrief Diamond

The Debrief Diamond consists of three key phases: *description*, *analysis* and *application*. The description phase aims to restrict the discussion to facts instead of emotions in order to gain shared understanding of what actually happened in the scenario. In the analysis phase the educator leads the debrief around non-technical skills. The recommendation is to focus on one NTS that the learners find important in order to avoid cognitive overload. In the final, application phase the participants are encouraged to summarize what they learned that could be applied in their real-life clinical environments. (Jaye & al. 2015.)

The use of structured framework Debrief Diamond improved debriefing quality based on trainee and facilitator self-evaluations. The participants identified good debriefing practice and development of teamwork skills. Facilitators experienced improvements in recognizing and supporting participants' learning. (Tierney 2018.)

6 Conclusions

6.1 Evidence for the best practices: is there?

The literature review revealed the vast nature of simulation debriefing as a topic as it constantly had to be narrowed to answer the main question of this thesis: is one structured

post-simulation debriefing method superior to another? Waznonis (2016) suggested that key elements of a succesful debriefing include a safe environment, competent facilitator and the use of a structured framework. Also Rall, Manser & Howard (2000) and others have discussed the various elements that could be useful in a debriefing. The goal of this thesis, however, was to focus on the methods instead of elements. The methods showed to be numerous with many overlapping in their phases and theoretical backgrounds they are based on. Also, the focus was strictly kept on seeking empirical evidence instead of deepening the theories many models are based on.

It seems that most debriefing models are still mainly based on theory (Cheng & al. 2014; Waznonis 2014) and few have beed studied in action. Even though supporting evidence for some aspects of the efficacy of the four debriefing models TeamGAINS, PEARLS, SHARP and Debrief Diamond was found it was limited to individual studies. The most evidence exists about the TeamGAINS debriefing framework. The lack of research of other debriefing methods however isn't proof of the method's superiority. Obvious need for comparative research between debriefing models and debriefer experience (Raemer & al. 2011) still prevails.

7 Discussion

7.1 Ethics

Responsible conduct of research refers to policies that the scientific community has agreed on: research integrity and generally a diligent and thorough manner of research, saving, presenting and evaluating one's work. Open and responsible communication is required of the publication stage. Other researchers' work is respected with appropriate references. The rights and responsibilities of all parties are made clear and the access rights agreed on. The funding is appropriately reported. Violations of responsible conduct of research include i.e. fabrication (making results up), falsification (changing, presenting or hiding results in a misleading manner), plagiarism and misappropriation (presenting someone else's work as your own). Negligence of responsible scientific conduct is considered a violation as well. (TENK 2012, 6-9.) These guidelines have been respected in the making of this thesis according to the author's best competence.

Good scientific practice also includes respecting the participants' self-determination and human dignity, valuing culture and nature and implementing any research in a way that does not harm the participants (TENK 2012, 6-9). Since the method included mostly collecting information from scientific articles according to the partner's needs instead of observing and analyzing actual human behaviour there was relatively little risk for these ethical principles

being compromised. The ideas and opinions of the representative of the partner organization were respected and actively included in the work. The partner organization was also allowed to comment berfore publication to ensure that thoughts were referred and applied correctly.

No ethical review or research permit was necessary in this thesis but a cooperation agreement was made between the author, Laurea and HUH Academic Simulation Centre. Finnish National Board on Research Integrity TENK (2019, 16) states that an ethical review has to be done in the following cases: the study intervenes with the physical integrity of the participants, the participants are under 15 years old and their parents havent been informed, exceptionally strong stimuli are used, the study deviates from the principles of the knowledge-based consent and there's a risk of mentally harming or risking the safety of the participants or their close-ones. None of the above are applicable here since this is not a study with objects that could be harmed. HUH or the simulation instructors were not under evaluation nor were the learning results from the simulations analyzed thus the partner organisation is not a subject of this thesis as it is a recipient of the information it provides.

7.2 Reliability

Reliability measures a quantitative study's ability to examine the entity it says it does with repeatability and consistency thus underlining a systematic approach in information retrieval. Validity means a study's extent of examining the entity it says it does. (Newell & Burnard 2011, 132.) Reliability and validity will be established by using peer-reviewed articles from well-known scientific databases. It is important to review the size and representation of each study sample and whether the questions measure the right things (Heikkilä 2014). The author should check for discomfirmation of the findings at all times and check whether they are not the only possible ones (Newell & Burnard 2011, 133). However, when it comes to qualitative research, not always would different researchers end up with the same results using the same material (Kylmä & Juvakka 2007).

Using a mixed method brought in both benefits and limitations. The process of this thesis at whole has been an iterative one and therefore the plan and the search words have changed along the way based on the newly acquired information. The flexibility that iteration made possible has been useful in many ways since the process is not limited to the knowledge and assumptions made in the beginning but instead the lessons learned along the journey can be put to use. Setting too strict guidelines for a topic completely new to the author could have directed the process to a wrong course. However, most changes in the process are chosen not to be documented here to avoid confusing the reader. Therefore those parts would be difficult to repeat. Nevertheless, co-creation approach allowed keeping the partner's needs in the spotlight. The partner commented the final text resulting in the last small changes of the written research questions to be made. The partner was also invited to comment the

work in the earlier phases and clarifying questions were discussed along the process in order to appropriately narrow the topic. The phases of the final literature review are documented for repeatability but regardless, the human factor in the process cannot be eliminated. Cinahl/EBSCO, PubMed and ProQuest were selected as they repeatedly came up as established databases in field of health care. The literature review was left descriptive without further analysis. This was a decision both based on the original comment of the partner's representative and the limited competence of the author to do profound evaluations thus with the goal to avoid unnecessary bias in the results. Mainly peer reviewed articles were selected to increase validity and reliability of the results.

Like any other academic work, the results of this thesis should be viewed with its limitations in mind. These include furthermore the resource and time limitations that come with a bachelor's level thesis and the author's lack of previous research experience. Literature reviews are limited by the choice of language and the exclusion of ongoing research (CRD 2008). Sometimes research is left unpublished if it has been unable to provide evidence of the efficacy of an intervention thus placing bias to the efficacy of the intervention that the literature review seems to suggest (Whittemore 2005; CRD 2008). The scope of 10 years was chosen to provide fresh information since the use and research of SBE has grown significantly during recent years. Possible limitations of a too narrow timeline was also considered since the specific topic of structured debriefing tool has not been well-researched yet. Many limitations had to be made since debriefings can be lead in so many ways: in-situ or simulation, by a facilitator or a peer, during or after a simulated scenario, be video-assisted or not etc..

Waznonis (2014) suggested benefits of more consistent use of terminology in simulation debriefing research, publications and practice. Therefore, the term *debriefing* was chosen for consistent use for this thesis instead of *learning discussion*, which was the term that the author originally wished to introduce because it has an emphasis on the positive learning experience instead of possible negative connotations stemming from the critical incident debriefing. Lastly, the author declares no conflict of interest and has no affiliations with any simulation centre or company organizing simulation debriefing trainings.

7.3 Suggestions

Utilization of existing wording, tools and assessment methods of debriefings instead of making new ones could be helpful in future research and definition of the suitability of a debriefing method to practice, just like Waznonis (2014) proposed. Theory-based debriefing tools should be empirically studied and compared. The debriefer's individual experience and skill level should be taken into account when choosing the best method. Perhaps using the same method

of debriefing is not the only path to increase the efficacy and uniformity of evidence-based practice in the HUH Academic Simulation Centre.

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Saari, L. 2020. Interview 24.5.2020.

Appendices

Appendix 1: Selection process of articles

DATABASE	PubMed	Cinahl	ProQuest
search terms	Title/Abstract: GAS OR PEARLS OR TeamGAINS OR AAR OR 3D OR Diamond AND debrief*	Abstract: GAS OR PEARLS OR TeamGAINS OR AAR OR 3D OR Diamond AND debrief*	Abstract: GAS OR PEARLS OR TeamGAINS OR AAR OR 3D OR Diamond AND debrief*
filters	Free full text, English, 1/2/2010-28/2/2021	Full text, English, 1/2/2010-28/2/2021, peer reviewed	Full text, English, 1/2/2010-28/2/2021, peer reviewed
references	18	1	43
chosen by TITLE	5	1	10
chosen by ABSTRACT	5	1	5
chosen by FULL TEXT	3	0	3

➔ SELECTED ARTICLES without doubles: 5

MANUAL SEARCH OF REFERENCES:	
references	160
chosen by TITLE	41
chosen by ABSTRACT	2
chosen by FULL TEXT	1

➔ TOTAL SELECTED ARTICLES: 6

Appendix 2: List of selected articles

AUTHOR, YEAR, COUNTRY	PURPOSE OF THE STUDY	PARTICIPANTS / SAMPLE (=n)	DATA COLLECTION METHOD	DATA ANALYSIS METHOD	MAIN RESULTS	LIMITATIONS
Craft, Franklin, Smith, Roberts, Endacott & Gale 2015, UK (peer reviewed)	to assess how using **TeamGAINS** method affects the quality of debriefing in undergraduate interprofessional simulation	19 pre- and 18 post-training debriefs analysed (n=37)	2 trained independent assessors rated video-taped debriefings according to DASH (part 1 excluded because session introductions not taped)	statistical analysis	overall debriefing quality by DASH-ratings was improved with the use of TeamGAINS tool	sample size, debriefers increasing experience during the study may also have increased debriefing quality
Eismann, Palmaers, Tsvetanov, Hagemann & Flentje 2019, Germany (peer reviewed)	evaluate students' development in collective orientation in relation to medical and **TeamGAINS** debriefing	4th year medical students (n=147)	between-group pre-post design, 2 groups (medical & TeamGAINS debrief), likert-scale survey	statistical analysis with SPSS	TeamGAINS can be recommended for medical education to clarify the connection between non-technical skills and the individual performance, simulation courses increase teamwork-oriented attitude	
Kolbe, Weiss, Grote, Knauth & Dambach 2013, Switzerland (peer reviewed)	development & evaluation of a debriefing framework integrating three established debriefing techniques, assessing **TeamGAINS** tool with respect to debriefing quality, leader inclusiviness and changes in psychological safety within the team	61 anaesthesia staff, 40 debriefings: (n=235 assessments)	post-test only & pre-post test, self-report debriefing quality scale based on DASH & OSAD likert-scale survey	statistical analysis	structured debriefing tool **TeamGAINS** was created and its use significantly increased leader inclusiveness and psychological safety	assessment based on participant evaluation, no control group, method not compared against any other method, the efficacy of the three main elements of TeamGAINS were not separated, evidence not applicable to correlations with long-term learning

Tierney 2018, UK (peer reviewed)	to assess debriefing tool **Debrief Diamond** and how it impacts learning at individual, team and organisational levels	n=130	post-intervention 'trend survey'		PARTICIPANTS: 93% identified good practice among the debrief (13% more with Diamond than previous debriefs), 70% felt they learned teamwork skills, 89% experienced that debrief was better with structured tool, FACILITATORS: 100% felt that structured tool increased their ability to recognize and utilize learning opportuinties for participants' benefit	risk of sample bias due to low response rate of the pre-intervention survey, response rates of individual questions vary because of the survey design
Sullivan, Campbell, Ross , Thompson, Underwood, LeGare, Osman, Agarwal & Jung 2018, USA	to study NTS in a simulated trauma setting in order to learn about future areas to target for development of educational interventions	n=13 debriefing sessions analyzed	T-NOTECHS pre- and post debriefings	qualitative analysis, Wilcoxon signed ranks test	significant increase of teams' communication and Interaction skills pre to post debriefing, majority of facilitators' time was spent on directive performance feedback	
Ahmed, Arora, Russ, Darzi, Vincent & Sevdalis 2013, UK	to study debriefing in the OR, to develop and assess an evidence-based, user-informed intervention termed **SHARP** to improve debriefing in surgery	n=100 cases (50 pre and 50 post-intervention)	OSAD, user satisfaction questionnaire, 20% of cases observed independently for reliability	statistical analysis with SPSS	SHARP: 5-step Feedback Tool for Surgery significantly improves the quality of debriefing in the OR and is well received by surgical trainees and trainers	