Simulation based leadership

A scoping review

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Even though the technical dimensions of leadership is a widely researched topic, the disaster training programs are inefficient in equipping disaster actors with non-technical skills for disaster response. Appropriate training has been highly noted as future facilitator for crisis management, but not implemented in training programs yet.
To avoid error and enhance patient safety and interdisciplinary teamwork, simulation scenarios provide opportunities for health care professionals to practice communication and coordination skills.
This study seeks to illustrate different alternatives to train leadership skills and the basics of simulation settings. The paper attempts to provide suggestions for enhancing leadership skills in crisis management with simulation training. The collected information will serve Arcada Patient safety Learning Centre to improve training leadership skills in different ways. Ten articles were selected for this study.

The study was conducted by a scoping literature review and the results show that simulation training as an education form is unparalleled compared to current training of leadership skills. Good leadership skills are hard to train comprehensively because good leadership requires many different qualities that cannot be obtained only by theory. Non-technical skills can be trained in different settings individually and in groups.

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1 INTRODUCTION

Current disaster training programs are inefficient in equipping disaster actors with non-technical skills for disaster response. Appropriate training has been highly noted as future facilitator for crisis management, but not implemented in training programs yet. Self-development and prior mission training with non-technical skills are recommended. (Marshalls, T. 2015 p.8)

Simulation is different from traditional education. The main content of simulation is from concrete happenings and action, concepts and theoretical material are not primary. Simulation of a certain process or chain of event aims to imitate a situation that produces real and authentic experiences. The basic idea of simulation is that when the student is recreating his own knowledge, he should comprehensively and realistically relate with the reality that he aims to understand and study. (Salakari, H. 2007 p.118)

The pedagogy of simulation training is not that well researched. The first sources of pedagogic approach in simulation training are from the 1990's, but the concept of simulation training is not new. (Salakari, H. 2007 p 116)

To avoid error and enhance safety, simulation scenarios provide opportunities for health care professionals to practice evidence-based communication and coordination skills. This form of education strategy promotes patient safety and enhances interdisciplinary teamwork. Different studies report the in situ simulation has demonstrated a positive impact on learning. (Klipfel, J et al.2014 p.39-46)

This paper is a scoping literature review based on theory that is a large part and underlays the entirety of the work. Chapters 2-6 are background theory for this paper, they are vital for the entirety to understand the results. The material found was wide, but considerable and specific material was poorly found. When thinking about the research questions there were many answers rising from the theory part that could be used also as results. The second research question was found in theory and mentioned in the literature but was not properly answered.

2 SIMULATION SETTINGS

Simulation settings are one kind of learning environment and a social endeavor. Simulation can be applied with different settings and resources, however it is important to assess how, when and why simulation is used and for which goals. Sometimes using different methods some goals are achieved more efficiently and easily. (Dieckmann, P. 2009 p.10)
A notable factor when using simulation-based learning is the sense of reality. The simulator itself does not have to be special but the simulation scenario. People often compare their work setting to the simulation, when they are similar the reality is also high. (Dieckmann. P. 2009 p.11)

The definition for simulation setting is described as a spatiotemporally a socially limited event. During this event people interact in a goal-oriented way with each other, a simulator and other equipment needed. Therefore a simulation can be considered a social practice. (Dieckmann, P. 2009 p.41)

As early as the 1960s full-body mannequins simulators were used in the field of anesthesia for training endotracheal intubation and induction of anesthesia. The model was called ’Sim One’ and worked by Denson and Abrahamson from the university of Southern California. Later in the 1980s simulator systems began to develop by individual groups when the personal computer computers became less expensive and more simulation software became available. Today full-body simulator models copies closely the physiology seen in the human body. At first when simulation training was introduced it was very expensive and only a few institutions could afford it. Most of the cost was due to the laboratory setup and maintenance, also the cost of a technician. Today the variation is large from simple scenario training or simulation mannequins only to expensive simulators.

With simulation practice aviators get the experience to help them act in situations that crave fast decisions. For example an ability for fast and realistic situation assessment, situational awareness is a skill that especially aviators but also in other branches is needed. (Salakari, H. 2007 p.81)

2.1 Patient safety

To err is human. Even though patient safety is good in developed countries, it is not good enough. (Rall et Dieckmann. 2005). Dieckmann writes that amongst the 10 leading causes of death is the diagnosis ”medical error”. Mostly the outcomes are not due to inadequate medical knowledge, but problems transforming the medical knowledge into meaningful clinical actions under real world conditions of patient care. (Rall&Dieckmann. 2005) In the development of critical incidents and threats to patient safety the role of human error is emphasized and some works suggest the use of simulation wherever possible to increase patient safety. There is a different way of dealing with errors and how to approach people who have made errors since every society and profession have their specific views, norms and values. (Dieckmann, P. 2009 p.43) Human factors are attributed to 70% of all errors. (Rall&Dieckmann. 2005)

In western society there is a tendency to punish failures and errors. The ’blame culture’ is operated in medical professions and its’ organizations where the errors are attributed to individuals who need to be retrained or removed. Thus it can be said that health-care professionals are the second victims of error after the patients. That is why simulation settings offer a safe environment to discuss problems and errors and provide unique opportunity away from the restraints of patients or relatives. (Dieckmann, P. 2009 p.44)

2.2 Setting up

The simulation setting itself is usually compromised with seven prototypical modules. First the setting introduction where participants receive information of the aims and objectives of the course. Secondly simulator briefing where the participants get to know the simulator (how to use it and what is considered normal, e.g. auscultation sounds) and the simulated environment (how to interact with the control room and environment, e.g. summon for help). Third is theory input where participants get information on the contents of the course, for example crisis resource management (CRM) or specific procedures. In the fourth scenario briefing participants receive information regarding the simulation scenario: patient's history and presenting problem. Fifth is the actual simulation scenario that has a certain length and takes place in a special simulation area (operation room, emergency room, prehospital care) and can be later debriefed. After the simulation scenario comes the sixth module, debriefing that often takes form of video-assisted group discussion. The actions and mental models of participants are analyzed and discussed (strengths and weakness). The last module, the ending summarizes the course and what they have learned. (Dieckmann, P. 2009 p.48-49)

In order to take part in a simulation setting both participants and instructors need certain knowledge, skills, motivations, emotions and beliefs. Instructors have to tailor the scenarios to the training group and the participants have to be willing to engage in the scenarios. (Dieckmann, P. 2009 p.61)

A major issue for simulation centers is funding, for example state funding, selling courses, obtaining research grants or industrial sponsorship. (Dieckmann, P. 2009 p.62)
Higher realism of simulators is not necessarily connected with better learning outcomes. It depends on the goal of the scenario how much realism is needed to fulfill the goal. (Dieckmann, P. 2009 p.74)

Simulations can help discover errors that are not relevant during routine conditions but show up during stress, emergency situations and pressure and also help develop control actions. Even though simulation cannot train participants to cope with every difficult situation but teaches generic elements of dealing with unknown situations. (Dieckmann, P. 2009 p.78)

Both instructors and participants need simulation competence. To conduct a successful simulation the instructor needs to design goal-oriented scenarios and be able to conduct them as planned. Also they need to obtain the ability to develop strategies to adapt scenarios to participants and course needs. Communication is a key competence in simulation within the scenario, between the scenario and the control room area. (Dieckmann, P. 2009 p.116) During debriefing it is important not to push participants into a defensive mode nor to neglect important learning points but to discuss strengths and weaknesses. (Dieckmann, P. 2009 p.61) It is also important that instructors are able to give honest and constructive criticism which help developing suggestions for improvements. (Dieckmann. P. 2009 p.122)

Since simulation is a form of role play, communication is also related to role play. Instructors need a clear understanding of role play and how to use it. For example role play can be used to help participants with questions or pointing out things they may have overlooked with adding a person into the scenario without interrupting the flow. Another form of communication is to verbally simulate senses that cannot be displayed visually, for example what they see, hear, feel, smell, and taste. A third form of communication during the simulation is calling the control room to add verbal simulation of the infrastructure that surrounds the scenario, for example calling the blood bank or a laboratory in a hospital. Finally the physiological communication between the scenario and the control room, where the instructor can influence the patient's physiology by lowering or rising oxygenation and blood pressure. Communication about the scenario refers to moments where the form of scenario is left for a moment to talk in a meta-communicative way, for example when a participant is about to or might damage the simulator

and the instructor interrupts by telling how to interact with the simulator as a technical device. (Dieckmann. P. 2009 p.116-117)

The simulation scenario needs to be executed according to plan. To distinguish verification and validation, you need to ask are the goals able to be achieved by executing what was planned and do the goals reach the desired effects. (Dieckmann, P. 2009 p. 124)

Goal-based scenario (GBS) is based on a background story that is believable, challenging and motivating for the student. The story is linked with the skills that are meant to be learned and the student ability to perform independently. The activities need to be clear decision making situations that result in clear consequences. The student will get immediate feedback on failure or success. Special attention will be given to the form and timing of feedback. Material for further information has to be available for the student at all times and guidance when needed. (Salakari, H. 2007 p. 90). GBS can either be a computer game or role play as long as the content is rich and motivating for the student with interesting and challenging tasks. For example there is a computer simulation called ”Advice the President” where the student acts as USA Presidents’ advisor when a civil war has broken out in a country called Krasnovia. The game is created so that the student uses a menu where he has to use a specific choice and explain that choice based on facts or cases. The student must also prepare a report describes the assignment and choices made. The program contains also other material like video clips, where experts describe similar cases. The student can utilize in the assignment what they have learnt from these video clips. (Salakari, H.2007 p. 94)

The GBS method contain seven phases like goals, assignment, background story, students’ role, scenario functions, resources and feedback. The goals are related to process learning and content learning. The assignment needs to be motivating and somehow realistic, the background story is needed to create the need for the assignment, to motivate and to offer substantial chances to practice skills and search for information. The role of the student has to be the kind that uses needed skills and knowledge. The role is some what realistic and exciting, for example in the simulation ”Advice the President” the

role is the presidents' advisor. The scenario functions needs to be firmly attached to the assignment and task goals. The functions has to have clear decision making situations that have instant consequences, which indicate how the assignment is proceeding. Negative feedback needs to be understood as failure of expectations. The functions can not claim more knowledge than the goals require. The resources need to offer the knowledge that the student needs to complete the assignment and the knowledge needs to be well organized and immediately available. The information is usually best presented in the form of a story so that the knowledge and learnt skills will last in the students' memory. The feedback has to be related to the subject so that it can be understood as failure related to expectations and the feedback has to be timed that it is given when needed for the student to use it appropriately. Feedback can be given in three different ways: coaching, result of action or stories by experts from similar cases. (Salakari, H. 2007 p.98)

Event-based approach to training (EBAT) is a method where essential situations to learn are copied as precisely as possible The required performance will be written as a manuscript and the student will perform in the way that is described in the manuscript. Also the criteria for evaluation will be documented. (Salakari, H. 2007 p.90). This method contains a solid connection between the goals of education, the implementation of the exercises and the students performance evaluation. This reminds a lot the Finnish vocational examination system where the goals are implemented in the curriculum and they are measured and evaluated based on performance. EBAT is originated from aviation education but currently also used in several other branches. (Salakari, H. 2007 p.99)

2.2.1 Principles of learning and teaching

The principles of crisis resource management and non-non-technical skills help optimize simulations. However it is important to keep it simple, when the scenario is used to discuss socio technical interplay the most difficult, delicate and fancy scenarios are not necessary. (Dieckmann, P. 2009 p.125)

Rall and Gaba (2005) have identified the following 15 key principles:

1. Know the environment
2. Anticipate and plan
3. Call for help early
4. Exercise leadership and followership
5. Distribute the workload
6. Mobilize all available resources
7. Communicate effectively
8. Use all available information
9. Prevent and manage fixation errors
10. Cross (double) check
11. Use cognitive aids
12. Re-evaluate repeatedly
13. Use good teamwork
14. Allocate attention wisely
15. Set priorities dynamically

The simulation process takes place in the mind of the trainee, as an internal simulation. As the simulator is a device used for learning process, the learning process also happens in the mind of the trainee. Especially medical simulators are not true to nature no matter how realistic we try to make them and do not score highly with regard to realism. The importance is our ability to imagine. (Dieckmann, P. 2009 p. 202)

The learning process is according to Rasmussen (1983) a mental process and describes our behavior in three categories:

1. Skill-based behavior
2. Rule-based behavior
3. Knowledge-based behavior

Problem solving skills and knowledge are built and expanded by alternation of reflexes and experience. Rule-based skills are achieved and optimized when we try to remember procedures. (Dieckmann, P. 2009 p.203)

Citizens have been handed out group announcements how to take action and cover in a crisis situation. Knowledge and material have been dealt out, but what are the consequences. How many have embraced the given guidance. Everyone reacts differently during a crisis. That is why without practice there are no trained models that have been formed, which is the purpose of civil defense. (Suonperä, M. 1992 p.34)

Father John Dewey warned in 1901 about the gap between theory and practice as an obstacle for learning and encouraged the teachers to integrate training in practice already in school. (Suonperä, M. 1992 p.34)

When planning education using the simulator the following questions arise: how to use the simulator in education, how much, when and what skills to educate using the simulator, how should the education be arranged and how should the teacher act when guiding the learning process with use of simulator Also a essential question is how to integrate the use of simulator to an existing or under planning education. (Salakari, H. 2007 p.116).

2.3 Different simulators

The difference between a simulator and simulation is simple, a simulator is a mannequin or a screen that allows the users to interact with the simulator operator or software, the simulation mechanism. Simulation on the other hand is the event, the simulation scenario that is designed around a specific problem or task with the help of a patient simulator, a simulator room, role play, medical equipment and so on. (Dieckmann, P. 2009 p.42)

There are many kinds of simulators and the qualities that copy the reality varies much. The most simple simulators are based on a desktop computer using a keyboard and mouse, a bit more developed simulator uses a similar setting but has a joystick to help move the object. The most advanced simulators are for example used in aviation where the simulator is a copy of the airplanes' cockpit, these simulators are very realistic and cost tens of million euros. Simulator is a common name used for different teaching or other equipment in use that copies the reality. The simulators have evolved rapidly lately due to improvement of software, computer capacity and partly development of display. This has lead to broadening of use and accessibility tool in teaching.

The ability to imagine yourself to be present in the virtual reality is described as immerse. The virtual learning environments are classified as immersive and non-immersive. A typical non-immersive environment is a desktop computer, it is most used and the cheapest. In a full immersive surrounding the student feels completely outside the physical environment. When the student is moving, the virtual environment reacts to the movements and the user feels like being in another world. These can be head mounted displays (HMD) placed on the head where the display is inside the helmet or cave automatic virtual environment (CAVE) where the stereo picture is reflected on the wall and floor and the user is wearing stereo glasses. Virtual environment creates an interaction between humans and computers, also interaction between students. The environment of virtual reality can be modified to the level of competence or students' needs.

Learning in a virtual environment reduces the students' conceptual burden when it happens in a situation that resembles reality. (Salakari, H. 2007 p.120-121)

As a learning result the student creates a mental model of what he has learned. When it is adapted to reality it is done based on the consisting mental model. (Salakari, H. 2007 p.151) Patient simulators require more human interaction compared with flight simulator. (Dieckmann, P. 2009 p.46)

3 SITUATIONAL AWARENESS

Situational awareness has always been needed through history. In prehistoric time man had to be aware of his surrounding in able to hunt successfully and not be hunted himself. (Endsley, M. 2000) Oswald Boelke recognized the concept during world war one. He spoke of the importance to be aware of the enemy before the enemy is aware of you, also to plan methods how to achieve this awareness. During world war two and the Vietnamese war the investigation of air battles showed that most of the gunned down pilots were not aware of an attack or noticed the enemy too late. This was called lost of situational awareness. The actual concept of situational awareness started 1980's when aviation noticed that the cockpit was too small because of several displays and gauges. Several investigations show that lack of situational awareness has been the reason for aviation accidents.

3.1 Definition

There are several definitions of situational awareness, but simplified it is knowledge about your surrounding and the ability to conclude how to act. Situational awareness is also knowing what is not yet known, what needs to be solved and what others are aware of and what they do not know. (Norri-Sederholm, T. 2015 p.27)

According to Endsley (2000) situational awareness is identifying elements in time and place in the environment, understanding their meaning and a prediction of their situation in the near future. Endsley has created a model where situational awareness is described on three levels: identifying, understanding and prediction. On the first level of situational awareness you identify information from the environment related to the situation. If important information is not gathered or identified, the probability to create a false situational assessment. On the second level you interpret and understand the information affecting the situation. On the highest or third level of situational awareness is the ability to predict what could happen next. (Norri-Sederholm, T. 2015 p.28)

Situational awareness is known to be one of the fundamental grounds in efficient team work. After twenty years of investigation situational awareness is still a debated subject, but despite different opinions researchers have unanimously accepted the meaning of the teams situational awareness to the teams performance. The terms team, shared and distributed are associated with both individual and team situational awareness. The first point of view is the team situational awareness which is more than the combination of the every team members situational awareness. It also includes different team process like working in the team and process of information that helps team performance. Shared understanding of the situation among team members during a specific time is how Salas (1995) defines team situational awareness and in this point of view communication is key. According to Endsley (1995) team situational awareness is a phase where every team member has the required situational awareness to their own responsibility which includes sharing co-ordination and knowledge. The second point of view is shared situational awareness that concludes that each team member possess the same situa-

tional awareness that is associated with common requirements. For a successful outcome of the team requires that every team member has a good situational awareness associated with their own and the common elements of situational awareness. (Endsley, M. 2000)

The definition of shared is debated since it has not yet gotten enough answers and is not yet defined. In the third point of view distributed situational awareness is emphasized by continuous, changing interaction between environment and operator. The basic idea is that every team member experiences the situation in a different way based on his own goal, experience, role and education. This is how everyone has their own situational awareness that has to do with the goal of the assignment. This allows the team members to work together. (Norri-Sederholm, T. 2015 p.30)

3.2 Analyzing situational awareness

Due to the complex nature of situational awareness and the difficulty to measure what happens in the human mind makes it difficult to measure and analyze situational awareness. There are three points of view from which situational awareness is viewed: in-mind, in-world and in-interaction. From a psychological point of view in-mind situational awareness is seen as a phenomena that happens in the human mind. The second in-world view is a technical view where situational awareness is seen more as a situation and the situational awareness is achieved with technical devices such as navigational systems and infrastructure mapping. The third point of view in-interaction situational awareness is seen through interaction of the whole system, its parts and the interaction between them. This is what situational awareness consists of. (Norri-Sederholm, T. 2015 p.31)

Situational awareness is is based on different information sources. It can be information or clues and they can be received through different senses. Some clues can be obvious like an alarm in a system. Some can be subtle that are registered subconsciously. (Norri-Sederholm, T. 2015 p.31)

When analyzing situational awareness it is strived to figure out what is the level of situational awareness and how it can be improved with for example education or what equipments or systems need to be developed to support situational awareness.

There are three different techniques to measure situational awareness: deduction, self-evaluation and inquiry technique. Deduction techniques, such as SABARS (Situational Awareness Behaviorally Anchored Rating Scale) try to seek indirect proof of situational awareness with detectable things. In the study the individuals performance, behavior and physiology is observed to then get indirect proof of the awareness or lack of awareness in situational awareness. Self-evaluation technique is used to find subjective proof of situational awareness that are obtained by individual self-evaluation. It can be done once or several times during the exercise or afterwards. Inquiry technique is meant to find direct proof of individuals content of situational awareness. Questions that are asked are things that should be detected or understood about the situation and the answers are compared to the actual situation, for example ”what is your current speed?”. These techniques are used to measure individual situational awareness. It is difficult to obtain a research method that can be used to study situational awareness in a team. Some of the same principles can be used to study team awareness that is used to study individual performance. (Norri-Sederholm, T. 2015 p.32)

Fatigue, wrong mood, too many tasks and bad communication are one of many reasons for reduction of situational awareness. Failure in communication is one of the most common reasons. Transformation of information to the right person is either delayed or lacking. (Norri-Sederholm, T. 2015 p.33)

4 CRISIS MANAGEMENT

The preparation components of crisis management plan (CMP) must be tested regularly. The testing involves running simulated crises and drills that determine the fitness of the CMP. A real crisis involves execution of the same crisis management resources, only the outcomes are real rather than hypothetical. In an actual crisis, responses seek to achieve outcomes related to reducing the negative impact of a crisis. (Coombs, T. 2015)

Crisis management ideally begins before the crisis starts. This means knowing what your resources are, personnel and equipment. A lot of stress can be reduced during a crisis when knowing the technical, human and organizational environment. Resources are there to be used. (Rall&Dieckmann. 2005)

Revision, one crisis factor, involves evaluation of the organization's response in simulated and real crises, determining what went right and what it did wrong during its crisis management performance. The organization uses this insight to revise its prevention, preparation and response efforts. The more and varied the crises an organization experiences through practice sessions, the better it can handle similar situation in reality (Coombs, T. 2015).

In USA the Agency for Healthcare Research and Quality (AHRQ) and the Department of Defense (DoD) have developed a systematic approach to integrate teamwork into practice called TeamSTEPPS, Team Strategies and Tools to Enhance Performance and Patient Safety. TeamSTEPPS is the direct outcome of the 1999 Institute of Medicine (IOM) report *To Err is to Human* where research showed that due to problems associated with patient safety medical errors caused 98 000 deaths annually.

According to research, the majority of errors identified were related to human or system factors, such as ineffective team leadership, non-standardized team communication, lack of global situation awareness, poor use of resources and inappropriate triage and prioritization (Petrosniak&Hicks. 2013).

TeamSTEPPS was released in November 2006 as the national standard for team training in health care and is the result of a 3-year research program funded by the DoD Patient Safety Program (PSP). TeamSTEPPS introduces tools to and strategies to improve team performance in health care. It is also designed to improve quality, safety and efficiency of health care. Health care workers share a common goal of safety and quality in care, but they perform interdependent tasks and have specific roles, they come from separate disciplines and diverse educational programs which means teamwork is critical to ensure patient safety.

4.1 ACRM

The importance of teamwork in health care emerged in anesthesiology when Anesthesia Crisis Resource Management (ACRM) was developed by David Gaba and colleagues over a decade ago to help anesthesiologists effectively manage crises by working with multidisciplinary teams. Using patient simulators ACRM provides training in specific technical skills and in generic teamwork skills.

A medical error is defined as error of execution or the failure of a planned action to be completed as intended. It can also be an error of planning or the use of a wrong plan to achieve an aim. The aviation industry has developed a crew resource management training to train flight teams in “nontechnical” skills. Like aviation, healthcare can be classified as a high-hazard industry. That is why crew resource management has been utilized into health care as crisis resource management (CRM). Where the flight-crew train effective communication, close-loop communication, cross-checking and cross-monitoring, leadership, resource utilization and situational awareness in health care the focus is on communication, leadership, situation awareness and resource utilization. The purpose of aviation-based CRM training is to improve team behaviors. While effective medical team performance requires individual task work, during crisis situations teamwork skills are required. A team of experts does not necessarily constitute an expert team. (Petrosniak & Hicks. 2013)

Although medical errors are ubiquitous and inevitable, the nontechnical skills are meant to address the limitations of human ability while teaching practical error management strategies. Ambient noise, crowding and diagnostic ambiguity during complex, rapidly evolving scenarios can negatively impact cohesive team behaviors and pose direct threat to patient safety. Acute stress further erodes decision making and team performance, promoting loss of situational awareness and encouraging errors in reasoning and heuristic decision making. (Petrosniak & Hicks. 2013)

Simulation based training is a way of learning and practice without posing a threat to patient safety and effective CRM training should demonstrate a positive influence. During simulation training there should be two key characteristics: acuity and opportunity. The potential severity of the event and patient impact and the frequency in which the team is required to manage the event. There are two essential aspects that the team is analyzed by: individual performance (task skills) and team performance (cognitive, behavioral and attitudinal approach of the team). There is no one-size-fits-all intervention for effective team training, CRM principles should be tailored to suit the domain-specific needs in which the team is likely to operate. Effective CRM training includes focused feedback through structured post scenario team debriefing. Particularly situation assessment, leadership and team communication should be targeted toward the entire team.

Petrosniak and Hicks write that for future effective team training they propose a "Triple Threat" framework that includes to promote the creation of shared mental models for resuscitation teams, formally investigate the impact of stress on team performance and refocus CRM training as a strategy to combat error and improve decision making. With mental model it allows a person to predict the behavior of the world around them among others and construct expectations for what is likely to happen next. In team work this means team members ability to predict rather than discuss each other's needs during a complex, high stakes operation. Acute stress may default individual's heuristic-based reasoning and lower receptiveness, compromising situational awareness and promoting suboptimal problem solving and decision making. Therefore it is important to train stress with three sequential steps: identify and understand acute stress, skill acquisition and rehearsal, and skill application. During a crisis situation cognitive errors may occur,

such as forming conclusions using irrelevant information or ignoring key modifiers. By using cognitive forcing and error mitigation strategies to reduce error and developing the CRM.

4.2 ANTS

The Anesthetists' Non-Technical Skills (ANTS) was developed in Scotland during a four-year collaborative research project to help trainees in Anesthesia trainee program to acquire necessary knowledge, skills and values to meet the challenges of consultant practice. In medical education it has been recognized the importance of reflection in training of professionals. Therefore feedback on strengths and weakness and self-reflect are more effective when analysis of performance. The usual cause of accidents and incidents in anesthesia are a combination of organizational and operational factors. As many as 80% of the "human errors" are due to poor communication, inadequate monitoring, failure to cross-check drugs and equipment, rather than lack on technical knowledge or equipment problems. Loss of situation awareness and poor team interactions has also arisen highlighted difficulties in research while observing medical teams in operating theaters. In order to reduce such problems anesthetists' need another set of skills known as non-technical skills. They are not directly related to the use of medical expertise, drugs or equipment but defined as behaviors. They include both interpersonal skills (communication, team working, leadership) and cognitive skills (situation awareness, decision making). These are not new skills but haven't been formally taught earlier just acquired along the way. The purpose of examining non-technical skills is to support the development of overall good practice. The ANTS System can be used to assess an individuals' behavior, to provide input for the training process and for structuring feedback on skills development. The ANTS System is divided in to four categories and each category has different elements.

4.2.1 Task Management

Either it is individual case plans or long term scheduling, skills for organizing resources and activities required to achieve goals. Task management involves planning and preparing, prioritizing, providing and maintaining standards and identifying and utilizing resources. It is important to develop in advance primary and contingency strategies, also to update them to ensure goals will be met. To be able to identify key issues and allocate attention to them accordingly. Supporting safety and quality is accurate to provide and maintain standards. Good task management involves establishing the necessary and available requirements for task completion.

4.2.2 Team work

Five skill elements to team work are coordinating activities with team members, exchanging information, using authority and assertiveness, assessing capabilities and supporting each other. In order to be able to carry out both physical and cognitive activities it is important to work together with others and understand the roles and responsibilities of other team members. To successfully lead the team or task as required but also to be able to accept a non-leading role when appropriate. For team coordination and task completion giving and receiving knowledge or data is necessary. Evaluating the team members' different skills and their ability to deal with a situation is to assess capabilities.

4.2.3 Situational awareness

To develop and maintain an overall awareness of the work setting is based on observing all relevant aspects of the environment, to understand the meaning and thinking ahead what could be. Situation awareness includes three elements: gathering information, recognizing and understanding and anticipating. Continuously monitoring all available data sources and observing the environment is actively and specifically collecting data.

Then interpreting the collected information to identify the match or mismatch between the situation and expected state. Then thinking ahead about potential outcomes and consequences, asking “what if” questions.

4.2.4 Decision making

In both normal situations and time-pressed crisis situations being able to make a diagnosis of the situation or take a course of action. The three skill elements include identifying options, balancing risks and selecting options and re-evaluating. To weigh the threats or benefits of a situation considering advantages and disadvantages of different courses of action continuously re-assessing the situation.

Human error problem can be viewed as the person approach and the system approach. Aberrant mental processes such as forgetfulness, inattention, poor motivation, carelessness, negligence and recklessness are viewed as unsafe acts and what the person approach focuses on. It is more satisfying to blame individuals than targeting institutions. It seems obvious that an individual is responsible if something goes wrong. This approach however has short comes and does no suit the medical domain. Often the best people make the worst mistakes- error is not the monopoly of an unfortunate few. Also mishaps tend to fall into recurrent patterns. In aviation maintenance some 90% of quality lapses were judged as blameless. The system approach focuses on the conditions under which individuals work and tries to build defenses to avert errors or mitigate their effects. Humans are fallible and errors are to be expected even in the best organizations. (Reason, J. 2000)

4.2.5 The Swiss cheese model

A key position in the system approach is defenses, barriers and safeguards. Like the Swiss cheese having many holes is the reality however in an ideal world each defensive layer would be intact. Unlike the cheese, the holes are continuously shifting their location, opening and shutting. This indicates that one "slice" does not usually cause harm but when momentarily many layers line up to permit a trajectory of accident opportunity. The holes in the defense arise for active failures and latent conditions. Active failures are the unsafe acts committed by individuals and latent conditions can translate into error provoking conditions within local workplace or create long lasting weaknesses in the defenses. (Reason, J. 2000) This is why it is important to always double check what you know from different sources. It is about making sure it is not an error, because sometimes eyes are faster than the brain and our mind fools us in trying to make things fit consistently. (Rall&Dieckmann. 2005)

4.3 Mental models

A mental model can be described as an inner representation of the surrounding world, the relationships between its various parts and a person's intuitive perception about his/her own acts and their consequences. With the help of mental models behaviors can be shaped and set an approach to solve problems and doing tasks. (Salakari, H. 2007 p. 81) According to Jay Wright Forrester mental model is defined as *the image of the world around us, which we carry in our head, is just a model. Nobody in his head imagines all the world, government or country. He has only selected concepts, and relationships between them, and uses those to represent the real system.* (Forrester, J. 1971)

Before a performance mental models are used to improve the outcome for example by having an inner discussion with yourself or doing a relaxation exercise before the performance to induce the level of competence. In sports mental models such as imagining yourself in the role of an expert to induce performance are used. (Salakari, H. 2007 p. 87)

Takano, Sasou and Yoshimura (1997) state that with simulation practice in nuclear plants the mental models of the staff have developed and made it possible to handle many kinds of problems if they occur in real surroundings. (Salakari, H. 2007 p.81)

5 CRISIS

A crisis is a sudden, unexpected event that poses an institutional threat. An essential part of every organization's crisis management capabilities' are simulations and training exercises. Crisis simulations are used to help select and develop effective crisis leaders in an organization. The primary goal is to assess the leader's crisis competencies. The single most critical factor in a crisis and the determination of how the crisis is resolved is having effective leaders. The basic principles of developing and creating a high-quality simulation are assessing the needs, designing the exercise, measuring performance, providing feedback, coaching and development. Behavioral Crisis Analysis (BCA) is used to gather information for creating a good crisis simulation. Its purpose to identify the tasks and activities performed by the crisis leader, the knowledge or competencies needed to successfully complete the tasks and and activities, also the context within which one will execute the tasks and activities. This is needed to determine what qualities a good leader needs and what kind of environment he is working in. Although outcomes are important aspects of performance they provide limited information since there might be things that are out of the leader's control during a crisis. That is why measuring behavioral competencies during performance are more informative. The competency list though needs to be specified, for example 'oral competency' is vague and abstract compared to 'adjusts vocabulary and communication style to better match the background of one's audience'. Different organizations require different competencies for good leaders, but analysis and problem solving competencies are needed in most crisis situations. Generally framing skills, technical skills, motivational skills, negotiation and conflict resolution skills, communication skills, decision making capabili-

ties, behavioral flexibility and adaptability, planning and organizing, innovation, creativity and resourcefulness are competencies that are valuable.

The simulation should be realistic and the participant is able to ’feel the heat’ and should contain an appropriate amount of uncertainty and chaos since crises are often described as confusing times. The actions and decisions should not be transparent, the ideal is to give the participant an option to respond in different ways with the possibility for different subsequent outcomes. Crises often unfold with twists and turns, that is why surprises and new information can be introduced throughout the simulation to make the crisis realistic. Participants should be provided with enough background information and be able to do well in the exercise. It is important to ensure enough psychological fidelity instead of focusing on a real scenario since they are often too expensive. The simulation usually require role-players to interact with the participant. The role-players should have the opportunity to become familiar with the script and practice so they can learn to anticipate and interact with the real candidate. The most important is giving feedback and coaching. It is also the most difficult to master since it is also requires oral communication, leadership skills and flexibility and interpersonal sensitivity. Some important qualities for coaching is to provide behaviorally-specific performance feedback, allowing the participant a chance to practice and develop the new skills, focusing only on a few key training suggestions at a time, not omitting the positives, creating a joint developmental plan, to model effective behaviors for the participant, helping the participant compensate for weaknesses by leveraging strengths, establishing supportive, trusting relationships by fostering a warm open climate for the participant, emphasizing that the feedback is only from your perspective and does not necessarily represent ’objective reality’, showing empathy but remaining accurate and truthful and not being judgmental.

Ineffective communication, resource allocation issues and information mismanagement are some of the major challenges with team coordination during crisis management. Simulation training is important but it is often focused on intra-organizational rather than inter-organizational since during disaster relief actors can be governmental agencies, non-profit voluntary organizations or spontaneous helpers. There may be variation in competence, resources, endurance and agility. Interaction and simulation between different actors could improve disaster preparedness. The final outcome of a disaster situation is highly dependable on preparations made before the disaster occurred.

A large number of medical schools and health care institutions have turned to simulation-based learning. It is a technique for practice that helps health professionals' develop knowledge, skills and attitudes in a safe environment to protect patients from unnecessary risks. Simulation can be applied to many different disciplines and trainees. In medical education it is important for students' to interact with live patients to learn skills and communication, but to be able to ensure patients' safety at the same time. The essence of a team is the shared goal and commitment. Simulation training improves training according to studies, but unfortunately there has not been studies that simulation training improves patient care outcomes directly. Life-threatening complications are rare.

6 LEADERSHIP

Leadership is a complex phenomenon. For centuries the concept of leadership has been studied and images come up of powerful individuals who command armies, found nations and change the world. Understanding the nature of leadership process has been the subject for much study, how leaders influence the course of events and inspire their followers. There are numerous definitions of leadership but they seem to have in common that ”leadership is a process of social influence through which individual enlists and mobilizes the aid of others in the attainment of a collective goal” (Jones, J. 2010 p.23).

Leadership is a relationship between those who aspire to lead and those who choose to follow, it involves the obtaining and utilizing the assistance of other people. Still leadership is the most studied and least understood topic of any in the social sciences. There are listed categories of leader behavior characteristics which are planning and organizing, problem solving, clarifying, informing, monitoring, motivating, consulting recognizing, supporting, managing conflict and team building, networking, delegating, developing and mentoring, and rewarding. (Jones, J. 2010 p.24)

Leadership can also be divided into components to identify the phenomenon: Leadership is a process, it involves influence, occurs in groups and leadership involves common goals. The process does not mean a trait or characteristic that resides in the leader, but it implies that a leader affects and is affected by followers. Leadership involves influence and it is the sine qua non of leadership, without it leadership does not exist. Leadership occurs in groups and they are the context in which leadership takes place. The last component includes attention to common goals, where leaders direct their energies toward individuals who are trying to achieve something together. (Northouse. P. 2013 p.5-6)

A team consists of a leader and followers. Leadership is someone who takes command, distributes tasks and collects information. It is not about who is right and knows the most but about what is right. The leader uses clear communication to coordinate and plan, also distributes the workload. The team leader should be hands-off from the patient in able to observe, gather information and delegate tasks. Followers are just as important for the team to function, they are the ones whom leadership is directed towards (Northouse, P. 2013 p.6). To be able to listen what the team leader says and does what is needed, but still has the responsibility for the patient equally and raises concerns if the follower thinks the leader is about to make wrong decisions. Followers should also actively look for things that need to be done. (Rall&Dieckmann. 2005)

Communication is a key factor in crisis situations. It includes every team member being on the same page. Sometimes communication can be difficult if the message is not received properly, because meant is not said, said is not heard, heard is not understood

and understood is not done. So acknowledge what is heard and confirm when the task is completed for successful communication. (Rall&Dieckmann. 2005)

7 AIM OF THE STUDY AND RESEARCH QUESTIONS

Current disaster training programs are inefficient in equipping disaster actors with non-technical skills for disaster response. This study seeks to illustrate different alternatives to train leadership skills and the basics of simulation settings. The paper attempts to provide suggestions for enhancing leadership skills in crisis management.
The collected information will serve Arcada Patient Safety Learning Centre to improve training leadership skills in different ways.

The research questions are:

How to practice leadership skills in disaster settings with simulation training?

What is situational awareness?

8 RESEARCH METHODS

When searching for literature regarding simulation training, the search results were enormous but not specific. Usually the results were regarding simulation training inside the hospital, for doctors, specific areas of expertise but quite little about disaster training per se. That is why scoping study was conducted in this research to ”map” relevant literature in the field of interest. The amount of articles selected were ten (N=10) that were conducted internationally in the UK, the USA and Canada. Unfortunately no national research was found. The material found was wide, but considerable and specific

material was poorly found. When thinking about the research questions there were many answers rising from the theory part that could be used also as results.

The university librarian helped with creating the search strategy, by using the PICO method (Problem/Patient, Intervention, Comparison, Outcome). The research question is divided by the PICO system to help conduct the material search. However there is no comparison in the research question so this part was not used. The main databases chosen for data collection were CINAHL Full text and PubMed, as these most likely give the most relevant results in health care sciences.

Database	Search words
EBSCO	(Leader OR leadership) AND (crisis OR disaster) AND (simulation OR training)
PubMed	(Leader OR leadership) AND (crisis OR disaster) AND simulation
ProQuest	leadership AND (crisis OR disaster) AND simulation

Table 1. Databases and search words

When conducting a systematic literature review, the research question is usually precisely identified so that the designs of the study can be identified in advance and the answers are provided from a relatively narrow range of quality assessed studies. While scoping studies provides a wider range of alternatives and many different study designs. (Arksey & O'Malley, 2005, p.20)

There are two ways of thinking when it comes to scoping study, one that could be understood as a part of an ongoing process of reviewing which ultimately aims to produce a full systematic review and the other that sees the scoping study as a method on its own and leading to publication. (Arksey & O'Malley, 2005, p.22)

Regardless of the study design, the scoping method is guided by a requirement to identify all relevant literature rather than letting the highly focused research question lead to search for particular study designs. There are strengths and limitations to this kind of search method. Time is probably the key factor in this type of study, it takes relatively short time to conduct a scoping study where it can be used to search available research in a transparent way and results presented in an easy format for practitioners, consumers and policymakers to understand compared to a full systematic review that takes time. However there is no universally accepted procedure for conducting a scoping study, therefore it generally does not appraise quality in included studies. This can lead to questionable final results as the quantity of available data can be massive. Decisions regarding breadth of data (covering all available data) versus depth (smaller number of studies providing a detailed analysis and appraisal) might be needed (Arksey & O'Malley 2005 p.23).

To make effective use of findings it is good to represent the results in an accessible and summarized format.

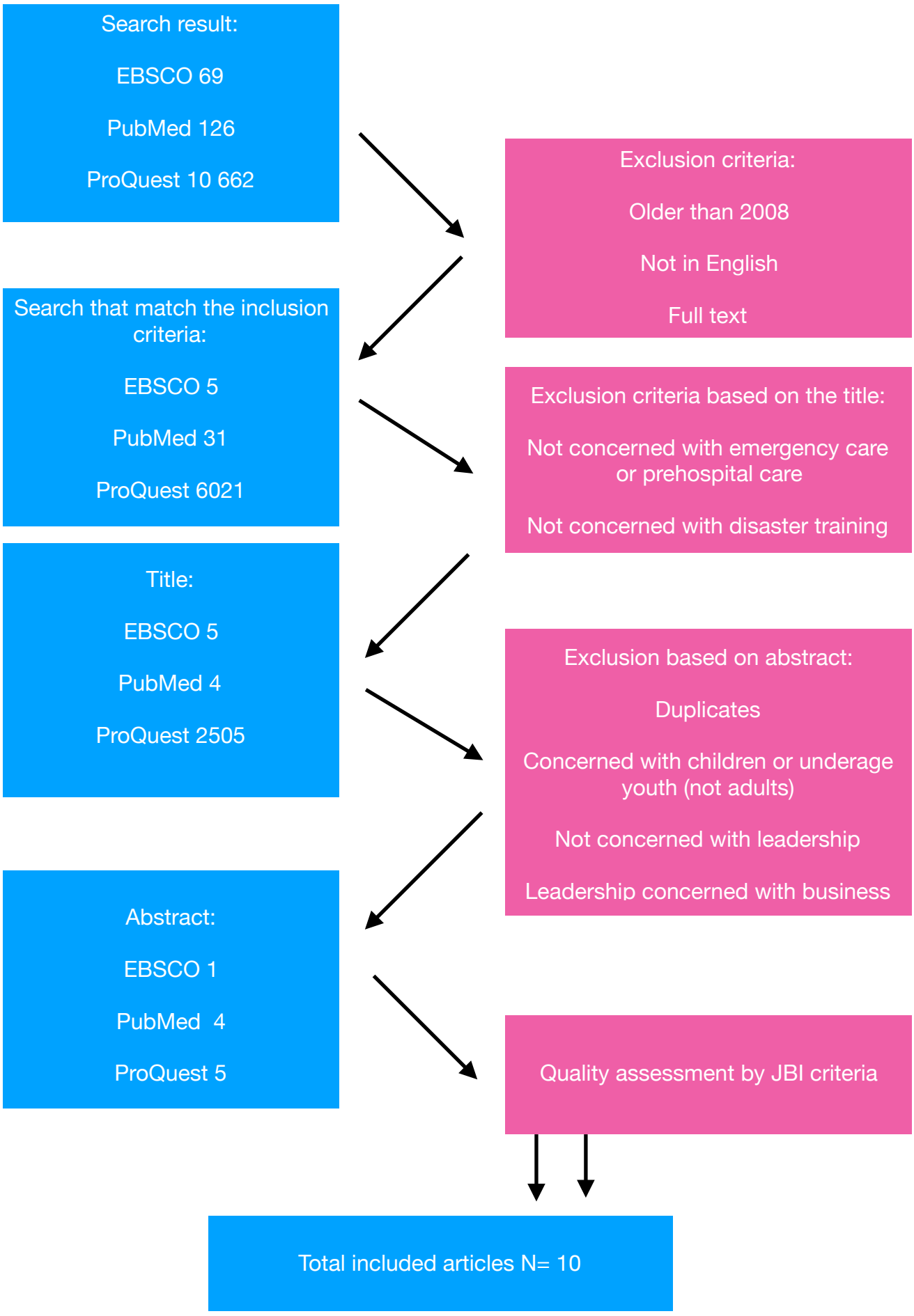

Figure 1. Data collection process

Inclusion	Exclusion
Research or expert article	Other types of articles
Academic journal or recognized professional journal	Published in other magazines
Between 2008-2018	Before 2018
English	Other languages
Full text available	No full text available
Healthcare	Business

Table 2. Inclusion- and exclusion criteria based on outset

9 RESULTS

This thesis included ten previously conducted studies that involved leadership skills, training in simulation settings and training for disaster settings, and gave suggestions for improving practice for preparation of disaster and leadership skills in simulation settings. The literature search included leadership training for disasters, only two articles were directly involving disaster training. The results will be presented article by article and in the end a summary of the main and most important results.

9.1 Reviewing results

We live in a volatile, uncertain, complex and ambiguous world (VUCA) and humanitarian workers frequently operate under these conditions where typical strategic processes of timing, planning, decision making, executing and reflecting are challenged by pres-

sured and unpredictable circumstances. When dealing with disasters the ability to respond effectively under the most acute and immediate circumstances is demanded. To help prepare aid workers beyond what theory and knowledge can offer, experimental training such as games and simulations are needed. Comfort with ambiguity, flexibility and adaptability are some of the most important skills for program leaders for effectiveness in disaster situations. A vital aspect of humanitarian intervention is training aid workers in critical skills for disaster readiness. The problem with humanitarian organizations is usually their conservatism and ineffectiveness with staff training, relying heavily on what is known rather than using simulations and role-plays that have been proven valuable tools in creating experiences relevant for preparing aid workers for crisis situations. Improvisational activities are used as a new way of learning and an excellent modality for training aid workers to deal with disaster and crisis scenarios where decision-decision-making and collaboration under pressure are critical. It is spontaneous and playful, but can be perceived as frivolous as it may not be valued or respected. Playfulness and fun however enhance openness, interactivity, creativity and engagement which helps relieve tension and engages participants successfully. (Tint et al. 2015)

Everything that could go wrong in Hurricane Katrina did. The political leaders failed to order evacuations in advance for all and assist the vulnerable and poor population who were unable to move. Also administrative preparation failed, the nation's most important agency FEMA that was expected to act with preparation but they didn't and lacked with basic supplies of food, water, logistics, organizational coordination, and interagency and network capacity. Chaos is expected as a normal condition in crisis and emergency situations, and it must be treated as another challenge and managed with knowledge, expertise, and capacities different from normal or routine emergency management processes. That is why the use of professionally trained people for emergency and crisis management, trained leadership capacity with chaos and crisis management knowledge and skills, and anticipation of impossibilities through "surprise management" knowledge, skills and attitudes are needed. (Farazmand. 2009)

The globally elevated terrorist threat has brought major incident preparedness into focus around the world. Effective response requires co-ordinated multidisciplinary approach which may involve local, regional and national healthcare institutions. In the UK, acute hospitals are required to prepare for major incidents by undertaking a live exercise every three years, a tabletop exercise yearly and a test of communications every six months. Live exercises are the accepted "gold standard" for both pre-hospital and hospital response, but they are costly and time-consuming to organize, and may be disruptive to local services. It has been stated that an enhanced tabletop exercise (Emergo) can substitute for live training if necessary. Current exercises focus primarily on the ability of organizations to follow a pre-defined incident plan, rather than improve the skills of individuals or teams involved in incident response, there is therefore a corresponding lack of structured feedback to individual participants. In addition, high-profile reports and analyses of responses in major incidents around the globe have been critical of emergency response and expressed the need for improved, scalable training provision. A study was made to demonstrate the feasibility of utilizing virtual world environments for multidisciplinary, multiuser, major incident training, both in the pre-hospital and hospital settings. The findings demonstrate the potential for running larger-scale exercises across multiple sites, based on realistic resource constraints, involving multiple agencies in real time. While virtual environments are not a substitute for hands-on training; they cannot simulate the physical elements of incident response, nor can they provide training in the dexterity of performing procedures on a patient. However, the response from the participants in this study indicates that the environments are appropriate and realistic enough to provide a setting for training, and possibly assessment, of decision-making and team skills in stressful environments, and associated non-technical skills, such as leadership and communication which have been identified as essential response competencies. (Cohena et al. 2013)

Previous literature has been conceptual rather than empirical, there are not many studies made yet and further research is needed to compare findings with other high intensity and complex situations outside of health care like disaster management. Traditional simulation is currently used extensively to tech non-technical skills in crisis an other

interventions, but this may be harmful if such education only focuses on task-driven aspects of leadership or the static role of a single overall medical leader. Education should be systematized because education for non-technical skills is still largely sporadic. Non-technical skills are realized to be important especially in complex critical care, but they are still left at chance. (Paquin et al. 2018)

The simulation room is an ideal setting for teaching the principles of crisis resource management (CRM). In a simulated crisis, vital non-technical skills, such as task management, teamwork, situation awareness, and decision making can be practiced safely. Despite an abundance of existing literature on simulation-based education and CRM, only nine articles were identified that examined transfer of learning to the workplace by healthcare providers or changes in patient outcome after simulation-based CRM training. The vast majority of the literature has been limited to lower-level outcomes, such as reaction of participants and learning that has been measured using further simulation scenarios. According to Boet et al it leaves the studies open to the criticism that learners may have been taught to perform well only in the simulator and not necessarily in real life. An ideal framework for simulation and education interventions would account for complexity of interventions, maintenance of behavior changes, and differentiate between self- and external skill assessment and between simulated and real practice. (Boet et al. 2014)

CRM training for team leaders only have been shown to improve team effectiveness than mere training for every team member. Team effectiveness is determined by a reciprocal influence between the effects of four primary leadership functions (information search and structuring, problem solving, managing personnel resources and managing material resources) and the four types of team precesses (cognitive, motivational, affective and coordination). The team role concept of leaders trained in a separate explicit step appears to be an efficient way to foster team processes and outcomes a whole. (Castelao et al. 2015)

Communication courses focus solely on verbal communication even though other forms are just as important or more important if verbal and nonverbal communication are discordant. The Standardized Trauma and Resuscitation Team Training (S.T.A.R.T.T.) course focuses on training multidisciplinary trauma teams highlighting CRM skills: communication, teamwork, leadership, situational awareness and resource utilization. Previously held only in English but with modifications made to the course curriculum in order to satisfy the learning needs of a bilingual audience the results suggest that bilingual multidisciplinary CRM courses are feasible, are associated with high participant satisfaction and have no clear detriments. The language gap appeared to reinforce the CRM teaching points by emphasizing that communication is more than just what you say. While verbal communication refers to the words spoken, paraverbal communication refers to how loud, emotional or rushed that communication is, and nonverbal communication refers to eye contact, hand gestures, body language and facial expressions. Bilingual simulation also provided the stimulus to test novel ideas that can supplement the course, regardless of future location or language. (Gillman et al. 2016)

Physicians need to possess not only medical knowledge and technical skills but also crisis resource management skills. However emergency medicine (EM) residency programs are not given specific instructions as how to teach these skills to their trainees and that is why a simulation-based CRM course was designed for novice EM residents as a pilot study. The CRM course improved leadership, problem solving, communication, situational awareness, teamwork, resource utilization and overall CRM skills displayed by teams of EM interns. While the improvement from pretest to posttest did not reach statistical significance for the pilot study, the large effect sizes suggest that statistical significance may be achieved with a larger sample size. (Parsons et al.2017)

Successful teams include effective communication, comprehensive decision making, safety awareness and the ability to resolve conflict. Strong leadership is important for a team to function effectively but just as important is the concept of followership. In order for a team to perform well, five major components are needed: team leadership, mutual

performance monitoring, backup behavior, adaptability, and team orientation. Failure of role-assignment to team members is one of the most significant causes of stress, also a team can not be led or built without leaders. CRM is being adapted and employed in healthcare to improve situational awareness, enhance communication and reduce hierarchy-related barriers. (Ezziane et al. 2012) The conventional model of stable teams with constant leadership does not apply to the majority of healthcare teams. There are three types of healthcare teams: ongoing team that have worked together before on a regular basis, is stable with fixed leadership. They have formally established structure and goals. The second team is a microsystem team, a small organizational unit where patient needs are met and value is created (orthopedic surgery). The third, rapidly formed team is comprised with a group of healthcare staff that comes together unplanned to address a specific, often emergent, purpose. Even though the team consists of highly trained professionals they may never have met before, unlikely to have worked together before and probably wont work together again. (Riley et al. 2011)

In a study focusing on rapidly formed, critical event teams the importance of the leader of healthcare team emerged throughout the study results. Situational awareness was found to be maintained approximately 50% of the time overall, though teams were more likely to loose situational awareness during the most critical stages of the response. Shared mental model and closed-loop communication are both extremely important to high performance in team responses, yet both consistently occurred less than 50% of the time. These were identified as the second and third most common active failures in simulated events. The study indicates that leadership transfer occurred frequently but was often not explicit, leading to potential for a loss of shared mental model and breaches in safety. The dynamic and ephemeral characteristics of rapidly formed health care teams require that individuals are trained in effective team behaviors, rather than teams be trained together for high performance. The focus should be on teaching individuals the non-technical skills needed. (Riley et al. 2011)

9.2 Summary

From the aspect of the study and keeping in mind the research questions there were a few articles that raised answers which were conclusive for this study.
A vital aspect of humanitarian intervention is training aid workers in critical skills for disaster readiness. The problem with humanitarian organizations is usually their conservatism and ineffectiveness with staff training, relying heavily on what is known rather than using simulations and role-plays that have been proven valuable tools in creating experiences relevant for preparing aid workers for crisis situations. (Tint et al. 2015)

The simulation room is an ideal setting for teaching the principles of crisis resource management (CRM). In a simulated crisis, vital non-technical skills, such as task management, teamwork, situation awareness, and decision making can be practiced safely. (Boet et al. 2014) CRM training for team leaders only have been shown to improve team effectiveness than mere training for every team member. Team effectiveness is determined by a reciprocal influence between the effects of four primary leadership functions (information search and structuring, problem solving, managing personnel resources and managing material resources) and the four types of team precesses (cognitive, motivational, affective and coordination). The team role concept of leaders trained in a separate explicit step appears to be an efficient way to foster team processes and outcomes a whole. (Castelao et al. 2015)

10 DISCUSSION

The purpose of this study was to provide suggestions for enhancing leadership skills in crisis management using simulation settings. In simulation settings practice can be trained safely to improve non-technical skills, such as task management, teamwork, situation awareness and decision making. It can also be applied to many different professions. Simulation is a versatile tool that can be set up broadly depending on the scenario and purpose of training.

According to previous research and numerous literature the importance of non-technical skills have been established and recognized. Still there is little research done on the implementation of these skills in to actual training and current disaster training programs are inefficient with equipping disaster actors with non-technical skills for disaster training.

The problem with conducted studies made are the limitations made by small sample sizes, this may affect the results. (Parsons et al. 2017) Exercises are seen as time-consuming and expensive to execute, but the use of virtual exercises could be seen as substitution for live training if necessary. It demonstrates the possibility to run large-scale exercises across multiple sites based on realistic resource constraints and involving multiple agencies at the same time. (Cohena et al. 2013) This could help NGO's (non-governmental organizations) around the world to work together and organize exercises at the same time getting a uniform operating model in disaster training. Studies demonstrate the feasibility of utilizing virtual world environments for multidisciplinary, multi-user, major incident training (Cohena et al. 2013) and this could help lower the threshold between countries helping develop disaster preparedness. Although a small-case study (Cohena et al. 2013) there is indication that virtual environment would likely improve immersiveness over Emerge and some tabletop exercises based on the local or novel surroundings by placing participants into realistic and stressful environments. In Finland simulation training is till a a prime factor but tabletop exercises like the XVR 3D operating environment are used to teach leadership for example in Kuopion Pelas-

tusopisto and Keski-Suomen pelastuslaitos (Hirvi, R. 2015) in different types of accidents to practice rescue operations leadership, planning and cooperation skills. This is cost-effective and saves time, while training areas can take weeks to prepare for one day of training. The goal with virtual environments is to promote learning and execute time. With traditional simulation you also learn technical skills but virtual training you develop thinking and produce observation skills. When using virtual environments communication is the main tool, this is noticed then information is not distributed or there is none. The future wish is to have a training environment non dependent on place and time.

Ineffective communication, resource allocation issues and information mismanagement are some of the major challenges with team coordination during crisis management. Simulation training is important but it is often focused on intra-organizational rather than inter-organizational since during disaster relief actors can be governmental agencies, non-profit voluntary organizations or spontaneous helpers. There may be variation in competence, resources, endurance and agility. Interaction and simulation between different actors could improve disaster preparedness. The final outcome of a disaster situation is highly dependable on preparations made before the disaster occurred.

There is a huge variation of different simulators, from expensive in room built simulators to virtual worlds to role-play with no equipment needed. Leadership skills have been recognized as needed in crisis management and team building and effectiveness, but training has not been studied or implemented in programs effectively. For future education this is needed to train leadership skills. According to Gillman et al (2016) language is not considered an issue when conducting a bilingual course in a communication course.

CRM principles, including situational awareness are important for leadership skills and can be trained ideally in simulation settings according to Boet et al. Situational awareness was not discussed in any research separately, only mentioned to be of importance to leadership skills thus leaving the second research question unanswered.

11 TRUSTWORTHINESS AND INTEGRITY

There are some limitations to this research, despite the best effort unfortunately lack of experience in conducting scoping studies might affect the quality of the results. It is possible that some literature was overlooked due to the fact that research was focused on electronic databases and literature reference lists. Also according to Levac, Colquhoun and O'Brien (2010) it is suggested that scoping studies be made in teams or at least the minimum of two researchers to discuss the searching process and bring different perspectives. In this case there was only on researcher an despite the attempt of reflexibility that may affect the literature that was chosen, analysis conducted and results interpreted.

Qualitative research strives to maintain openness, flexibility and freedom to include new ideas or exclude previous aspects included but later on not considered relevant. While flexibility and freedom provides certain advantages, it can also create problems in terms of comparability of the information gathered. During the preliminary and final stages of data gathering it is possible that the areas of search may become markedly different. The exact nature and extent of the research problem you propose to find answers is not predetermined in qualitative research. (Kumar, R. 2011)

To establish thurstworthiness of qualitative data Lincoln and Guba (1985) have suggested four criteria: credibility, dependability, confirmability and transferability. First credibility that involves two aspects: carrying out the study in a way that it enhances the believability of the findings and taking steps to demonstrate credibility to consumers. Second dependability refers to data stability over time and condition, for example to undertake a stepwise replication. Third confirmability is the objectivity or neutrality of the data. Fourth transferability according to Lincoln and Guba (1985) is to which extent the findings can be transferred to other settings or groups, in other words generalizability of the data. These four indicators reflect validity and reliability in qualitative research. (Polit&Beck. 2012 p.430-436)

Because there are no rules for analyzing and presenting qualitative data it makes qualitative analysis more complex and difficult than quantitative analysis. Also the enormous amount of work is required to analyze the data. (Polit&Beck, 570) Critical appraisal of decisions and continuous self-reflection was ongoing on the part of the researcher to ensure criticality and integrity. This was done as a reflective thought process and notes, where the researcher continuously questioned decisions, methods and ideas. But this could have been conducted for example by keeping a reflective journal. (Polit & Beck 2012 p. 589)

12 ETHICAL CONSIDERATION

It is important to consider if the planned research is relevant, useful and justifiable to others when planning the study, choosing the topic and developing research questions. (Kumar, R. 2011) Also part of the planning of the thesis involved consideration into the relevance its results could have for working life.

The research must be conducted according to the responsible conduct of research in order for it to be ethically acceptable and reliable and for the results to be credible. Often research proposals have to go trough an ethical review before research is conducted and the necessary research permits have to be acquired. (Finnish Advisory Board on Research Integrity, TENK, 2012 p. 30) As this study did not involve any participants and the study was conducted as a scoping study, no ethical review was needed according to the university guidelines.

13 CONCLUSION

Changes in the working life, limitation of time used in introduction and expectations of good professional preparedness in a new employee cause pressure for the companies organizing education. Expertise, leadership and development skills also interest in working life are qualities that are expected from professionals. Simulation training is going to expand in the future in different education of branches and updating training in working life. At the same time it evolves and changes to resemble more reality. In disasters leadership or taking care of a critical patient and preparedness skills can be trained in safe environments in stead of learning in action. This requires strong knowledge from working life and deep familiarization from both teachers and instructors to the challenges and possibilities that simulation-training has to offer.

KÄLLOR / REFERENCES

Arksey, H O'Malley, L. 02/2005. Scoping Studies: Towards a Methodological Framework. https://core.ac.uk/download/pdf/56237.pdf

Asproth, V. Amcoff Nyström, C. Preparing for Emergency situations. American Institute of Physics. 2010. 978-0-7354-0858-6/10/$30.00

Coombs, T. W. Ongoing Crisis Communication. 2015 4th edition.

Cronin, P. 1997. Report on the applications of virtual reality to education. HCRC, University of Edinborough. wysiwyg://62/http://www.cogsci.ed.ac.uk/~paulus/Work/Vranded/vr.htm

Dieckmann, P. 2009. Using simulations for education, training and research.

Endsley, M, R.: Toward a Theory of Situation Awareness in Dynamic Systems. Human Factors Journal 37(1), 32-64 https://www.researchgate.net/publication/210198492_Endsley_MR_Toward_a_Theory_of_Situation_Awareness_in_Dynamic_-Systems_Human_Factors_Journal_371_32-64

Finnish Advisory Board on Research Integrity. 2012. Responsible conduct of research and procedures for handling allegations of misconduct in Finland. Available from http://www.tenk.fi/sites/tenk.fi/files/HTK_ohje_2012.pdf Retrieved 19.4.2019

Forrester, J.W. Counterintuitive Behavior of Social Systems. February 1971. https://doi.org/10.1177/003754977101600202 Retrieved 19.04.2019

Jones, J. E. 2010. The challenge of leadership in times of crisis: A case study of Hurricane Katrina. Capella University, ProQuest Dissertations Publishing 2010. 3398721. https://search-proquest-com.ezproxy.arcada.fi:2443/abiglobal/docview/250841243/110A68FE42DF4712PQ/2?accountid=27294 Retrieved 17.4.201949

Hirvi, R. 2015 Simulaatio – oppimista vai leikkiä? https://verkkolehdet.jamk.fi/elo/2015/11/24/simulaatio-oppimista-vai-leikkia/ Retrieved 21.4.2019

King, H. B., MS, CHE, Battles J., PhD, Baker D. P., PhD, Alonso A, PhD, Salas, E. PhD, Webster, J. MD, MBA, Toomey, L. RN, BSBA, MIS, and Salisbury M., RN, MSN. TeamSTEPPS: Team Strategies and Tools to Enhance Performance and Patient Safety https://www.ncbi.nlm.nih.gov/books/NBK43686/

Klipfel, J.M., Carolan, B.J., Brytowski, N., Mitchell, C.A., Gettman, M.T., Jacobson, T.M. 2014. Patient safety improvement through in situ simulation interdisciplinary team training. *Urologic Nursing.* 39-46. doi:10.7257/1053-816X.2014.34.1.39

Kumar, R. 2011. Research mythology a step-by-step guide for beginners. http://www.-sociology.kpi.ua/wp-content/uploads/2014/06/Ranjit_Kumar-Research_Methodology_A_Step-by-Step_G.pdf Retrieved 20.03.2019

Lateef, F. 2009. Simulation-based learning: Just like the real thing. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2966567/ Retrieved 20.05.2017

Levac, D. Colquhoun, H. O'Brien, K. K. Scoping studies: advancing the methodology. 2010. https://doi.org/10.1186/1748-5908-5-69

Marshalls, Tuula J. Non-Technical Skills and Personal Characteristics of Frontline Leaders in Crisis Management. 2015. https://www.theseus.fi/bitstream/handle/10024/99026/Tuula%20Marshalls%20Master%20Thesis%202015.pdf?sequence=1&isAllowed=y Retrieved 20.05.2017

Norri-Sederhom, T. 2015. Tilanne päällä! Tiedon tarpeesta jaettuun tietoon – Hätäkeskuspäivystäjän ja ensihoidon kenttäjohtajan tilannetietoisuus http://epublications.uef.fi/pub/urn_isbn_978-952-61-1694-5/urn_isbn_978-952-61-1694-5.pdf

Northouse, P.G. 2013. Leadership. 6th edition SAGE publications inc.

Pelastusopisto. 2019 https://www.pelastusopisto.fi/oppimisymparistot/xvr-johtamissimulaattori/ Retrieved 21.4.2019

Petrosoniak, A. Hicks, C.M. Beyond crisis resource management: new frontiers in human factors training for acute care medicine. 2013. DOI: 10.1097/ACO0000000000000007

Polit, D. F. & Beck, C.T. 2012, Nursing research: Generating and assessing evidence for nursing practice, 9th edn, Wolters Kluwer Health/Lippincott Williams & Wilkins. 802 pages.

Rall, M. Dieckmann, P. Crisis resource management to improve patient safety. 31.5.2005. European Society of Anesthesiology

Reason, J. Human error: models and management. Education and debate. BMJ 2000;320:768-70

Salakari, H. 2007. Taitojen opetus.

Suonperä, M. 1992. Opettamiskäsitys. ISBN 952-90-3778-3

The Joanna Briggs Institute. 2017, Critical Appraisal Tools. http://joannabriggs.org/research/critical-appraisal-tools.html Retrieved 20.5.2017

University of Aberdeen. Framework for Observing and Rating Anesthetists' Non-Technical Skills. https://www.abdn.ac.uk/iprc/documents/ANTS%20Handbook%202012.pdf

Yusko, K. Goldstein, H.W. Selecting and Developing Crisis Leaders Using Competency-Based Simulations. Journal of contingencies and crisis management, Vol5, Nr4, dec1997.

APPENDICES

Appendix 1 List of articles reviewed

1. Applied improvisation training for disaster readiness and response

Tint, Barbara S; McWaters, Viv; Raymond van Driel

Journal of Humanitarian Logistics and Supply Chain Management; Bingley Vol. 5, Iss. 1, (2015): 73-94.
DOI:10.1108/JHLSCM-12-2013-0043

2. Effect of CRM team leader training on team performance and leadership behavior in simulated cardiac arrest scenarios: a prospective, randomized, controlled study
Castelao, Ezequiel F; Boos, Margarete; Ringer, Christiane; Eich, Christoph; Russo, Sebastian G.
BMC Med Educ. 2015; 15: 116. Published online 2015, Jul 24.
DOI: 10.1186/s12909-015-0389-z

3. Transfer of learning and patient outcome in simulated crisis resource management: a systematic review
Boet, Sylvain; Bould, Dylan M; Fung, Lillia; Qosa, Haytham; Perrier, Laure; Tavares, Walter; Reeves, Scott; Tricco, Andrea C.
Can J Anaesth. 2014; 61(6): 571–582. Published online 2014 Mar 25.
DOI: 10.1007/s12630-014-0143-8

4. Trauma simulation in bilingual Canada: Insurmountable barrier or unexpected strength? Insights from the first bilingual S.T.A.R.T.T. course
Gillman, Lawrence M; Widder, Sandy; Clément, Julien; Engels, Paul T; Pa ton-Gay, John, Damian; Brindley, Peter, G.
Can J Surg. 2016 Apr; 59(2): 80–82.
DOI: 10.1503/cjs.014115

5. Filling the Gap: Simulation-based Crisis Resource Management Training for Emergency Medicine Residents
Parsons, Jessica R; Crichlow, Amanda; Ponnuru, Srikala; Shewokis, Patricia A; Goswami, Varsha; Griswold, Sharon
West J Emerg Med. 2018 Jan; 19(1): 205–210. Published online 2017 Dec 14.
DOI: 10.5811/westjem.2017.10.35284

6. Emergency preparedness in the 21st century: Training and preparation modules in virtual environments
Cohen, Daniel; Sevdalis, Nick; Taylor, David; Kerr, Karen; Heys, Mick; Willett, Keith; Batrick, Nicola; Darzi, Ara
Resuscitation Journal, European Resuscitation Council Jan. 2013 vol84, Issue 1, pages 78-84
DOI: https://doi.org/10.1016/j.resuscitation.2012.05.014

7. Leadership in crisis situations: merging the interdisciplinary silos
Paquin, Hugo; Bank, Ilana; Young, Meredith; Nguyen, Lily HP; Fisher, Rachel;
Leadership in Health Services; Bradford Vol. 31, Iss. 1, (2018): 110-128.
DOI: 10.1108/LHS-02-2017-0010

8. Hurricane Katrina, the Crisis of Leadership, and Chaos Management: Time for Trying the 'Surprise Management Theory in Action'
Farazmand, Ali
Public Organization Review; Dordrecht Vol. 9, Iss. 4, (Dec 2009): 399-412.
DOI:10.1007/s11115-009-0099-2

9. Building effective clinical teams in healthcare
Ezziane, Zoheir; Maruthappu, Mahiben; Gawn, Lynsey; Thompson, Emily A ; Athanasiou, Thanos;
Journal of Health Organization and Management; Bradford Vol. 26, Iss. 4, (2012): 428-436.
DOI:10.1108/14777261211251508

10. Creating High Reliability Teams in Healthcare through In situ Simulation Training
Riley, William; Lownik, Elizabeth; Parrotta, Carmen; RN, Kristi Miller; Davis, Stan
Administrative Sciences; Basel Vol. 1, Iss. 1, (2011): 14-31.
DOI:10.3390/admsci1010014