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Disaster Nursing: Are we prepared?

An empirical qualitative study about disaster nursing preparedness in Finland

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BACHELOR'S THESIS

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Abstract

Disasters have been increasing through-out time, both natural and man-made, and it's agreed upon, that disaster can gravely affect communities and countries if they are not prepared for them. One major part of this preparedness is in the healthcare systems, and primarily in the hospital's Emergency Departments. Finland has disaster preparedness as part of its national laws, and the Ministry of Social Affairs & Health (STM) has also provided guidelines for Healthcare District Municipalities(SHP) and hospitals. International research has been increasing on this subject recently, but no public national research had been found.

This thesis explored the current level of disaster preparedness of nurses in working in an Emergency Department (ED) in a middle size hospital in Finland. The research attempted to identify the different types of disasters which the ED nurses are prepared for, and what trainings and education they have. As well as to identify the factors affect the nurse's preparedness levels.

An empirical qualitative research was performed using inductive thematic data analysis. Data was collected by interviews with 4 charge nurses from an ED. Patricia Benner's theory "From Novice to Expert" was used as framework, along with the STM guidelines.

The findings revealed a lack of knowledge in some areas of disaster preparedness, as well as a lack of sufficient training and education, which affected the participants' confidence in themselves when it came to some specific major events, and in the ED's level of preparedness, especially since many of the nurses working there currently were new.

Language: English Key words: Disaster, nursing, preparedness, emergency department, hospital, planning, resilience, MCI, CBRNE, Finland

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OPINNÄYTETYÖ

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Tiivistelmä

Katastrofien, sekä luonnonmukaisten että ihmisten aiheuttamien, määrä on kasvanut ajan saatossa. Ollaan yhtä mieltä siitä että katastrofien vaikutukset ovat vakavia yhteisöille ja valtioille, ellei niihin ole valmistauduttu. Suuri osa tätä valmiutta koskee terveydenhuoltoa ja etenkin sairaaloiden päivystyspoliklinikkoja. Valmiuslaki on osa Suomen lakia, sen lisäksi Sosiaali- ja Terveysministeriö (STM) on valmistanut ohjeita Sairaanhoitopiireille ja sairaaloille. Kansainvälisten, katastrofeihin liittyvien, tutkimusten määrä on kasvanut viime aikoina, mutta yhtään julkista kansallista tutkimusta ei löytynyt.

Tämä opinnäytetyö tutki tämänhetkistä katastrofivalmius tuntemusta, suomalaisen keskisuuren sairaalan, päivystyksen hoitajilla. Tutkimuksen tavoitteena oli selvittää millaisiin erityyppisiin katastrofeihin päivystyksen hoitajat ovat valmistautuneet sekä mitä koulutusta ja harjoitusta heillä on aiheeseen liittyen. Tavoitteena oli myös selvittää mitkä tekijät vaikuttavat hoitajien valmiusasteeseen.

Empiirinen laatututkimus suoritettiin induktiivisella, temaattisella data-analyysillä. Materiaali kerättiin haastattelemalla päivystyksen neljää vastaavaa hoitajaa. Opinnäytetyön runkona käytettiin Patricia Bennerin teoriaa ”aloittelijasta asiantuntijaksi” ja Sosiaali- ja Terveysministeriön ohjeistuksia.

Tuloksista selviää tiedon puutteita joissain katastrofivalmiuden osa-alueista, kuten myös puutteita riittävässä koulutuksessa ja harjoittelussa suuronnettomuuksien ja katastrofien varalta. Nämä puutteet vaikuttivat tutkimukseen osallistuvien itsevarmuuteen tiettyjen suurien tapahtumien osalta ja myös päivystyksen valmiustasoon, etenkin koska moni päivystyksessä työskentelevä hoitaja on uusi.

Kieli: englanti Avainsanat: katastrofi, hoitotyö, valmius, sairaala, suunnittelu päivystyspoliklinikka, suuronnettomuus, CBRNE, Suomi

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Abstrakt

Katastrofer har genom tiden ökat i antal, både naturkatastrofer och katastrofer orsakade av människan. Man har konstaterat att katastrofer kan påverka både samhällen och nationer allvarligt om ingen beredskap finns. En avgörande del av beredskapen ligger i sjukvårdssystemet, primärt vid akutpoliklinikerna. Beredskapslagen är en del av finsk lagstiftning, dessutom har Social- och hälsovårdsministeriet (STM) utvecklat bereskapsdirektiv åt landets sjukvårdsdistrikt och sjukhus. Internationell forskning inom ämnet har den senaste tiden ökat, men ingen offentliggjord nationell forskning kunde hittas.

I det här examensarbetet har man undersökt nivån av katastrofberedskap hos sjukskötare vid en akutpoliklinik i ett medelstort sjukhus i Finland. Syftet med undersökningen var att identifiera vilka olika typer av katastrofer som sjukskötarna vid akutpolikliniken har beredskap för, samt vilken typ av skolning och träning de har inför katastrof. Även att identifiera vilka faktorer som påverkar nivån av beredskapen hos sjukskötarna.

En empirisk kvalitativ studie gjordes genom induktiv tematisk data-analys. Data insamlades genom intervjuer av fyra ansvariga sjukskötare vid en akutpoliklinik. Patricia Benners teori "Från novis till expert" samt STM:s beredskapsdirektiv har använts som teoretisk referensram.

Resultatet påvisade brister på kunskap i en del områden inom katastrofberedskapen, samt brist på tillräcklig träning och skolning. Bristerna påverkade informanternas tro på sig själva i specifika händelser samt på beredskapsnivån vid akutpolikliniken, speciellt när många av sjukskötarna som arbetar där är nya.

Språk: Engelska

Nyckelord: katastrof, Kris, vårdarbete, katastrofberedskap, beredskap, akutpoliklinik, sjukhus, planering, massolycka, CBRNE, Finland

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List of Abbreviations

Abbreviation	[Finnish Origin] Explanation
ED	Emergency Department
EP	Emergency Preparedness
OR	Operating Room
CBRNE	Chemical, Burns, Radiation, Nuclear, High-Yield Explosives
STM	[Sosiaali & Terveysministeriö] Ministry of Social Affairs & Health
MCI	Mass Casualty Incidents
SHP	[Sairaanhoitopiirin] Healthcare District Municipality
VIRVE	[Viranomaisradioverkko] Government official radio network
PHN	Public Health Nurses
ERVA	[Erityisvastuualue] Specific catchment area
PEL	[Poikkeusolojen Elintärkeiden Lääkkeiden] Emergency Conditions Vital Medications
PELLA	[Poikkeusolojen Elintärkeiden Lääkintälaitteiden] Emergency Conditions Vital Medical Devices

1. Introduction

In our world today we wake up almost every day to some shocking news of earthquakes, tsunamis, volcano eruptions or terrorist attacks happening somewhere in some country, some far away from us, but sometimes very close. And most of the time, the people of those countries are caught off guard & unprepared. **Natural** disasters have been on the rise this past decade more than ever before, as stated by Block (2016) *"The total number of disasters as of June 30, 2008 already exceeds the average number of disasters recorded at mid-year over the past decade".* There are tsunamis & earthquakes happening almost every year, but the ones we remember most are the ones that cost a large number of lives, such as the 2011 ones that hit Japan and cost about 19,000 lives, and caused reactor meltdowns in the Fukushima Daiichi nuclear plant which was the worst atomic accident since Chernobyl, or the Indian Ocean tsunami in 2004, which is considered the deadliest tsunami ever recorded history, because it lead to almost 230,000 deaths in 14 countries including Indonesia, Sri Lanka, India, Thailand, Somalia, Myanmar, Maldives, Malaysia, Tanzania, Seychelles, Bangladesh, South Africa, Yemen and Kenya (UNESCO/IOC-NOAA, 2020). Mostly the cause is attributed to global warming, climate change or the human negative impact on the environment as Than (2005) reported. We also have another type of disasters that has been on the rise as well; **Terrorism** (MacAskil, 2014; Fox & Gilbert, 2016; Roser & Nagdy, 2016), as reported by the U.S. State Department, terrorist attacks have increased by 35%, with an 81% increase in fatalities since 2013 (Williams, 2015). From the beginning of 2016 up until April 2020 there has been a reporting of **4,155 attacks, 31,628 fatalities** (Esri, 2020). While another website "Our World in Data" estimates around 26000 deaths to be related to terrorist attacks in 2017 alone, based on "The Global Terrorism Database" reports (Ritchie 2020). And even though religious terrorism has been declining the past few years, an increase in activity from right-wing terrorist groups has brought up another cause of concern, based on the Global Terrorism Index (GTI) as reported by Brzozowski (2019). As well as international peace and the threat of nuclear war or attacks remains in the horizon (Baker, Gillespie, & Hodge, 2017; Connor & Millward, 2017; O'Brien, 2017) our healthcare systems should be prepared now more than ever to receive and care for mass casualties from any type of extreme event without the risk of the systems breaking down. At the center of these healthcare systems are nurses, and since nurses make up the largest category of healthcare personnel anywhere, it is therefore expected that in a disaster response nurses make up the majority of personnel. For example, in one hospital it is stated on their website that around 1400 nurses are employed compared to 200 doctors. So even if only half or a

quarter of these healthcare professionals are able to report to duty in a disaster situation, we would have much less doctors compared to a few hundred nurses. So as a nursing student who had been witnessed several disaster events growing up, I got interested in emergency care & disaster response, and I was intrigued to find out how well are emergency departments EDs (also known as an accident & emergency department (A&E), emergency room (ER), emergency ward (EW) or casualty department) and their nurses prepared for such events here in Finland, and due to a lack of any official public national researches on this subject, the question rises "are we prepared?"

2. Aim and problem definition

The aim of this thesis is to identify the current level of disaster preparedness of nurses in working in an Emergency Department in a middle size hospital in Finland.

The following questions will be answered:

- What different types of disasters are the Emergency Department's nurses prepared for?
- What trainings and education do the Emergency Department's nurses have?
- What factors affect the nurse's preparedness levels?

The results can help the nurses and the Emergency Department self-reflect on their level of preparedness, and can help identify the need for more researches or areas in need of improvement in the Emergency Department's preparedness.

3. Background

The United Nations started a series of international conferences in 1994 called the **World Conference on Disaster Risk Reduction** (WCDRR) that were focused on disaster risks in the context of sustainable development, to manage and reduce them by building resilience through enhanced national and local capabilities. 3 conferences have been held so far, each of which ended up with an international guideline or framework for disaster risk reduction. From the 2nd conference in 2005 the *Hyogo framework for action* was adopted, titled "Building the Resilience of Nations and Communities to Disasters", it had a 10-year plan that aimed to substantially reduce disaster losses, in lives and in social, economic and environmental assets of communities and countries (United Nations

International Strategy for Disaster Reduction [UNISDR], 2005). Yet over that 10 year time frame disasters had continued to affect countries and their communities heavily, even with all the efforts and increases in preparedness and work on disaster risk reduction, still over 700,000 people have lost their lives while over 1.4 million have been injured by disasters, many of which are increasing in occurrence and force; possibly due to the climate change; which drastically hinders sustainable development even in developed countries, and definitely in developing countries, and Former UN Secretary-General Ban Ki-moon stated that *There is a very real possibility that disaster risk, fueled by climate change, will reach a tipping point beyond which the effort and resources necessary to reduce it will exceed the capacity of future generations* (UNISDR, 2015a). In the latest WCDRR in 2015, the "Sendai Framework for Disaster Risk Reduction 2015–2030" was adopted, which had an assessment of the Hyogo framework, and a 15-year plan to better improve disaster preparedness and reduce disaster risks and losses on all aspects for communities and countries, locally, nationally, globally and regionally. One key action in that goal is enhancing the resilience of national health systems by integrating disaster risk management into all healthcare levels; such as developing the understanding disaster risk for healthcare workers, in and applying and implementing disaster risk reduction plans in healthcare systems; promoting and enhancing the training of disaster medicine; and supporting and training communities in disaster risk reduction approaches through health programs. (UNISDR, 2015) According to UNISDR (2009) *Resilience* is defined as *"The ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions".*

3.1 What is a Disaster

There is no one definition of the term disaster that everyone has agreed upon, according to the International Federation of the Red Cross (IFRC, 2009): *"A disaster is a sudden, calamitous event that seriously disrupts the functioning of a community or society and causes human, material, and economic or environmental losses that exceed the community's or society's ability to cope using its own resources." Though often caused by nature, disasters can have human origins.* While the definition adopted by the World Health Organization (WHO) and the United Nations (UN) as established by Gunn is *"the result of a vast ecological breakdown in the relationships between man and his environment, a serious and*

sudden (or slow, as in drought) disruption on such a scale that the stricken community needs extraordinary efforts to cope with it, often with outside help or international aid." (according to Task Force on Quality Control of Disaster Management [TFQCDM], World Association for Disaster and Emergency Medicine [WADEM], & Nordic Society for Disaster Medicine [NSDM], 200, p32). Whatever the definition happens to be, it will always be agreed upon that a disaster substantially overwhelms a community's resources, especially social services, hospital care and emergency services (WHO & International Council of Nursing [ICN], 2009). Many disasters might be referred to as mass casualty incident (MCI), an MCI is defined as an accident that has created a very large number of victims, but even if an unfortunate event, ended up with mass casualties, such as a train wreck, building fire or terrorist attack, it does not necessarily create a *medical disaster*, it all depends on the ability of the healthcare system to cope with the number of casualties, but if it is unable to, and runs out of resources whether human or medical supplies, then the event becomes a *Healthcare* or *Medical Disaster*. For a hospital, disasters can be either internal or external. An internal disaster for example a large fire or damage from a natural event such as earthquakes, or from an attack by individual or group of people on the hospital premises, where the hospital itself is partly or totally compromised and requires evacuation of patients and personnel, and reallocation to another hospital or temporary treatment facility. On the other hand, and more commonly, external disasters can be, where the aftermath of the event, leads to an over surge in patients which can easily overwhelm a hospital's Emergency Department beyond its surge capacity, which would have negative consequences for the incoming victims from the disaster as well as the normal incoming patients. Both situations need proper preparedness planning for, to safely minimize the overload on the hospital and its staff and prevent medical disasters. (Powers & Daily, 2010)

3.2 Hospital Resilience

When it comes to healthcare systems, resilience refers to the *"...capability to effectively absorb, respond to, and recover from an internally or externally induced set of extraordinary demands"* (Powers & Daily, 2010, p120). When a large disaster occurs, the resilience of most healthcare facilities is extensively compromised whether it's in a developing or a developed country, the disasters can cripple the healthcare system not just for the duration of the disaster, but for a long period after, especially if the structures of the facilities are damaged by the disaster itself. So the concept of resilient hospitals has emerged recently and is getting more attention now, its focus is on the hospitals' structural, non-structural and

functional capabilities and integrity during and after disasters. Disaster preparedness and planning is considered one of the most important elements in developing resilient healthcare systems. Being the largest group of health care providers, nurses are often called upon to support in disaster response and relief, be it on the field or in the healthcare facilities or even make-shift shelters or temporary mobile hospitals, therefore disaster nursing preparedness, which relies on education and training, and testing out the disaster preparedness plans in drills, is an essential part of maintaining hospital resilience (WHO & ICN, 2009; Powers & Daily, 2010). Part of the disaster preparedness besides the main planning, is also "Contingency planning", which is the development of specific plans for different hazardous events, since a disaster will almost always present unexpected and unpredictable challenges, which can create additional chaos in an ED or hospital in general, such as if an earthquake causes electric power failure or communication failure, or for example preparedness planning for a pandemic which is about stocking large amounts of Personal protective equipment (PPE). It is also important to note that during certain biological events such as pandemics, medical equipment, such as ventilators, may become in short supply. For example: "*Within the US hospital system, there are a total of 105,000 ventilators, while estimated ventilator requirements during a flu pandemic are projected to be approximately 742,500* (Powers & Daily, 2010, p207). The national emergency storage can contain a few thousand ventilators, but that still falls short of the estimated need, so contingency plans such as pre-arranged agreements between hospitals and suppliers, refurbishing and using older ventilators, or even the conversion of anesthesia machines for ventilator use, may help provide a sufficient number of ventilators when needed in emergencies (Powers & Daily, 2010). Because if a shortage of ventilators occurs during a disaster or pandemic, healthcare leadership will be forced to perform what is known as in-hospital "*Disaster Triage*" for the patients requiring ventilators, which means choosing who gets one and potentially live, and who doesn't and most likely dies. And that; the development of a ventilator triage process guideline that would help medical staff in ethically choosing which patients are provided with a ventilator and which are not; is also something that needs to be considered in contingency planning (Powers & Daily, 2010; Gray, 2016) And another area that requires a planning for is *Surge Staff Capacity,* where a possible shortage of staff should be expected, because for example in the event of a pandemic, it is estimated that 50% of the hospital workforce may not report to work because of falling ill themselves, or having family responsibilities that they must tend to, or simply out of fear. (Powers & Daily, 2010) And we should remember what Powers & Daily (2010, p121) have stated *"The resilience of a*

healthcare facility during a long-term event is a tremendous challenge that requires dedication and commitment from staff in addition to planning and preparedness measures".

3.2.1 Surge Capacity

Surge capacity is an old concept that has been looked at again after some learning of the major impact some disasters had had upon the healthcare systems, such as the terrorist attack of 9.11 or the earthquakes and tsunamis of japan. Surge capacity is defined by Hick et al. (2004) as the "*Ability to manage a sudden, unexpected increase in patient volume (ie, numbers of patients) that would otherwise severely challenge or exceed the current capacity of the health care system*". Another definition by Chiu, Polivka, & Stanley (2012) is that surge capacity is the *"health care system's ability to expand quickly beyond normal services to meet an increased demand for medical care in the event of bioterrorism or other large-scale public health emergencies"*. Surge capacity is considered essential especially in long-term disasters, because the "Surge" of patients can be either immediate after an MCI or natural disaster or terrorist attack, or can happen more gradually and over an extended period of time such as what would happen in a pandemic. Surge capacity has to be planned before hand and the requirements to increase it, have to be maintained in order to be capable of increasing surge capacity at any time. (Powers & Daily, 2010) The percentage of capacity that can be raised can vary from country to country or depending on the hospital sizes. Increasing capacity is more than just providing place or space for extra patients, it also includes making sure, there is enough staff, equipment, medicines, nutrition & other resources for the extra patients that are taken in. (Hick et al., 2004; Powers & Daily, 2010)

3.3 Disaster Nursing: The Nurse's Role

Powers & Daily (2010) stated that "*The goal of disaster nursing is ensuring that the highest achievable level of care is delivered through identifying, advocating, and caring for all impacted populations throughout all phases of a disaster event, including active participation in all levels of disaster planning and preparedness"*. Nurses need to use their nursing care skills in addition to critical thinking, adaptability, teamwork & leadership skills, to be able to advocate and care for the patients in disaster times, where some things will be different from normal times, that why the nurses' scope of work might expand to beyond normal tasks. Nurses have to think in terms of individual care and mass patient care at the same time. Creativity and critical thinking will be required for example when supplies are

lacking, and the nurse has to think of alternative ways that might not be used during regular times. Adaptability is the key when nurses have to deliver a high quality of care under stress with minimal resources, or when they have to care for a large number of patients in a short time, at a rapid pace. So for nurses to be able to assist other coworkers and help the victims, they must be able to remain calm in chaotic stressful situations, and be able to think clearly and act professionally with full confidence. (Powers & Daily 2010) But the unfortunately several studies have shown that most nurses lack confidence in their knowledge and ability to perform in disasters because of lack of education and training (Schmidt, 2011).

Nurses have the required coordination and delegation skills that, along with their care management experience, that can put them in healthcare leadership roles during disasters. Those roles should be usually assigned during the disaster preparedness planning, and usually to charge nurses, nursing managers or head nurses, but all nurses should be ready and capable of assuming leadership roles in cases where the assigned leader is missing or if immediate actions are required to solve problems and no clear protocols or guidelines were found. Nurses are also more aware of the availability of resources, and can identify supply needs and workforce issues better than other healthcare providers (WHO & ICN, 2009).

> "Nurses with their technical skills and knowledge of epidemiology, physiology, pharmacology, cultural-familial structures, and psychosocial issues can assist in disaster preparedness programmes, as well as during disasters. Nurses, as team members, can play a strategic role cooperating with health and social disciplines, government bodies, community groups, and non-governmental agencies, including humanitarian organizations." (ICN, 2006) according to WHO & ICN, 2009

The nurse manager or charge nurse (during a shift) who is the one meant to be in a leadership position during a crisis, has to fulfill a variety of roles such as the ones stated by Middaugh (2003): The first one is **Planning**, nurses should play; even though sometimes they never even get a chance to voice their opinion; a major part in the planning process, an essential step in disaster management, which should be done before any disaster occurs, in collaboration with people from every department that could be involved during a disaster, since the nurses know better the reality of the situation on the ground in their wards. Secondly, **Organizing,** because when disaster strikes, resources become limited, especially if resupply is hindered, so a manager should know how to well organize both material and human resources, depending on the nature of the disaster and the anticipated probable type of casualties, a nurse should distribute and allocate resources to where they will be most needed, without wasting any, especially when it comes to nursing skills. Roles should be pre-identified to avoid overlapping and chaos. This role is closely linked to the next one,

which is **Directing,** where the manager needs to direct the staff working under them, making sure they have received their pre-defined roles and tasks, along with the authority to perform those roles without delay, this role requires communication, delegation and training skills. The fourth role is **Coordinating,** between all departments, personnel, and even external agencies or entities is a must to ensure harmony in the work flow, and to prevent chaos. "*Coordination occurs only through strong, effective leadership and management that organizes, directs, and controls staff efforts"* (Middaugh, 2003). The final role is **Controlling,** it's the manager's duty to ensure that the staff is performing according to the plan, and to control everything, one must be a strong and strict leader capable of correcting any deviations from the plan, without losing time in arguments (Middaugh, 2003).

3.4 Disaster Education & Training

Recognizing the importance of emergency preparedness competency for nurses, a report by the American Association of Colleges of Nursing in 2001 stated that all nurses must receive training to respond to chemical, biological, radiological, nuclear, or high-yield explosives (CBRNE) emergencies as part of their basic education. A study by (Chiu et al., 2012) developed a competency based educational training course about disaster surge for public health nurses (PHN), the study then evaluated the impact of this training on the PHNs self-perceived confidence and need for further training in disaster surge preparedness, response and recovery. The results proved that the training did indeed significantly increase the self-perceived confidence and decreased the self-perceived need for further training for the PHNs (Chiu et al., 2012). An article in Nursing journal also wrote about a CBRNE curriculum development project for New York City nurses, which in its first phase tested the nurses' emergency preparedness (EP) for catastrophic health events which include CBRNE events that can cause mass destruction to both infrastructure and health, the results showed that most of the participant nurses had received training only once or infrequently or never, and that caused them to lack confidence in their ability to perform EP activities. Then they developed a CBRNE educational & training curriculum which proved to increase the knowledge of EP for the participants (Jacobs-Wingo, Schlegelmilch, Berliner, Airall-Simon & Lang, 2019). And another study proved that an *Emergency Preparedness Disaster Simulation* for last year Nursing students increased their knowledge and confidence in handling emergency preparedness events and in working in teams considerably (Kaplan, Connor, Ferranti, Holmes & Spencer, 2012).

3.5 Earlier Researches

There have been several international studies done earlier about disaster preparedness in hospitals; in the last 10 years especially; but no official studies from Finland were found, only a few bachelor or master level theses had examined this subject nationally. Though based on the available official guidelines, we can assume that there must have been some studies done in order to come up with the guidelines but none were found publicly. Of the international studies many were concerned with out-of-hospital/pre-hospital medical care which is provided by paramedics or by special deployed teams of doctors and nurses from hospitals, and the others were concerned with the preparedness of hospitals or the emergency departments for such mass casualty incidents (MCI) or disasters. Most of the studies found had used the quantitative method, while some used the results from tabletop exercises or simulations to assess the preparedness level, but here I report about 5 qualitative researches that were specific to nursing preparedness. The first was called *Flood disaster preparedness experiences of hospital personnel in Thailand: A qualitative study* (Rattanakanlaya; Sukonthasarn; Wangsrikhun; & Chanprasit, 2018), which explored the experiences of hospital personnel in Thailand in flood disaster preparedness, the study reached two themes which were ***Maintaining the function of care provision*** and ***Struggle with preparedness,*** the results helped the participants realize that the levels of preparation of their hospital were inadequate and they identified the challenges in providing care during and after floods, which they hope will help everyone in improving preparedness by addressing the problems that were found. The second study was about nursing in disasters in Iran called *Nurse in limbo: A qualitative study of nursing in disasters in Iranian context* (Pourvakhshoori; Norouzi; Ahmadi; Hosseini; & Khankeh, 2017), the study showed that various factors affect nurses when they provide health care services during disasters, the study reached five categories: ***Afraid of probability of recurrence, Necessity of providing health care services for an unknown period of time, Nurses' challenge of what to prioritize, Nurses' own conflicting emotions,*** and ***Nurses' concern for their own families***. The results identified the problems nurses experience at the time of disasters to provide health care services for affected population. The study also concluded that nurses who feel better prepared, and had some understanding of moral implications of working under different standards of care, were better capable of providing care during disasters, than the ones who had no choice about going to the disaster area or had less choices. Also training and preparation for disasters was found to be essential for the nurses to function safely and with minimum emotional and psychological trauma. The third case was a research under the name *Emergency*

Preparedness Policy and Practice in Massachusetts Hospitals: A Case Study (Taschner; Nannini; Laccetti; & Greene, 2017), which explored the development and implementation of emergency preparedness policy and practice in Massachusetts hospitals after 9/11. Five themes were extracted in the data analysis: ***Training, Communication, Organization, Funding,*** and ***Events influencing emergency preparedness***. The study identified several factors that affected preparedness response, with standardized inter-professional training being one of the major elements, as well as communication with other parties that are also involved in disaster and emergency response, and it presented the impact of decreased funding and prior incidents on general preparedness. Nurses were also identified as key contributors in preparedness for disasters, and the study concluded that *preparedness* is a dynamic continuously evolving process. The fourth study was *Hospital nurses' competencies in disaster situations: a qualitative study in the South of Brazil* (Marin & Witt, 2015) which examined hospital nurses' competencies in disaster situations based on WHO and Bodies' other published documents on that subject, 29 competencies were extracted from the analysis of those documents and using a focus group 17 of them were validated into a final list, which was found to be beneficial to the improvement of education and practice of nurses in a hospital, strengthening its capacity in disaster preparedness and response. And the last study I'm reporting was a mixed method study called *Emergency nurses and disaster response: An exploration of South Australian emergency nurses' knowledge and perceptions of their roles in disaster response* (Hammad; Arbon; & Gebbie, 2011), which explored the disaster preparedness knowledge of South Australian emergency nurses and perceptions of their roles in disaster response in the emergency situations. The research had three major themes in the results from the data analysis. The first theme ***Previous disaster response experience*** was concerned with the limited previous disaster response experience from both real event or simulated exercises that the nurses were found to have, which highlighted the necessity of regular and appropriate training. The second theme was ***Disaster education and training***, where even though about 82% of the nurses participating appeared to have had some sort of disaster education and training, almost half of them turned out to have not had any training in the past year or more, hence questions regarding the appropriateness, relevance and frequency of that education were raised. The third and final theme was ***Disaster knowledge***, which was based on the poor performance of the participants in the knowledge test, suggested that the majority of the nurses *have a low level of disaster knowledge,* which could have serious implications on their preparedness, and performance in future disaster responses, and could become a barrier to effective training.

3.6 Disaster Preparedness in Finland

The Finnish government has been working hard on the total internal security from all aspects within the country, since publishing the 2010 resolution "Security Strategy for Society", a resolution which was meant to help guide all agencies in preparedness for disasters and exceptional emergency situations, including hospitals and hospital districts. Yet even with all the published resolutions, guidelines and laws, the internal preparedness within each hospital is not focused on, and is left to the hospitals themselves to plan and implement the training, which is where a lack of training and education is usually found.

3.6.1 Types of Disasters of concern

Disasters occur when sporadic hazard events cause damage to properties and humans. There are several types of hazards that could result in disasters which TFQCDM, WADEM & NSDM (2003) classifies them into 3 main categories, the first is **Natural,** such as extreme storms, floods, wildfires, earthquakes, tornados and hurricanes, the second is **Mixed** (natural + human caused) such as droughts, floods, fires, and epidemics of infectious disease, and the third is **Man-made** (completely caused by humans) and that can be split into two categories, *Technological* such as accidental or purposeful CBRNE incidents, in facilities or from vehicles transporting such hazardous materials, large scale traffic accidents, large transport vehicles, or structure failure, or *Conflict (inter-human) related* such as acts of terrorism, armed conflicts and wars, or even sanctions and embargos. While Finland is considered to be one of the safest countries in the world nowadays (WEF 2017), there are still several disaster scenarios that are possible, some of which have been experienced during these recent years, and that's why everyone should be prepared for, especially the healthcare sector. The threat scenarios described by the Finnish "Security Committee" in the publication *Security Strategy for Society 2010* consist of the following:

- a serious failure of the power supply
- serious disruptions to telecommunications and information systems
- serious disruptions to logistics
- serious disturbances in the community infrastructure
- a serious disruption to food supply
- serious disturbances in the finance and payments system
- failing access to public finances funding
- a serious disturbance in public health and well-being

- major accidents, extreme weather conditions and environmental threats
- terrorism and other type of crime posing a threat to society
- serious disturbances in border management
- political, financial and military pressure, and
- the use of military force.

(The Security Committee, 2017)

Here is a list of some examples of the biggest incidents that have occurred in Finland in the recent years from various news sources or official reports, which we can always expect more of. It has been fortunate that so far, that many of them, but not all, have passed without the large number of human casualties, but things could have been much worse:

- One of the most common mass casualty accidents in Finland are **transportation accidents** such as the bus crashes that happened in Konginkangas (Munukka, 2016), and the two mini-bus crashes in Lappeenranta (Pettersson & Teivaine 2014, Kivimäki 2017), the bus crash in Kuopio (Salokorpi, Sundqvist, & Nykänen 2018), and the van crash in Peräseinäjoki (Yle News 2019).
- **Water Transport accidents** such as the MS Estonia Ferry which sank in the Baltic Sea on 28 September 1994, costing 852 lives (The Maritime Executive, 2014).
- **Weather related events** such as the **extreme storms**, **floods** (Yle Uutisten artikkeliarkisto 2004a, 2004b, 2009a, Väinämö 2016), **large forest fires**, **building fires** & **hospital fires** (Safety Investigation Authority 2007, Varjonen 2017, Keski-Korpela 2019, Pöllänen 2019, Koskinen 2019, Laitinen 2019).
- **Structure collapses** such as the 2 ceiling collapses in 2 different schools in south Finland & Helsinki (Yle News, 2018a, 2018b) or the ventilation pipe that fell on a crowd at the Vaasa Arena (SIA 2018).
- **Hazardous or radioactive material contaminations** such as **Radioactive leak** in Helsinki's Roihupelto area (SAI 2016), and the **train cart accident** in Mäntyharju (Hevonoja, 2018), and **nuclear meltdowns** which have not occurred but are always considered a possibility near any Nuclear power plant.
- **Terrorist attacks**, such as the **knife stabbing** in Turku (SIA, 2017), the **mass school shootings** such as two that took place in Jokela 2007 & Kauhajoki 2008, on which police say are preventing up to 6 possible mass shooting events per year (Daily Mail Online 2014, Yle News 2016), **bombings** such as the one in Myyrmanni shopping center

(Ortenwall, Almgren, & Deverell, 2009), or threat of **biochemical attacks**, since there has been an evident rise in terrorist attacks in Europe these past few years (Esri, 2017).

- **Epidemic & Pandemic outbreaks** such as the **Swine flu epidemic** in 2009 (Yle Uutisten artikkeliarkisto 2009b), the ***"Exceptional" flu epidemic*** that was seen in 2018 (Yle News 2018c) or the **measles outbreak panic** in west Finland in the end of 2018 (Yle News 2018d) or even a simple **coincidence of influx** of patients beyond average capacity such as the university hospital in Helsinki experienced (Nironen 2017). And coincidentally the most current **Coronavirus pandemic** which is still ongoing at the present time of this study, which has reached over 2 million confirmed infections and a massive amount of deaths around the world up till now (Worldometers, 2020).

3.6.2 Preparedness by Law

In Finland, the health care law "Terveydenhuoltolaki" (1326/2010) states that the district healthcare union must decide in cooperation with the municipalities in its area on regional health preparedness for major accidents and special health care situations. In addition, the Healthcare District Municipality (SHP) is required to draw up a regional emergency preparedness plan in cooperation with the municipalities in its area (Section 38). As well as in the amendment (1516/2016) it is stated that participation in the preparation of regional contingency and contingency plans for major emergencies and special health care situations in cooperation with other authorities and actors; and the provision of official assistance to the police, rescue authorities, border guards and maritime rescue authorities to carry out the tasks for which they are responsible, are parts of the emergency care service that is to be provided by SHP (Section 40). A separate law concerning disaster preparedness called the Emergency Powers Act "Valmiuslaki" (1552/2011) has been set in 2011, which defines which exceptional emergency conditions count as disasters and what the purpose and scope of this law is, and has made it an obligation for all governmental, provincial and municipal services and enterprises to make preparations to ensure the best possible management of their duties, through the preparation of contingency plans and emergency operations and other measures (Section 12). The exceptional emergency conditions are defined as such:

1 An armed or serious attack on Finland and the immediate aftermath of it.
2 A threat of a major armed or serious attack on Finland, the impact of which requires the immediate introduction of powers under this Act.

3 A serious event or threat against the livelihood of the population or against the economy of the country, as a result of which the activities essential to the functioning of society are substantially compromised.
4 An exceptionally serious major accident and its immediate aftermath.
5 A very widespread and serious communicable disease with an impact equivalent to major serious accident. (Section 3)

3.6.3 District Preparedness

In Finland the Social and Health ministry (STM) has defined the requirements that have to be included in any hospital's disaster preparedness plan, and each hospital plan is to be coordinated with the SHP Plan. Finland is divided in 20 SHP each with a central hospital. In five SHP there are University hospitals which act as central hospitals as well. And as (The Security Committee, 2015) states, the five university hospital districts with *neighboring hospital districts form five specific catchment areas (ERVA) for the purpose of providing services of more demanding specialized medical care and research and teaching in medicine,* services which are not available at the smaller hospitals, so these districts have to cooperate together in disaster situations as well.

3.6.3.1 Planning Responsibilities

The communes are responsible for the organization of the social and healthcare services for the people living in their area. Legislation does not regulate precisely the content, scope or organization of the services. The healthcare preparedness for special situations is lead, supervised and coordinated by the STM in co-operation with healthcare department of the provincial government. Each hospital will make its own disaster preparedness plan for the special situations, and those plans are then matched within the SHP. (STM, 2002, 2006)

3.6.3.2 Levels of preparedness

The STM defines 3 levels of preparedness. The first level is Basic readiness (*Perusvalmius*), which means preparedness that is maintained during normal times, which requires regulatory planning and operational capacity, as well as advance arrangements for special situations and exceptional emergency conditions. Interferences and special situations are handled under basic readiness. The second level of readiness is called enhanced readiness (*Tehostettu Valmius*), elevating the readiness to this level requires for example big accidents, when the

number of patients is massive and the situation can't be controlled with the normal situation's resources. Action is still under the law for normal situations. Enhanced readiness level is ordered by STM and /or regional state Administrative Agency and the transition from basic readiness must happen within 48 hours. The operational and bed capacity has to be increased by 25% from that at basic readiness. The third level is full readiness (*Täysvalmius*), which will be applied only in exceptional emergency conditions, the authorities then have the power to order which tasks are made recessive and where the resources are concentrated. Under the full readiness level, all the extra resources and assets are to be put into use. The transition to the full readiness must happen within 6 days. The Operational and bed capacity has to be increased by 50% from basic readiness. (STM, 2006; Pirkanmaan Sairaanhoitopiirin [PSHP], 2018)

During the normal condition the hospital works within the authority's basic mandate for action. The special situations of the normal conditions are for example accidents, functional problems in the laboratory/Xray department/pharmaceutical services, crimes and vandalism, fires, disturbances in delivery of electricity/water/heat, communication and IT problems and problems in information security and privacy. Exceptional emergency situations of the normal conditions are for example large accidents, chemical accidents, toxic emissions, pandemics, oil accidents, nuclear plant accidents and terrorism. (PSHP, 2018)

3.6.3.3 Preparedness Requirements

The healthcare preparedness for special situations is part of the work under "normal conditions", which means that the basic readiness is created and maintained during the normal situation, so that the readiness level can then be elevated easily and with minimum effect on the normal activities. In the state of "Emergency conditions" all normal activity is cancelled or postponed, but with good preparedness and pre-planning the situation can stay under control. The guidelines also state that medical preparedness must include also disturbances in the network and communication and failure of the municipal infrastructure (heating, electricity, water and drainage systems). (STM, 2002)

To be able to do the preparedness plan the districts must perform risk analysis, which includes the probability and size of accidents/incidents. After the risk analysis, resource analysis will be done, and then it will be evaluated if the resources are enough. The resource analysis includes medications, medical supplies, equipment, reserve parts/maintenance and

food services, as well as staffing and operational unit facilities (Operating Rooms, labs, x-ray units etc). The aim is that the society will survive 12 months during special situations or exceptional emergency conditions. Security of Medications and vaccinations are quite import-dependent, since 90% of the ingredients to prepare medication are imported, and only 40% of medicines are made in Finland. The infusions are 100% imported and soon also all vaccines will be imported. Medication storage obligation is necessary for crisis resilience in Finland, so the hospitals and healthcare centers must have the storage to meet six months of normal consumption for the so called basic medicines & medical supplies, two weeks for the infusions, and twelve months for necessary medical equipment. The Medical Care Advisory Board has published a list of the essential medicines for the emergency situations called PEL-List that can be used as a guideline, and the list of the essential medical equipment, during emergency situations, is called PELLA-List. (STM, 2002)

During radiation and chemical accidents, the hospitals and healthcare centers are responsible for the medical care. First they need to screen, decontaminate and treat all the exposed victims. For this they must have beforehand a dedicated decontamination area within the healthcare unit. For large radiation there must be decontamination areas for all the affected citizens. All healthcare centers should have the emergency guidelines for the exposure of the most common chemicals. (STM, 2002)

The hospitals make their own detailed preparedness and safety plans. Safety instructions and guidelines must be available for all the staff, but the broad and detailed safety plan is only known and available for the safety personnel, especially if the plan includes confidential information about hospital's safety. On-call hospitals must organize their work so that operational readiness can be increased quickly at all hours, and they must be operated so that regular staff can handle normal accidents at first without the need to increase staffing. The preparedness plan defines in what kind of situations more staff is called in and how the call system works. The emergency powers act (article 22) states that anyone of working age (17 to 65 years old), who works in healthcare, or has been educated in it, or is otherwise suitable for medical tasks, are obligated to perform the tasks they can according to their education or experience. (STM, 2002)

The preparedness plan must be updated continuously, and everyone who is responsible for the plan must be clearly stated. Plan basics and functionality must be controlled and clarified minimum every 3-5 years. (STM 2002) The success in real situations depends on repeated

education and practice, which is why the preparedness plan should be studied in theory and practiced regularly. Drills are not just teaching the participants; they also point out areas that needs improving or changing in the preparedness plan. Without drills the modifications are almost impossible, because we don't know how the plan works. The preparedness plan is basically never final, it needs constant improvement and updating. (Castrén, Ekman, Ruuska, & Silfvast, 2015)

3.6.4 The preparedness plan for ED

All the emergency situations are different and unexpected. Common for all of them is the huge amount of the patients needing care compared to the resources. Most likely each patient won't be treated in the same manner as he would be treated under normal condition. The main aim is to save as many lives as possible and giving the best care possible. It's really important to focus the recourses to the essential/relevant action. One way to control the situation is to be prepared, so energy is not used for unnecessary planning and thinking on the spot when a disaster alert comes. Emergency departments should have 3 levels of actions depending on alerts, the number of patients required to raise the level of alerts can vary according to each hospital's size and surge capacity and available resources. Sillanpää, Koponen, Castrén, & Pylkkänen, (2005) describe these 3 levels according to one hospital: The first is "*Ennakkovaroitus Suuronnettomuudesta*" which translates to "early warning of a major accident or disaster" when a hospital receives the alert from the Emergency Response Center, the Charge nurse "*Vastaava Hoitaja*" gets the disaster preparedness files or action cards ready and distributes them to the staff. If the number of patients is for example 15 or less, then the ED should be able to manage with the available staff on duty, supplemented if necessary by some of their own off-duty staff. But if a mass casualty is confirmed, with the number of patients between 15-100, a *Basic Alert* known as "*Perushälytys*" is activated in the ED. The ED alerts its own off-duty staff (nursing staff and on-call hospital doctors) to come in, also alerts the other wards of the hospital, the doctors on duty at the hospital, and other necessary hospitals in the hospital district. The readiness at this level should mean the ability to treat 7 red and 6 yellow patients simultaneously. Any patients that tolerate transport are to be transferred from the observation room, emergency room and treatment rooms to bed-wards "*Vuodeosastoja*" or on-call ward "*Päivystysosasto*". The "Basic Alert" can be broadened to a "*Full Alert*" known in Finnish as "Täyshälytys" where the ED alerts more of their own off-duty staff, the on-call ward, the intensive care units (ICU) and the orthopedic surgery department. The capability to treat 14 red and 6

yellow patients simultaneously should be achieved. All patients that tolerate transport are to be transferred from the ED. From the waiting area for walk-ins, patients are told to go to their own healthcare centers if it's during office hours, or to wait in the patient café if its on-call time, until the disaster or accident is over. The hospitals preparedness plan needs to be compared and adjusted to the whole districts plan. The emergency activation needs to be flawless and uninterruptible. The leaders need to be stated beforehand, everyone must know their duties and responsibilities. In ED the time to prepare is shorter than on the wards, but also the situation will be normal faster. When the patients start coming, many comes at the same time, and the critical patients unrelated to the catastrophe must be handled as well. Then the action cards are good way to organize the action and to make sure everything is done in correct order. (Sillanpää et al., 2005)

3.6.4.1 The role distribution

The charge nurse of the shift coordinates the work in ED. They inform the staff about the mass casualty situation (*suuronnettomuus*), distributes the work for the staff and makes sure the necessary action is done to increase the preparedness. They can alarm the nurse manager and head nurse, and can meet the extra staff coming to duty, put them in care teams and tell them what to do. The charge nurse will also give the report for the preparedness leader as soon as he arrives. The charge nurse cannot take part of the actual care of the patients, for they are the one who supervises the work, communicates with the other leaders and relocates recourses as needed. Triage team is the first to meet the patients, they triage or categorize the patients according the urgency of the care. The triage team must be fast and work well together, there is not much time to triage and move the patient to the correct care team, usually the most experienced nurses would do the triage unless there are designated *Triage Nurses*. It is important to gather the patient's information (age, gender, social security number etc…) as fast as possible and share them with the preparedness leader, this makes it easier to control the overall situation and action of the patient information center. The triage team will categorize the patients in to four groups (I - **Red**, II - **Yellow**, III - **Green** & IV - **Violet**) and they will be transferred to the care teams of each group. Figure 1. Shows an example of an ED divided into triage care areas. The paramedics will give their report directly to the care team, not to the triage team. The ED care teams are then divided to the 4 different groups according to the triage areas. The red team is for the severely injured and

critical patients, and should have minimum two nurses, a surgeon and anesthetic, and all should have long experience of care for trauma patients. In the *Red* team specifically, the patients must also be evaluated and classified into urgency of the care need (injury, need of operation, medical imaging etc…). The *Yellow* team takes the significantly injured patients, but without immediate life-threatening injury. In this group, patients may worsen if left untreated and that would change the patient's classification to *Red*. The Green category is generally, all walking patients, who may have minor injuries that are not life-threatening and that can wait until most of the Red & yellow patients have been treated. But the boundary between yellow and green patient is volatile in certain types of injury, depending on the mechanism & location of injury, for example patients with eye injuries, spine or spinal cord injuries can be classified as yellow even if they are walking, depending on the hospital's guidelines. The Violet group is for patients with extremely severe injuries and poor prognosis, who would not even benefit from surgery or treatment. Care for this group is immediate terminal care, mainly pain management. Each team has to concentrate on their own patients, if a team's patient has not yet arrived, the team can help the other teams if requested. (Sillanpää et al., 2005; Castrén et al., 2009; Castrén et al., 2015)

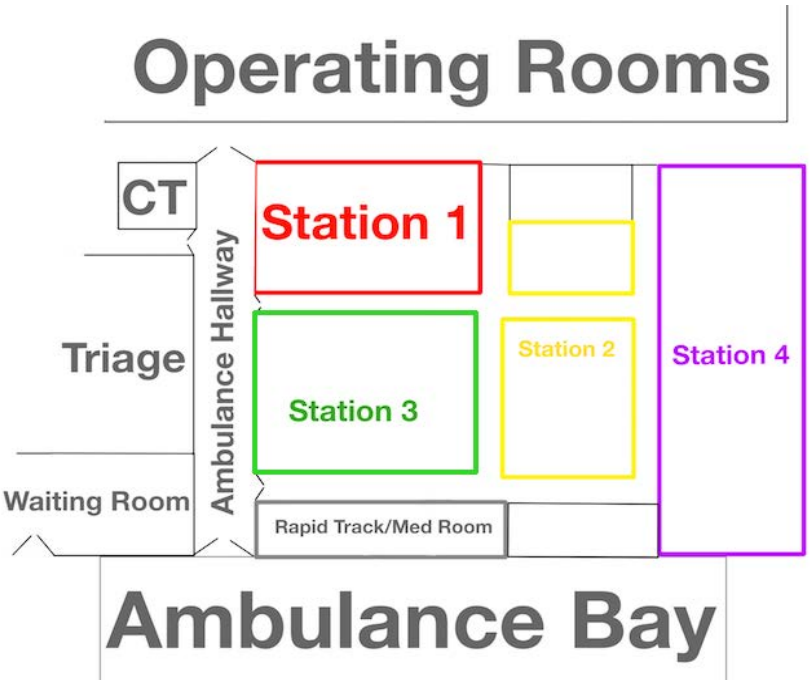

Figure 1. ED Internal Triage - Modified from Menes, Tintinalli & Plaster (2017).

3.6.4.2 The action cards

The action cards, or so called role cards, are meant to be used as a checklist on sudden situations in hospitals, they are done for the professional use. One card describes, in a simple

and short way, the action that one person should perform in a specific situation. There is no point adding several tasks in to one card, better to distribute tasks as much as possible. The aim of the cards is to secure that all the important tasks are prioritized and performed in the correct order. If there are more cards than performers, one can do several cards but one by one. On top of the actual role cards, different kind of forms and memory lists can be made. Simple and easily interpreted maps and charts can make it easier to understand the roles and responsibilities of the leaders; the path and location of the patients etc. A map can show the treatment areas for each category (red, yellow, green etc…), but the care level of each area can be elevated as needed. The charge nurse and the preparedness leader are in charge of locating the incoming staff, there the care team location map can be used to add names in each team, so leaders know which team needs more manpower. One important list is the staff contact list, it needs to be up-to-date. The preparedness leaders of the hospital must have accurate and clear lists for all possible cooperative partners, the emergency leader on the field, the police commander, the catastrophe leaders in other hospitals, accident investigation board, the press officer etc. All communication needs to be documented for the later analysis and investigation. (Sillanpää et al., 2005)

3.6.4.3 Communication & Traffic planning

The communication has been shown to be the weak point during emergencies. Not just the telecommunication (VIRVE) but also communication from person to person. All communication should be repeated by the receiver and documented in to the message protocol (viestipöytäkirja). The communication outside the hospital is more advanced even in the normal situation, so it is really important to educate and practice the communication in ED, so that during the emergency situation the communication between paramedics and ED is effective. The communication education is highlighted while using the VIRVE. Also the communication with the relatives and the press needs to be planned. Who can give information and where the information will be given needs to be decided beforehand. The traffic inside the ED needs to be planned well before. Where can relatives wait, which area the incoming staff will go first, how the patients are transferred, and where do new patients go or wait, especially in case of infectious diseases. The patient secrecy must be maintained all the time; no press interviewing the patients or taking pictures, especially without proper permissions. (Sillanpää et al., 2005)

4. Theoretical Framework: From Novice to Expert – Benner

For this research the theory of Patricia Benner "From Novice to Expert" from 1984 will be used. Benner used the Dreyfus model of skill acquisition and applied it to nursing to identify the different levels of a nurse's skills & capabilities in a clinical setting figure 2. Her works also shed a light on the difference between theoretical knowledge and practical knowledge, and why the latter is key for nursing advancement. Benner's theory states that nursing skills are acquired over time by learning from experience, and putting theoretical knowledge into practice. There are three general aspects of skilled performance necessary for the transition from one level to the next:

> "One is a movement from reliance on abstract principles to the use of past concrete experience as paradigms. The second is a change in the learner's perception of the demand situation, in which the situation is seen less and less as a compilation of equally relevant bits, and more and more as a complete whole in which only certain parts are relevant. The third is a passage from detached observer to involved performer. The performer no longer stands outside the situation but is now engaged in the situation." (Benner 1984, 13)

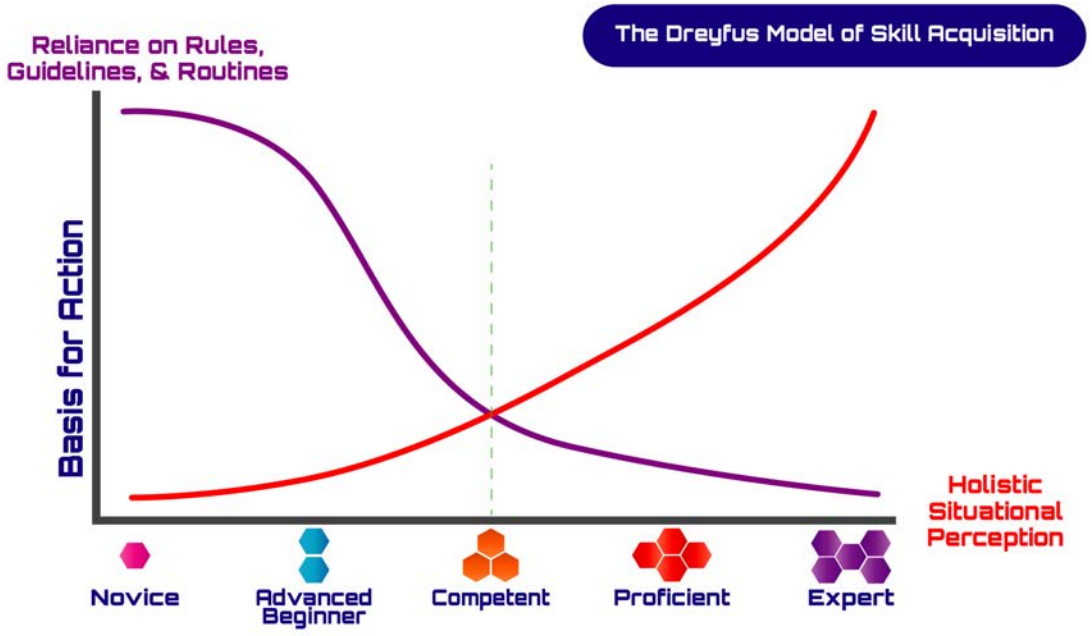

Figure 2. Visual representation of the Dreyfus Model

Following the Dreyfus model, Benner's theory (1984) presents how a nurse goes through the five levels or stages of proficiency figure 3., the first of which is the **NOVICE** stage: At this stage it is mainly the new nursing students, who have no previous experiences what so ever, they carry general theoretical knowledge which they have learned in school, and they need to be taught the context-free rules, regulations and routines of the place where they will be working or practicing. Their work is limited by those rules and regulations and they

Figure 3. Stages of Proficiency

rely mostly on objectifiable, measurable parameters such as vital signs, and do not yet have the ability to recognize what tasks are more important than others, and when there are exceptions where the general rules don't apply or need modifying. Benner also notes that even an experienced nurse or clinician who moves into a completely new field where they have not had previous experience especially with a different type of patients, such as from adult to pediatric or neonatal, would also be considered a Novice in the new place of work.

The second stage is the **Advanced Beginner** stage:
At this stage the nurse or nursing student demonstrates a *marginally acceptable performance* because they have gained some experience enough to start recognizing *Aspects of the situation*, which are recurring meaningful components that cannot be objectified like vital signs, they can be assisted by mentors to help them notice cues that can be gained from observing the patient. They start to use their past experiences to guide their actions, but they are still task oriented and their goals are usually to complete certain tasks rather than seeing the whole picture of the patient's situation. And they still need help from more experienced nurses in setting priorities to ensure that patient needs are not left unattended while focusing on less important tasks. (Brykczynski 2018, Benner 1984)

The third stage is the **Competent** stage:
At this stage the nurse has already been working long enough to have gained perspective from actual practical situations and from watching their more experienced colleagues or mentors in action, though they still lack the speed & flexibility of proficient nurses. They are better at time management because they can set long-term plans based on conscious, abstract,

and analytical thinking which helps them achieve greater efficiency and organization. This stage is the most pivotal in the clinical learning journey, because this is when a nurse starts to recognize patterns more quickly, and learns to prioritize with more consistent accuracy. The competent nurse can handle busy situations better than an advanced beginner because of the ability to plan and predict what is needed. Anxiety is still present for the competent nurse but becomes less generalized and more related to specific situations. The Emotional responses to one's own successful, suboptimal or failed performance becomes the ethical moral compass that guides a nurses in everyday practice. (Brykczynski 2018, Benner 1984)

The fourth stage is the **Proficient** stage:
At this stage nurses have become quite advanced in their work that they can see the whole picture instead of only components and specific problems. The nurse knows from previous experience what to expect in abnormal situations and can make better decisions because they think holistically, and they can be proactive by implement preventative measures because they can recognize patient deterioration before any clear changes in vital signs or other visible attributes. The importance or unimportance of aspects stands out clearly now for the proficient nurse. The nurse's performance is guided by *maxims* rather than rules or guidelines; a maxim is a statement of a philosophy or a guiding principle, something more abstract that cannot be used by beginners when they do not yet have a deep grasp of the situation. A proficient nurse demonstrates increased confidence in their knowledge and abilities, and they need less conscious planning. This level is a big leap from the previous one. (Brykczynski 2018, Benner 1984)

The fifth stage is the **Expert** stage:
At this stage, the expert nurse is one who has so much experience that they do not rely anymore on an analytic principle such as rule, guideline or even maxim, in order to know what to do in each situation, but rather has an intuitive grasp and an ability to identify the problem and its solution without wasting time on the multiple alternatives that do not help or work. The nurses at this level should have the following key aspects as Brykczynski has reported (according to Benner, Tanner, & Chesla 1996):

- *Demonstrating a clinical grasp & resource-based practice*
- *Possessing embodied know-how*
- *Seeing the big picture*
- *Seeing the unexpected*

It's hard to always get a clear explanation from expert nurses on why they chose to do one action or another or how they knew the patient was going to crash, because their response is usually "because of a hunch or intuition", even though it is usually based on evidence from previous experiences, but they do not need to consciously think about it which is why they can't always describe it figure 2. Meeting the patient's needs and addressing their concerns becomes the priority of the nurse, and with their extensive background of experience, they are able to identify patterns much more clearly and faster, and can care for their patients with a fluid, flexible, and highly-proficient performance. (Brykczynski 2018, Benner 1984)

5. The Qualitative research method

In a qualitative study what we are looking for is in-depth insight on the subject we're studying. Hence this research is an empirical qualitative study based on interviews with Nurses from an Emergency Department in a hospital in Finland. In a qualitative study the data collected is descriptive as opposed to the numerical data in quantitative studies. From that data one seeks to understand the experience of the nurses by performing a data analysis which will be described below (Holloway & Wheeler, 2010). An empirical research is based on data collected from real experiences in the field being studied. A qualitative empirical research can provide rich, deep contextual data to make a phenomenon more understandable, but cannot be generalized to determine predominance or commonness of a phenomenon; nor any statistical deductions concerning it because it's based a small or limited sources of data whether literature or participants. (Schiøler, K., Calopietro, M. J., Wieser, M., Møller, T., Gulis, G. & Rattenborg, R.I. 2013)

5.1 Purposive Sampling

In qualitative research does not need a huge number of participants because it does not need sampling strategies that are meant to produce statistical representativeness. Even though qualitative research might seek to establish a different form of generalizability, it requires that the sample relates in some systematic manner to the phenomena that is being studied. As King, Horrocks & Brooks (2019) stated that *"researchers seek to recruit participants who represent a variety of positions in relation to the research topic, of a kind that might be expected to throw light on meaningful differences in experience."* Therefore, one can choose

participants that fulfil different aspects which will provide the required variety such as age or gender or years of experience, this type of targeted sampling is called “Purposive” or “Purposeful” (King et al., 2019, Holloway & Wheeler, 2010), which is what will be used for this study. In a qualitative study only a small sample can be enough for the researcher to make a deeper analysis of the data collected. (King et al., 2019) There are no specific rules that define sample size, but Holloway & Wheeler (2010 p128) mention that most often qualitative research samples consist between 4 – 40, yet some researches can have more or less, because sample size does not necessarily reflect the importance of the study or the quality of the data. Saturation of data is defined as the point when additional samples do not provide any new information or codes, and just starts repeating what has been found from the previous samples Grove, Burns & Gray (2012). Grove et al. (2012) also mention some important factors that should be used to determine the sample size that would give adequate saturation, and those are 1. the scope of study, 2. the nature of the topic, 3. quality of the data, and 4. the design of the study according. Due to limitation of time a combination of convenience and homogenous samples will be used to acquire charge nurses from an “on-call Emergency Department” (*Päivystyspoliklinikka)* of a medium sized Hospital in Finland for interviewing. A charge nurse (*Vastaava Hoitaja*) is a nurse who is in charge of managing operations and logistics on the ward during their shift, since the emergency department charge nurses are of the first healthcare personnel to be involved in disaster or mass casualty events after paramedics & fire fighters, until the nurse manager (*Osastonhoitaja*) arrives.

5.2 Interviews for Collection of Data

Interviews are a great tool for obtaining rich information from participants by asking open-ended questions and getting the participant to talk and share their information which is based on their experience, feelings and thoughts. An interview can be done is several methods nowadays, but the face-to-face interview remains the most popular and common method. There are 3 types of interviews, the unstructured or non-standardized, the semi-structured, or the structured standardized. In a semi-structured interview an interview guide can be used in which questions can be written, but is not necessary to ask them in the same order or in the same way to each participant, because it will depend on how the interview goes and what responses the researcher gets, so some topics might get covered in follow-up questions rather than one of the planned questions. The purpose of the interview guide is to help the researcher collect similar data and cover the topics that are of importance to his study but still be flexible. The interviews can be audio-recorded and later a verbatim transcription of

the data should be performed. (King et al., 2019; Streubert et al., 2011; Holloway & Wheeler, 2010) In this research semi-structured interviews will be carried out in English language with the aid of an interview guide.

5.3 Thematic Data Analysis

According to Elo & Kyngäs (2008) qualitative content analysis has become quite popular and acceptable recently especially in nursing research. Since in most of the nursing research relies on words that describe experiences or phenomena, the need to interpret the results in a non-mathematical way has lead to the rise in the usage of qualitative content analysis. Both inductive and deductive processes are performed in 3 stages: Preparation, Organization, & Reporting as can be seen in Figure 4. Content analysis is a method of analyzing and interpreting the results of collected data whether its qualitative or quantitative. Content analysis attempts to make the results of a study clear and understandable and possibly replicable in other similar studies. It can be used in 2 ways, either inductive where one starts from a specific idea and ends up with a generalized concept or theory, or deductive where one has already a theory and one tries to test this theory by checking if the data fits or applies to the theory, which going from general to specific.

For this qualitative study an inductive *Thematic Analysis* (TA) with open coding will be carried out. Clarke & Braun (2017) define TA as *a method for identifying, analyzing, and interpreting patterns of meaning ('themes') within qualitative data*. Elo & Kyngäs (2008) point out how qualitative content analysis is quite suitable for nursing research because of its flexibility and content-sensitive methodology which works well for the *multifaceted sensitive phenomena characteristic of nursing*, especially when there is lack of previous research or the information on it is fragmented. TA in qualitative research can be used to analyze both small and large data samples, from 1-2 participants up to 60 or more (Clarke & Braun, 2017). The researcher must decide before he starts coding, whether he will take into account the latent content (body language, tones of voice, pauses, etc.) or only the manifest content which is the words that can be transcribed, and the collected data should be read once without coding and then read several times during the process, because qualitative data analysis is a non-linear process which will require the research to go back and forth between the stages and the data (Elo & Kyngäs, 2008; King et al., 2019). The organization process of

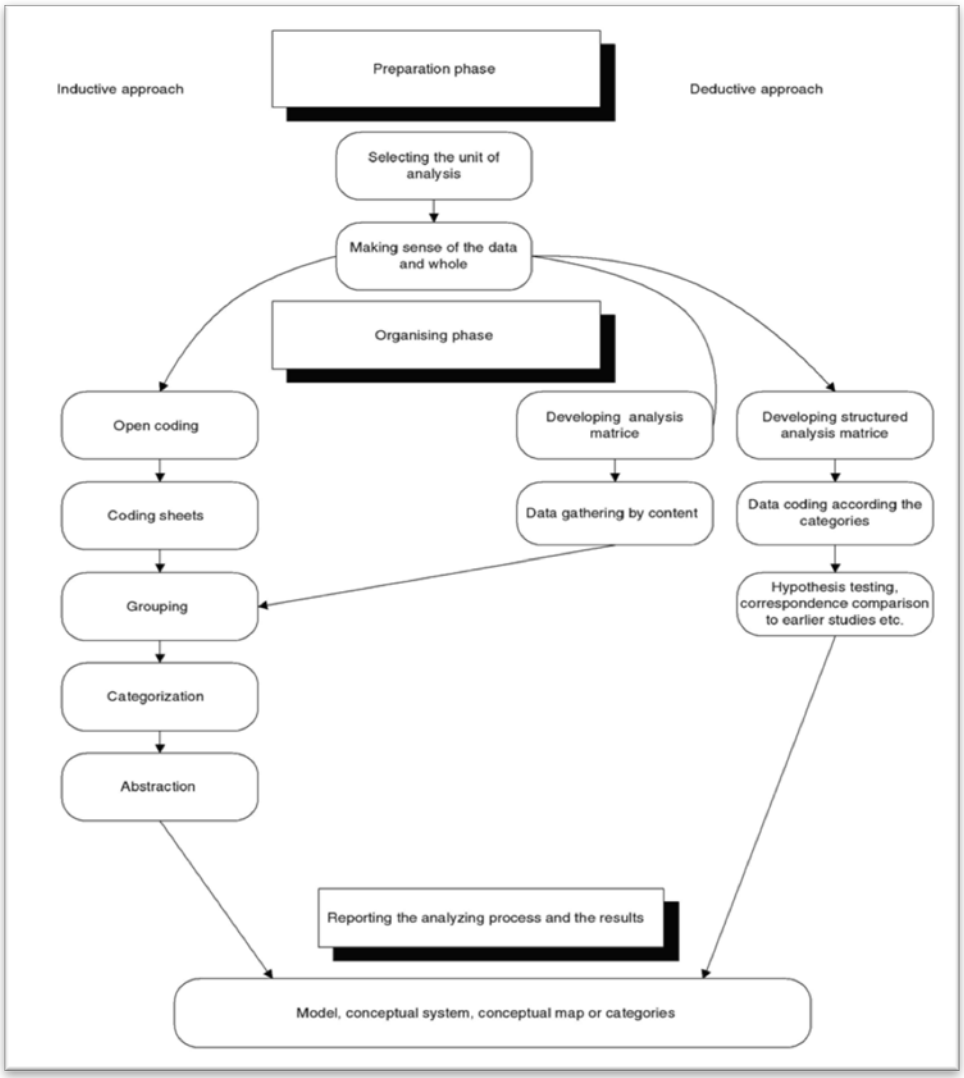

Figure 4. Qualitative data analysis (Elo & Kyngäs, 2008)

thematic analysis can be broken down into three stages. In the first stage, *descriptive coding* will be made, at first using "in vivo coding" to highlight important words or expressions from the transcribed interview text, which keeps the data analysis process objective, free from the researchers own idea. Color coding will be used to highlight similar extracts. Then descriptive coding will be defined to each color, while attempting to keep it simple and short. In the second stage, *interpretive coding* is used to group together descriptive codes that are similar in meaning, keeping in mind that the same descriptive code might fit into two or more different clusters. In the third stage, we identify overarching themes based on the interpretive themes that we have found. In this stage it is possible to relate the theme to any theoretical background that was used for the study, as long as it's supported by the analysis. The overarching themes will be the major key concepts of the research, which will be reported in the discussion section. (King et al., 2019) The findings will be described and discussed in turn with examples from the interpretive and descriptive codes, as well as some direct quotes will be included to illustrate some themes.

5.4 Ethical considerations in healthcare research

In any research whether qualitative or quantitative, the ethical issues must be considered, especially when it comes to healthcare research, where the concept of non-maleficence applies, as in the research must not cause harm to anyone from participants to the community which is why confidentiality and anonymity are very important, as well as the voluntary participation and rights to withdraw at anytime without any consequences, and the data should be stored and handled securely. Here in Finland one must also follow the guidelines for the responsible conduct of research that have been published by the Finnish Advisory Board on Research Integrity (TENK) which promote research integrity by following a responsible conduct of research in order for our research to be ethically acceptable and reliable and for its results to be credible. So it is important to follow the principles of scientific research in a manner that demonstrates accuracy and integrity. It is also of utmost importance to acquire proper permission from ethics committees and research supervisors, as well as informed consent from human participants in the study. So a research must also check if an ethical review statement from a human sciences ethics committee is needed. And as with all research, we must pay attention for any misconduct and violations of the responsible conduct of research, such as Fabrication, Falsification, Plagiarism and Misappropriation. (Holloway & Wheeler, 2010; Streubert, Carpenter, & Speziale, 2011; TENK, 2019)

6. The Conduction of Study

In this chapter how the research was actually performed is described, following the qualitative methodology presented previously, from obtaining the samples to the collection of data and its analysis, and the ethical considerations that were considered for this study.

6.1 Sampling

Only 4 participants were acquired by the end of the study, which is acceptable in qualitative research, yet it cannot confirm whether the sample saturation had been achieved or not. Participants were recruited by consulting with the nurse manager. With the help of the nurse manager an email concerning the study and participation in it was sent to all the charge nurses of the ED, but after waiting around 2 weeks, we still had no replies from any of the nurses, so another approach was attempted, whereby researcher went to the ED in person

and while there the head nurse asked the charge nurses who were on duty at the time, if they would like to participate in my study, and two of them agreed, then with the help of one of them, another charge nurses was recruited as well on the same day, and the fourth charge nurse was recruited about a week after, with the help of one of the previous participants and the nurse manager. Information was left that the opportunity would still be open for any more charge nurses to participate as well later if they wanted to, with both the participants as well as the nurse manager, but no other participants were acquired.

6.2 Data collection

Face-to-face semi-structured interviews were conducted. The interviews were audio-recorded using a smart phone and then afterwards a verbatim transcription of the data was done. The interview guide was based on the Finnish guidelines & the recommendations for disaster situation management, and its structure was based on some of the categories for that have been suggested by Patton for qualitative interview questions (according to King et al., 2019, p. 65) which are *Background/demographic, Experience/behavior, Opinion/values, Feeling, and Knowledge.* then an unofficial pilot interview was performed with an ED nurse, based on which some questions were modified, deleted, and added to better suit the Finnish ED nurses, but that interview was not transcribed nor included in the data analysis. The interview guide can be found in Appendix A. The interviews took place in one of the ED's meeting rooms, they were averagely around 20 mins plus or minus a few minutes, and were conducted in English language, but some specific terms were spoken in the interviewees' mother language (Finnish or Swedish), to help them understand some questions better, and the interviewees had replied with some terms in their mother language sometimes, but all the terms were later translated during the transcription with the assistance of either a Finnish/Swedish native speaker, or the Nurse Manager of ED, since a normal dictionary or translation website/software cannot convey the meaning of some terms, especially if they are from the local dialect or only spoken dialect.

6.3 Data Analysis

For this qualitative study an inductive thematic analysis with open coding was carried out. Elo & Kyngäs (2008) point out how qualitative content analysis is quite suitable for nursing research because of its flexibility and content-sensitive methodology which works well for the *multifaceted sensitive phenomena characteristic of nursing*, especially when there is lack

of previous research or the information on it is fragmented. So the transcripts were read more than once before starting with coding, then descriptive open coding with in-vivo codes was used in the first interview, and some new in-vivo codes also emerged as well from the first run of the other interviews, then the codes were consolidated into descriptive codes that fit the similar quotes from the other interviews and defined to one color each, but some quotes were found to fit under more than one code. Only manifest content was considered, since the interview was not in the interviewees mother language, there were too many pauses and sounds which had no additional value to the responses. In the next stage, after going through the code sheet, the the descriptive codes that were about the same subject or topic were grouped together into sub-categories using simple and short interpretive coding. And in the end using abstraction the sub-categories that had a common theme were grouped together into one category, which is the same as what King et al. (2019) refers to as *overarching theme*, ending up with three categories. A graph of the entire coding matrix of the results and their frequencies per interview is presented below in figure 8.

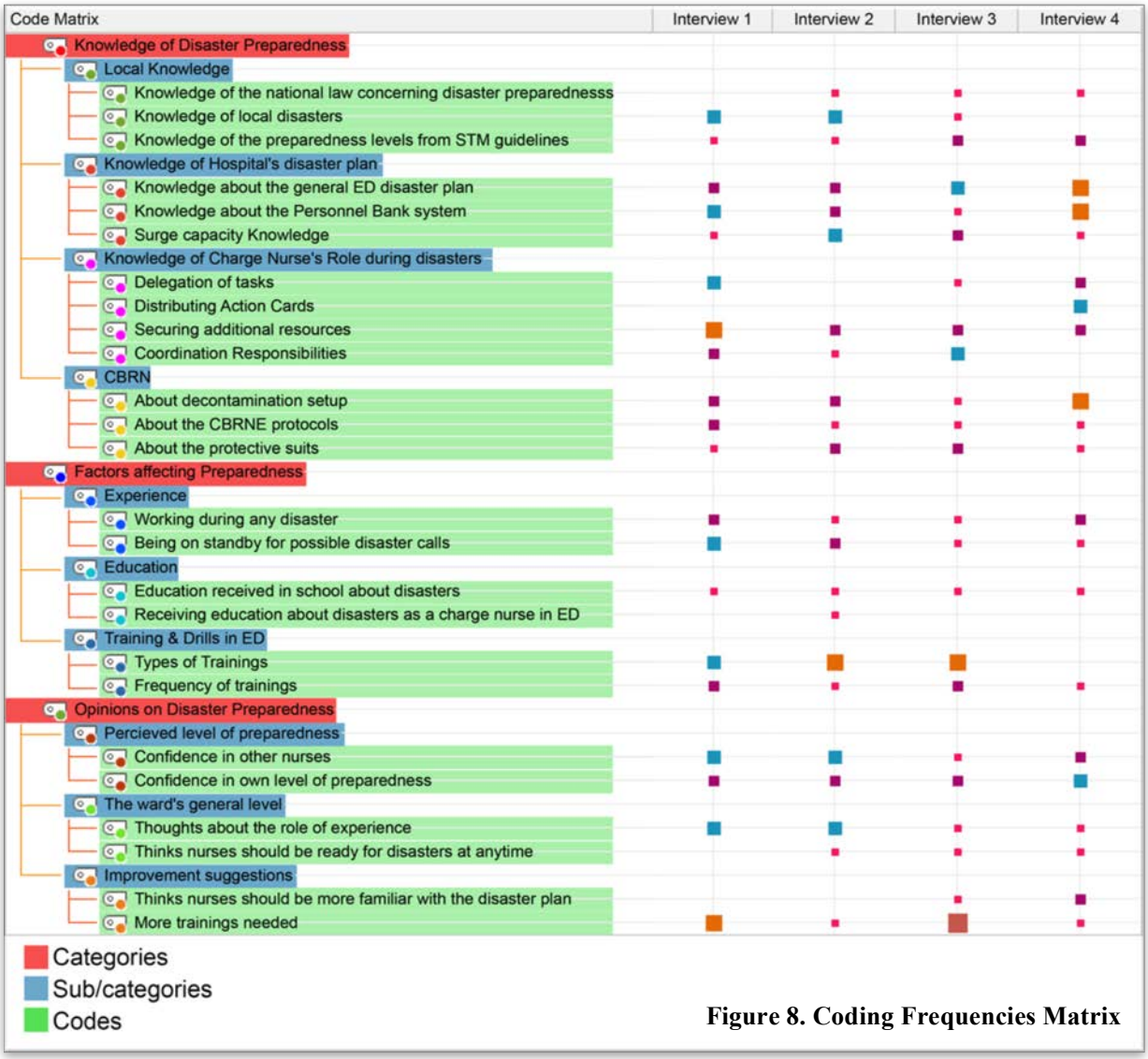

Figure 8. Coding Frequencies Matrix

6.4 Ethical considerations

Permission was requested and obtained to carry out the study, at first from the thesis supervisor, then from the hospital's designated head nurse; who is in charge of several wards and researches conducted in them, the ED being one of them. Respondents received and signed a Consent form that included a written description of the purpose of the study, and it's benefits and disadvantages, and their right to withdraw from the study at any time without any negative consequences, a sample of which can be found in Appendix B. And again before the beginning of the interviews, further verbal information about the study were given. All the data that was collected was handled anonymously, and with full confidentiality. The interviews' audio files were saved securley on to my personal computer in a password protected folder, and will not be used for any other purposes. The audio files will be deleted after the thesis is published. (Streubert, Carpenter, & Speziale 2011) And to preserve anonymity for the participants, the order of the interview transcripts has been shuffled. The hospital's name has also been kept anonymous to preserve a higher level of confidentiality and anonymity, and so the approval on the permission request cannot be published in the Appendix, because it clearly identifies the hospital.

7. Findings

Four charge nurses were interviewed from an Emergency Department of a medium-size hospital in Finland, their demographics were as such:

Gender was balanced with two females and two males, their age range was between 30-40 years. Their general nursing experience ranged from 7.5-20 years. Their experience as charge nurses were between 1-7 years.

Three categories were reached after inductive thematic data analysis, two of which turned out to be similar to the categories from the interview guide that were described by Patton, but it's important to note that those categories had only been used for the interview guide and not for a framework matrix for the data analysis.

The three categories:

- ***Knowledge of disaster preparedness***
- ***Factors affecting preparedness***
- ***Opinions on disaster preparedness***.

7.1 Knowledge of Disaster Preparedness

The First of the categories was ***Knowledge of disaster preparedness*** which was the category that revealed what areas of disaster preparedness the nurses were familiar with, this category came from the 4 sub-categories: *Local Knowledge, Knowledge of the Hospital's disaster plan, Knowledge of charge nurse's role during disasters,* and *Knowledge of CBRNE,* which came up from the grouping together codes that were related to similar topics. The first category's layout can be seen in figure 5.

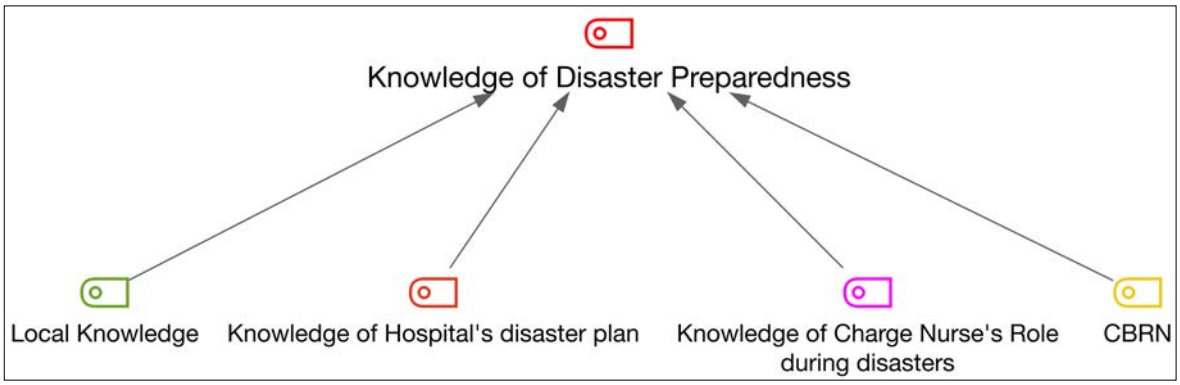

Figure 5. Knowledge of disaster preparedness – 1st Category

7.1.1 Local Knowledge

This sub-category was concerning the local disasters that had happened in Finland, and we can see that the participants had some knowledge, their knowledge seemed limited to mostly the famous mass casualty incidents such as some bus accidents and school shootings, when they only named a few as we can see from quotes such as:

> "yes, Konginkangas was the biggest, and like maybe the biggest and most awful part that's happened in traffic accidents— there are many" (Nurse 1)

> "do you remember this Kauhajoki" (Nurse 4)

As well as the knowledge of the preparedness levels from STM guidelines, some had an idea about, even though it was not completely accurate because those mentioned were the levels of alerts in the ED, which are mentioned by Sillanpää (2005) and are similar to STM levels yet not the same, but it is important to know those as well, such as

> "Normal and then it's this Valmuiden Nosto [readiness raising], and then it's the Suuronnettomuus [Mass casualty Incident]" (Nurse 4)

while others didn't seem to know about the STM guidelines or their levels of preparedness required of hospitals, or did not know what those levels meant, as we can perceive from

> "not that I can recall" (Nurse 2)

> "yeah ok, the one we are here, and then there is the administrator or the— you mean there is like?" (Nurse 3)

And also about the knowledge of the national law concerning disaster preparedness, which most participants were not much familiar with, as can be seen from responses such as

> "about the law I can say I'm not sure, whether— what exactly the laws say, the thing I'm assuming what I have learned from the protocols that we have in this hospital is according to the law, but I don't know" (Nurse 3).

7.1.2 Knowledge of the Hospital's disaster plan

This sub-category included the knowledge of the general ED disaster plan, which all participants seemed to have, but not necessarily remembering the details of it, for example:

> "it's been for a while since I read it but I know how the system works, that we have a responsible nurse here, and Kenttis—" (Nurse 1)

> "Yeah, I would say it's quite broad the preparedness, and for example I think the scary part is the— being the one who is in charge and I'm actually in charge now so right now for example, you know I have to have some of the ideas on the finger tips, if this happens what do I do" (Nurse 3)

Two other subjects belonged to this sub-category which were more specific, one was concerned with staffing resources, where all participants had good information on how extra staff is organized and called in, they all talked about the "Personnel Bank system" known as "*henkilostopankki"* in Finnish language, which is the automated group messaging software at the ED for acquiring extra staffing in cases of sickness absence as well as bigger emergencies. For example:

> "we have text message for groups, a program in a computer that if we send a group message it goes automatical to 75 persons, but we can also choose for surgery or there is different kinds of groups yes categories, send a text message or call" (Nurse 1)

> "we have a system whereby we send a message, like a message to many staff, we have a group already, like they are grouped, for example if I want all the nurses here, all the doctors here, all the like the potilas kuljetaja [Patient Transporters] like transport, so we have like a massive message to many people… so you send the message here, and also how it works is before you even, when you are getting the prior information from the, I think it's from 112 they have that kind of message whereby they send like for preparedness, so they send this hazard, and.. to be alert yeah" (Nurse 3)

And the other was about "Surge Capacity", for which the participants also had good knowledge, especially concerning critical patients, with some minor discrepancies, but less accurate knowledge concerning the less critical patients, as we can see by what is said here:

> "if there's a bus accident so we have a triage we have to go with that, so how many red patients we can take in, and how many *B patient* or *C patient*, but in term of *A patient* in triage we can take maybe, depending with the shifts and how many experienced nurses at the time we have so we can take maximum 6" (Nurse 1)

> " yes well, I would say for example if we have the maximum we can take for red patient is 5, maximum is 5 red patients and then we can have; its yellow; you know we have different, yellow patient we can have— now the figure is not exactly but it's something between 10 & its about 15, if I remember well—" (Nurse 3)

7.1.3 Knowledge of charge nurse's role during disasters

This third sub-category belonging to the ***Knowledge*** category was concerned with the different responsibilities that need to be addressed as part of the charge nurse's duty during a disaster call. The first was delegation of tasks, where we could see that the participants were quite familiar and confident about their own tasks and responsibilities from quotes like:

> "I check that there's enough, like extra packets, and if it's in the daytime, I will, me if I would be a responsible nurse, I would ask pharmacist to go *and take more from the pharmacy…* yes from the storage, and also if there is like 10 orange patients, like 2nd needed, I will order another nurse to check medications for all of them for example" (Nurse 1)

> "there is henkilostopankki [Personnel bank] and then I plock [pick] that you are triage and you are so" (Nurse 4)

Second was the distribution of the action cards, for which there was not sufficient information on, since only one nurse mentioned them:

> "we have there is a card, the staff nurse, she or he must take this card and there is right side by side what you must do" (Nurse 4)

Third was a discussion about securing additional resources such as medical supplies, medicines and medical equipment, for which the participants had quite good knowledge about, as they described:

> "we have a few here in emergency department, and then we can get more still in the same, in intensive ward they have quite a lot, so there we usually borrow in case we need extra, and in Jouravdelningen [Emergency bed ward], it's upstairs too, we can borrow" (Nurse 2)

> "we have this Katastrof varasto [Disaster Storage] we call it, a store for when if a catastrophe happens, and there you can find most of the materials" (Nurse 3).

And the fourth and final topic in this sub-category was coordination responsibilities, where the participants also seemed to have good information on, as we can see:

> "on my shift if something happens so we have to— we coordinate with the doctors and the other field nurses and then we come with the plan of what to do, but then there is that one basic emergency preparation the one we always have it, like what to take incase if it's a road accident or something like those, we have to be prepared we have to inform the intensive, we have to inform the x-ray department, we have to inform the operation, and those are like just the protocols" (Nurse 2)

> "uhhm like if there is for example 3 A patients [Red triage tag] coming to shock room, that responsible nurse is making like groups, that each patient has enough staff around for example" (Nurse 1)

> "as a charge nurse today the most important things to know is to know if something happens because we of course we will get some prior information, whom do I contact, it's not actually how I'm going to treat that patient, it's more how do I coordinate" (Nurse 3).

7.1.4 Knowledge of CBRNE

The fourth sub-category was concerning *CBRNE* Incidents (Chemical, Biological, Radiological, Nuclear, and Explosive) which was about the rare yet more extreme events that might still be possible even in Finland. Preparedness and Response to CBRNE events requires specialized training and equipment, so there was a discussion of the participants' knowledge of CBRNE protocols, where one participant mentioned that this field was her specialty, as for the others they stated that because of the rarity of these events they do not really have ready knowledge to know what to do, but they would read and follow protocols from the disaster plan then.

> "that's a tricky too question, because it depending with the chemicals, so we call have these— we don't have so much of these what can I say— accidents happening, so it's quite difficult to evaluate just what I can do, but in case it happens we can maybe go with the protocol of the basic, basic burns and what type of chemicals it is" (Nurse 2)

> "we have in the entrance we have a closet with all the stuff we need, to what to put, but I haven't checked the closet for years, but like what is inside, but yes its bad… there is everything you need for chemical things, maybe clothes and stuff" (Nurse 1)

and then also one expressed uncertainty about such situations:

> "so if we have many patient so that one is more— it can hold maybe one or maximum two, if we can put two beds, and so if we have many patient then, if I remember how it goes we have another place, another— we have in a certain ward, I have to you know— as I was telling you, that disaster preparedness is very broad, so we actually were told you have to have it when you are coordinating the—you cannot have it in your mind… so I know there is, I don't know whether it's A3 and Päivystys Osasto [observation ward] they have some room where by we could move a patient, that one about the

> wards I'm not sure which place, but I know there is a place where by we can move a patient, but still we can't have like 20 patient" (Nurse 3)

Decontamination setup was discussed more specifically, which is a must in all mass casualty CBRNE incidents. Here was a lack of consistency in the information, where some participants believed that the ward's own CBRNE isolation room, would be used for decontamination, for example:

> "we have only one room where the CBRNE, where by in case of the chemical contamination in that sense all the patients have to go through the shower in that area" (Nurse 2)

> "yes well we have the CBRNE room, and there's we are able to put the patient on the bed and wash it, as chemical accident, in the chemical accident have to be done, to wash with water and also in that room we can intubate and take care of like ICU patient" (Nurse 1)

while others said it would take place outside the ambulance entrance with a special shower setup, so it was not clear which is the actual protocol that would be followed:

> "what happens here is ambulance will bring the patient, and they will come outside there where we have the ambulance parking area, we have some kind of sprinklers or kind of pipes whereby we can flush the patient, and there is a way we can even put like a curtain outside, so the moment the patient come if it's for example patient that requires like you flush yeah so you decontaminate outside there, and I understand the— system under for transporting the waste it's not transported to the same sewage, so it's a special… and so and also we have our CBRNE room where we can take—" (Nurse 3)

And when asked about the protective suits, which require training and practice to put on and take off safely, the participants admitted to not knowing how many suits the department had, nor having trained to put them on, as can be seen from quotes such as:

> "no we have not gone through that one particularly" (Nurse 2) on practicing wearing the suits.

> "we have couple I have seen them like they're just hanging there, which were just ready, but I can't say like how many we have all of them all together" (Nurse 2)

> "I don't know so exactly" (Nurse 4) on how many suits are available.

7.2 Factors Affecting Preparedness

This second category came from 3 sub-categories: *Experience, Education, Training & Drills in ED,* each of which was a significant factor in the level of preparedness of nurses as research proved. The layout of this category can be seen in figure 6.

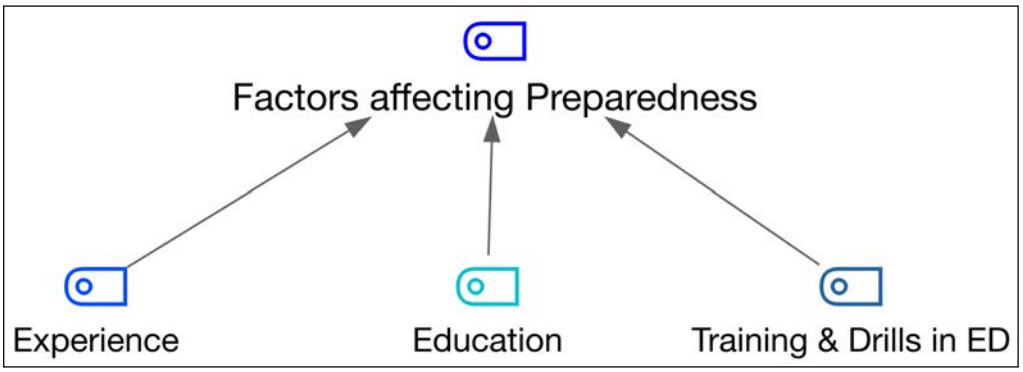

Figure 6. Factors affecting preparedness

7.2.1 Experience

This sub-category included discussions about the participants' own experiences, such as if they had worked during any disaster calls, which most reported that they lacked that experience, except for one but it was while working as a paramedic and not in an ED:

> "well I haven't been like working on a shift whereby we have been having that kind of disaster, we have been having very severe cases for example accidents involving about 4 or 5 people, but not to that level of a serious disaster, but those 4 to 5 if for example they are red patients, it's also quite a big thing to our emergency" (Nurse 3)

But when asked about having received alerts to be on standby for potential MCI, the participants reported having experienced that a few times but most of the calls had been canceled afterwards, for example:

> "maybe twice, yes but then like we got an information from ambulance that ok we have to do it, but then very quickly we got another information that oh no need" (Nurse 1)

> "we have been here so *läheltä piti tilanne* [a close call] so that we have had *valmiuden nosto* [readiness raising]" (Nurse 4)

7.2.2 Education

The second sub-category was concerned with the education about disaster preparedness, though most education comes in form of trainings, but theoretical courses or lectures could be considered education, for example during in nursing school, to which the participants had all responded negatively:

> "nothing in school" (Nurse 1)

> "when I was studying no" (Nurse 2)

Then also whether the participants had received any extra education when they became charge nurses:

> "ah not really" (Nurse 2)

but they all had access to the disaster plan folder and were expected to read it and prepare by themselves, as can be seen from the responses:

> "because first time when I come here it's my first so priority learn here everything" (Nurse 4)

> "I have read the mapp [File] regularly" (Nurse 1).

7.2.3 Training & Drills in ED

The third sub-category included discussions about the types of trainings and drills the participants had received or taken part in, while working at the hospital, from which we can see that they have had some trainings and simulation drills "with fake patients", sometimes in collaboration with other rescue authorities such as firefighters or paramedics, like:

> "Yeah real patients, like of course they were acting like real patients, it was a drill yeah, so we had to take care of real people but yeah" (Nurse 3)

> "here we have had couple of trainings, but then there was a disaster training one we had here with—which was with ambulances and fire fighters and we had some patient to come in and practice" (Nurse 2)

some of the participants also reported that they have had both types of trainings, such as practical/drills and theoretical/desktop or tabletop training, but mostly for general accidents such as trauma rather than bigger MCIs or disasters:

> "yes, not like *suuronnettomuus* [Mass Casualty Incident], no, just normal thing, but that is very good simulation, you understand how things work, what you have to do, because still after these years I remember how it was and also we go through with chemical accidents, and like how to, what to do, but unfortunately a lot of things, if you want to know what to do you have to be active yourself and find out yourself, there's no like usual education" (Nurse 1)

But concerning the frequency of those trainings, most reported to having attended only one or two trainings during the entire period of their work:

> "we do have trauma simulation once in a year, but usually it's for nurses that are younger than I, so it's been maybe 3-4 years since I was there last" (Nurse 1)

"it was the whole period I have been working here it was only that one I have had for disaster, but other training about the emergency, trauma those ones we usually have quite often" (Nurse 2)

"in my time I have participated only two times, so there could be, there have been of course other times but then I'm not working because it depends are you working, but also they are not so often" (Nurse 3)

7.3 Opinions on Disaster Preparedness

The third and last category was ***Opinions on disaster preparedness,*** which came up from the subjective opinions & ideas, from the participants' point of view, and those had been grouped under three sub-categories: *Perceived level of preparedness, The Ward's level of Preparedness,* and *Improvement suggestions.* The layout can be seen in figure 7.

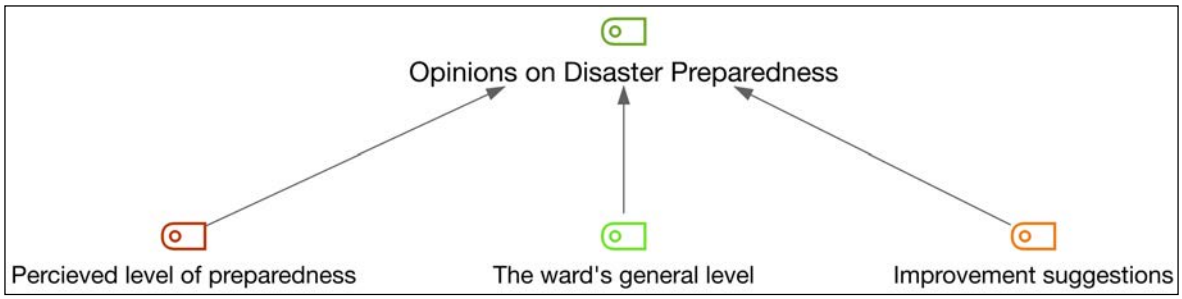

Figure 7. Opinions on disaster preparedness

7.3.1 Perceived level of preparedness

In this subcategory there was a discussion about the confidence in other nurses, which there was an apparent lack of, especially when it came to the new nurses, because of their lack of experience and training in disasters or MCIs:

"sometimes new nurses need help even with the easy cases" (Nurse 1)

"no we can't because we need to be more experienced nurses who hold their A- patients" (Nurse 2)

"We have quite much new {nurses} here just now, so that its quite different haha (nervous laugh)" (Nurse 4)

But concerning the participants' confidence in their own level of preparedness, some showed a high level of confidence when saying things such as:

"depending with the situation, but because when you come to work you always have to be ready for anything, so depending with what is coming and when it's coming so" (Nurse 2)

> "I have so much experience, yes, so and I have so- how I say- scale in my head, that I know what I must do, what is possible, what is coming, and so- it's quite easy to me I know so, or I like so I have learned some mind codes" (Nurse 4),

while the others made it clear that they would be quite confident if it is more of a Trauma-type of call but not as much if it is one of the special CBRNE incidents:

> "well if we think for example the chemical accident, i'm not feeling so certain about it just because we never have it, and now we found out that we never had a training exactly for it, so I wouldn't feel certain what i'm doing, but I know how to deal with things, but i'm maybe more like confused i'm about the situation that we have so much new nurses who doesn't know about it, so how me as a leader would tell everybody what to do" (Nurse 1)

> "because I don't know how we can handle if we get so many patients who have been contaminated because if it's any kind of trauma, a plane has fallen or a bus, those are kind of maybe normal kind of— we have been taking care of trauma patients" (Nurse 3)

7.3.2 The Ward's level of Preparedness

The second sub-category was about the perception of the general level of the preparedness in the ED, the first part from was about the participants' thoughts on the role of experience and its effect on preparedness, where most of them linked the level of preparedness to the availability of experienced nurses during a shift:

> "for example, in *Valvomo* [Observation Room with multiple beds] the place number 1 where is the usually more experienced nurse so on his or her side I usually put some patient who are like triage B, who need more urgent help, and the other side are more like Urine way infection [UTI] and those nurses who are just begun here, so you have to think a bit, but if in case of emergency everybody has to know what to do so that's a bit tricky" (Nurse 1)

> "the ward level of preparedness it's depending with the type of nurses we have, because we have been having- we have experienced nurses and then we have the new nurses, so depending with how experienced the nurse they are, then its more comfortable like you can feel more comfortable working with them like if something happens so you have a team already…you know what to do, than when you have an inexperienced nurses, those who started, then you have to direct and try to help out of course so" (Nurse 2)

but some also believed that education and training could play a more important role than experience itself:

> "well I think they cannot of course be compared with those who have been for a shorter time here… but I think because we have been having those drills I think if I talk about myself the drills have helped me open my eyes" (Nurse 3) and:

> "it depends if they have gotten the education about it and how have— how can I put it… if they can manage the stress, because sometimes you can be experienced nurse for 10-20 years but then when it

> is a stressful situation then you— your levels goes completely down so it depends with the level of stress how you can handle it" (Nurse 2)

And then the participants also stated that they do thinks that all nurses should be ready for disasters at any time:

> "I think it should be initiative for everyone because anything can happen, any time it can happen" (Nurse 2)

> "I think it's very important to be prepared for the disasters, even those which are not maybe easily going to happen here, because you never know, it's always good to have a second plan, so I think it's important to be prepared" (Nurse 3).

7.3.3 Improvement suggestions

The third and final sub-category included what the participants believed would help improve the overall level of preparedness for the ward, the first was a belief that all nurses should be more familiar with the disaster plan:

> "yeah they can't [read the plan when a disaster happens], if it happens you have to have an idea of what you can do" (Nurse 3) or

> "so I hope that everybody read this *mapp* [folder], when we have this *suuro* [Mass casualty Incident] … before so that they have some scale there inside their head, so that I have to myself so I have there in some locker so it's there so that it is almost routine, so that you know just when you find this *mapp* [folder], when you find this card, so that not use so much energy to think about it, that it is something that you go there and take *mapp* [folder], there and take so" (Nurse 4)

The second was an agreement by all, that more trainings were needed for everyone in order to improve and maintain a good level of preparedness for the whole department:

> "I think it can be more often even though it's not that common, it can be good to educate, more practice and for the newer nurses too, to show them like hey this can happen, so at least awareness, I mean like more practice at work and more showing like this can happen theoretical and practical" (Nurse 2)

> "we need more, it's got not good not be the routine so we need much more training" (Nurse 4)

> "so I think more drills would be good, I think they would have, it would be nice to have at least once in a year a drill that is different from like normal, for example this year it can be mass shooting, the next year can be maybe a ship has drowned, has capsized and we have hypothermic patients" (Nurse3)

8. Discussion of Findings

In reference to the theoretical framework of Patricia Benner, where her theory "From Novice to expert" emphasizes on how years of experience affect the level of care and confidence that nurses will have at work, and we can see this theory valid from both the demographics and the findings, based on the thoughts from the participant nurses, where both for themselves, and for their colleagues', it seemed that the amount of experience years reflected on their confidence & knowledge levels, especially when there was minimal training obtained. But it is of importance to note that the quality or area of experience also plays a big role, which Benner also states, that if a nurse moves from one field to another, it will not necessarily mean that they will have the same level of advance expertise in that level, but they will be back to the beginner or novice stage when it comes to the new field of work (Brykczynski 2018, Benner 1984). Which is also apparent in the results as most of the participants had no experience in disasters or mass casualty incidents, which reflected on their levels of confidence in some areas such as CBRNE, and one nurse did mention how some nurses holding years of experience were still ineffective in a disaster situation because they hadn't had any training in it, or if they are unable to manage in stressful situations, which raises questions such as "does training equate to years of experience?". So another matter of consideration is education, trainings & simulation drills in specific topics, that would give the nurses a certain experience which they would otherwise require years of work in order to achieve, if they even get the chance, especially when it comes to disaster calls, which are rarer in some areas than others.

As for the findings, the category *Knowledge of Disaster Preparedness*, tells us what and how much the nurses know about disasters and preparedness, and in that category were three areas that could use more attention, the first was about local knowledge, especially of the laws and guidelines; such as the levels of preparedness and levels of alerts, and what is required of the hospital during those according to STM guidelines (2002, 2006) and Sillanpää et al. (2005). The second was hospital's own plan, though the participants had good knowledge of some parts but there seemed to be some inconsistencies or missing information about other parts such as Triage numbers or the action cards which are described by Sillanpää et al. (2005) as part of the ED departments functioning during disasters, because it is important to be at least acquainted with the main parts of the plan if not have a good knowledge beforehand. The third was CBRNE knowledge, especially concerning decontamination of patients, which the STM guidelines (2002) states that it is part of the

hospital's responsibility in case of CBRNE incident. And even though it is something rare in Finland, it is considered one of the most critical and difficult fields of disaster preparedness, and the lack of experience & training in that domain, makes the ED and the whole hospital vulnerable to total collapse in an event of a CBRNE incident, under which fall pandemics, even though with the latter there is usually a little bit more time to prepare and train the staff, since the surge happens more over days or weeks rather than minutes or hours. As for the general ED's plan and the charge nurse's role, the participants did have knowledge of the main points that were discussed by Sillanpää et al. (2005) concerning distribution of roles, and triaging.

The findings in the *Factors affecting preparedness* category identified the reasons why the current state of preparedness of the nurses and the ED ward, is where it is at currently. We can clearly see that there is insufficient education and training, which Castrén (2015) states is essential not only for teaching the staff, but also to test the preparedness plan and improve it, and international researches as well prove them to be essential for raising the nurse's level of preparedness, which the participants themselves also recognized as the most important factors in improving their own and the whole ward's preparedness level.

As for the category *Opinions on disaster preparedness*, the responses from the participants told us their thoughts on the whole disaster preparedness, which shines a light on what areas future research should focus on. And in general portrays the thought that even though there was an acceptable level of self-confidence in the participants' own ability to lead a disaster call, especially with the guidance of the disaster plan folder and guidelines, there was still a sense of hesitation and lack of confidence when it came to the rarer and more special incidents. As for the ward's ability to keep up and maintain functionality during a disaster incident, there was an obvious lack of confidence in that, especially when there's many new nurses among the staff, due to their lack of experience, education and trainings in this matter.

9. Discussion of Method

Due to lack of public researches nationally in this field, and to collect information from the what's happening on the grounds and from the experiences of charge nurses working currently in the ED, the empirical qualitative method was chosen. The qualitative method was suitable to give us rich information which helps identify areas of weakness in the ED

preparedness even without having the ability to generalize the evaluation of the nurses. One of the limitations of this study was the use of English language which is not the main language in Finland, which might have contributed to the difficulty in finding participants willing to undertake an interview in a foreign language. Another obstacle for the researcher, due to language, was finding, interpreting, and understanding the laws and guidelines which were only available in Finnish language, where assistance from a native speaker was required and the whole process was very time consuming, and some information was found late so they were not included in the interview guide, also the scale of the study and its design have not covered all areas of disaster preparedness. The reliability of the findings might also come in question, even though the responses of the participants seemed truthful and honest, but the small number of participants can infer a low reliability. This research took a longer period than planned originally, due to personal reasons, but it's relevance couldn't have come at a better time, due to the current coronavirus pandemic, one might just wonder what the effect of the findings could have been on some emergency departments' preparedness or simply on some nurse's own preparedness, if it had been published before the pandemic had started. But one benefit that was noticed instantly was that the interviews gave the participants a chance to reflect upon the ward's level of preparedness as well as their own, where some even remarked that they were keen to check or read on some of the things that had been discussed, soon after the interview finishes.

10. Conclusion

As we see disasters unfolding nearly every day on the news, from natural disasters to terrorist attacks, to pandemics, it should prompt us all to think, what we would do if something happens in our area, and it should prompt people to ask, is our healthcare system capable of supporting our community when such disasters hit. At the front line of this healthcare system are the emergency departments, which people expect to be prepared to handle whatever comes their way. Following the interviews with 4 charge nurses from an Emergency Department, this study identified what the nurses think of disaster preparedness, and what they self-evaluate their level and their department's level to be at currently, and what are the factors that affect that level of preparedness. As charge nurses, the participants were aware that they should always expect anything, and always be ready for any situation during their shift because they will be in the role of the leaders when that call comes in. But the participants also admitted to not being ready for everything, especially huge and rare

CBRNE incidents, the participants also related their concerns about the level of preparedness of the ward in general because of the many new or beginner nurses, who had not had any training or education for disaster calls yet. The participants also informed us that they had had very few trainings or drills throughout their whole duration of their work, and that what they believe is needed to improve their levels, is what the research also recommends (Chiu et al., 2012; Jacobs-Wingo et al., 2019; Kaplan et al., 2012), **more frequent and more variety of education and trainings for disaster calls**. The results provide a general picture of what the disaster preparedness level of the ED nurses looks like, but this study does not attempt to evaluate it, and though the results cannot be generalized to all the nurses or even to the rest of the charge nurses, but they do clearly identify the areas of weakness in need of further consideration, research and evaluation.

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APPENDIX A) Interview Guide

1 Background / Demographic questions:

1. Can you please tell me what is your gender?
2. Would you tell me your age or age category... (+20, +30, +40, +50, +60)
3. Can you tell me how long have you been working as a nurse in ED? and elsewhere?
4. How long have you been a charge nurse?

2 Experience / Behavior Questions:

5. Have you heard about some of the disasters or mass-casualty accident occurred here in Finland? Which ones?
6. Have you been working professionally in any disaster situation or a mass-casualty accident before? If yes, please describe your experience (duties, organization, length, extraordinary tasks, feelings)?
7. Have you had education or training in disasters or mass-casualty accidents
    a. at school
    b. at your work

3 Knowledge Questions:

8. How familiar are you with your hospital's disaster preparedness plan? Can you describe the main parts?
9. Did someone go through the plan with you? (clarify it for you)
10. What do you know about what the law (says about disaster preparedness?
11. What do you know about the STM guidelines for disaster preparedness?
    a. Do you know what are the (3) levels of preparedness?
12. What do you know about surge capacity? How do you increase it? (location, supplies, beds) (30 patients example) (What do you do if there are 20 GSW or Bus accident patients) Treatment areas?
13. What do you know about basic medicines & medical supplies stock? Who requests the extra supplies, how, and how fast do you expect them to arrive?
14. Do you know what is the hospital responsible for during radiation and chemical accidents or attacks? (how to setup the decontamination area, how to decontaminate)

15. Do you know in which kind of situations, more staff is called in, and how the call system works? How many can be deployed?
16. Do you know how many extra equipment you can get and how? (Monitors, Ventilators, infusion pumps…)

4 Opinion/ Feeling Questions:

17. Do you think everyone should be prepared for disasters even if they rarely happen? Why?
18. Do you believe only charge nurses should have several trainings and simulations per year or should that include all the nurses?
19. How do you feel about your own level of preparedness for a disaster situation or a mass-casualty accident?
20. What do you think about the ward's general level of preparedness?
21. What do you think could improve the level of preparedness?

APPENDIX B) Consent Form for an Interview About Disaster and Mass-Casualty Accident Preparedness

I'm a nursing degree student at NOVIA UAS, seeking participants for interviews for a bachelor degree thesis study with the aim to identify the current level of disaster preparedness of nurses in working in an Emergency Department.

The Following questions will be answered by the study

- *Are the emergency departments nurses prepared for different types of disasters?*
- *What trainings, education and competencies do the Emergency Department nurses have?*
- *What factors affect the nurse's preparedness & competency levels?*

The interviews will be in English language, and an audio recording will be used while interviewing. The interview should take about **20 minutes** and shall not exceed one hour. All participants' identities will remain anonymous and confidential, and the recordings will not be used for any other purpose. Recordings will be stored securely on the interviewer's computer.
Participation is completely voluntary and the participants reserve the right to withdraw from the study or the interview at any time without any negative consequences.

Please check the box and sign underneath:

☐ I have read the information above and have had time to consider it and ask questions for further inquiries before I consented to participation in the study.

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Participant's name	Signature	Date

I appreciate your giving time to this study and for any inquires I can be reached at this email: mido.taha@edu.novia.fi or by phone or sms at 0456 414 000.

Mido Taha