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# Developing an Aseptic Checklist for Perioperative Nursing

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<p>The purpose of this thesis was to develop an aseptic checklist for perioperative nursing, which is based on the hygiene instructions provided by the Hospital District of Helsinki and Uusimaa. The aim was to find accurate evidence-based literature through a literature review, which the statements of the aseptic checklist may be built on. The study question set for this thesis was: "What is the content of the aseptic checklist for perioperative nursing?"</p> <p>This thesis was conducted as a descriptive literature review. Literature was searched from five databases: Medic, Cochrane, Pubmed, Cinahl and JBI Ovid. Nine (n=9) articles were chosen for this literature review.</p> <p>This work was completed by using the inductive and deductive classification method. Altogether, four categories were formed based on the literature after completing the data analysis process. These categories were as follows: proper implementation of hand hygiene in perioperative nursing, personal protective equipment and clothing in perioperative nursing, aseptic conscience in perioperative nursing, and asepsis in perioperative nursing. Statements were formed from all of the categories. The aseptic checklist consists of 25 true or false statements written in Finnish and it is targeted for staff working in the perioperative setting (excluding anaesthetic nurses). It may be used as orientation material for new staff starting at the ward or students doing their clinical practice at the ward.</p> <p>More scientific research should be done on the aseptic field so that evidence-based knowledge would be the foundation of the rules and regulations set for perioperative nursing.</p>	
Keywords	Perioperative nursing, asepsis, aseptic checklist, infection control

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<p>Tämän opinnäytetyön tarkoituksena on tuottaa aseptiikkapassi leikkaushoitotyöhön Helsingin ja Uudenmaan Sairaanhoitopiirin hygieniaohjeiden pohjalta. Tavoitteena on löytää ajankohtaista näyttöön perustuvaa tutkimusnäyttöä, joiden perusteella voidaan kehittää aseptiikkapassin väitteet. Tämän opinnäytetyön tutkimuskysymyksenä toimi: ”Mikä on aseptiikkapassin sisältö perioperatiiviseen leikkaushoitotyöhön?”.</p> <p>Opinnäytetyö toteutettiin kuvailevana kirjallisuuskatsauksena. Kirjallisuutta etsittiin viidestä eri tietokannasta (Medic, Cochrane, Pubmed, Cinahl ja JBI Ovid). Yhteensä yhdeksän (n=9) artikkelia valittiin tähän työhön.</p> <p>Tässä työssä käytettiin sekä induktiivista että deduktiivista luokittelumenetelmää. Yhteensä neljä pääkategoriaa muodostui kirjallisuuskatsauksen luokittelun tuloksena. Nämä kategoriat olivat seuraavat: asianmukaisen käsihygienian toteuttaminen leikkaushoitotyössä, henkilökohtaiset suojaimet ja työvaatteet leikkaushoitotyössä, aseptinen omatunto leikkaushoitotyössä sekä aseptiikka leikkaushoitotyössä. Näistä kategorioista muodostui lopullinen aseptiikkapassi. Aseptiikkapassi on laadittu suomeksi ja se koostuu 25 totta/tarua väittämästä. Sen kohderyhmänä on leikkaussalihenkilökunta (poissulkien anestesiahoitajat). Aseptiikkapassia voidaan käyttää uusien hoitajien tai sairaanhoitajaopiskelijoiden perehdytysmateriaalina.</p> <p>Enemmän tutkimuksia tulisi tehdä aseptisistä käytännöistä ja sen periaatteista perioperatiivisessa leikkaushoitotyössä, jotta hygieniaohjeet perustuisivat tieteelliseen tutkimusnäyttöön.</p>	
Avainsanat	perioperatiivinen hoitotyö, aseptiikka, aseptiikkapassi, infektioiden torjunta

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## 1 Introduction

In hospital environment, prevention against infections is considered as one of the most important concepts. Asepsis includes preventing the spreading of microbes and infections. This may be achieved by using the aseptic technique, which consists of well-implemented hand hygiene, disinfection of surfaces and sterilization of instruments as well as following the aseptic working order. During an operation, only the staff that is necessary for the operation to progress as planned should be inside the operating room and the movement of extra people in and out of the operating room should be minimised. Asepsis is important for the well-being of the patient as well as the health care personnel. (Kurvinen & Terho, 2013.)

In 1847, doctor Ignaz Semmelweis from Austria, discovered that hand washing between patient contacts reduced death rates remarkably. After performing an autopsy, the medical staff went to assist in a labour right after without implementing any kind of hand disinfection process between procedures. This led to the spreading of bacteria and caused high mortality rates amongst the mothers. The odour from the autopsy that stuck to the hands was so strong that doctor Semmelweis instructed everyone to wash their hands in a chloride solution, which later on led to a significant drop in mortality rates. (World Health Organization, 2009.) Florence Nightingale also made an important realization about the correlation between hygiene and mortality rates in 1854, during which she worked as a volunteer nurse in the Crimean war. Nightingale learnt that dirt, food and sewers were the main cause of high mortality rates amongst the soldiers she cared for. (Fee & Garofalo, 2010.)

This thesis focused on asepsis and aseptic practices in the Hospital District of Helsinki and Uusimaa (HUS) surgical unit. Surgeries in the HUS area are implemented in the following hospitals: Herttoniemi Hospital, Jorvi Hospital, Meilahti Tower Hospital, Peijas Hospital and Töölö Hospital. Day surgery departments are located in Jorvi Hospital, Peijas Hospital and Surgical Hospital. (HUS, n.d.) The Hospital District of Helsinki and Uusimaa has multiple specialised units, treating various illnesses requiring surgical care. In addition to general surgery, HUS also performs complex surgeries for all anatomical parts of the human body. The operations consist of three phases: the preoperative phase, intraoperative phase and post-operative phase. (HUS, n.d.) In HUS area, nearly 90 000

operations were performed in 2016 (HUS vuosikertomus, 2016). According to Lumio (2018) approximately 40 000 hospital-acquired infections are reported in Finland annually.

The purpose of this thesis was to develop an aseptic checklist for registered nurses working in the perioperative unit in a university hospital in southern Finland. It is important that everyone working in the nursing field has similar knowledge of the rules and regulations related to aseptic working manners. By improving nurses' level of knowledge about infections and the prevention of them, may enhance infection safety (Mäkelä & Karhe, n.d.). This thesis was done in cooperation with the Hospital District of Helsinki and Uusimaa.

## 2 Background

### 2.1 Perioperative nursing

Perioperative nursing is the treatment of health and sickness, where the interest of the health care staff focuses on illness and the effects of the given treatment. The goal of the health care staff is to promote the well-being of the patient and their significant others. The goal is also to aid the patient to perform health needs in which they need assistance with. Perioperative nursing is evidence-based and it is based on scientific research results and empirical studies. (Lukkari, Kinnunen and Korte, 2013.)

The perioperative patient pathway consists of preoperative, intraoperative and postoperative phases. Preoperative phase starts with the decision to get the operation done and ends when the patient enters the operating room. Preoperative phase includes the physical and mental preparation of the patient as well as patient assessment. Intraoperative phase initiates with the patient entering the operating room and ends when the patient is transferred into the recovery room. Intraoperative phase includes the anaesthesia, preparing and draping the patient as well as performing the surgery. After the operation is completed, the patient is transferred into the post-anaesthesia care unit where the postoperative phase initiates. The postoperative phase lasts all the way until the patient is released from the hospital. (Goodman and Spry, 2014.) This phase includes monitoring the patient as well as administering pain medications (Karma, Kinnunen, Palovaara and Perttunen, 2016).

## 2.2 Asepsis and aseptic conscience

Asepsis refers to a way of working that focuses on preventing the spreading of microbes into tissue or sterile material. Post-surgical hospital infections are most commonly pneumonia, sepsis, vascular catheter infections and urinary tract infections. Good personal hygiene is the foundation of working in an aseptic manner. Proper work clothing and protective clothing prevent the spreading of infections. Good hand hygiene prevents infections that spread through physical contact. (Lukkari et al., 2013.) Aseptic technique refers to a procedure that minimises the transmission of microorganisms, preventing the patient from getting infections. Being in contact with the patients' body or the use of invasive devices require aseptic technique, as transmission of microbes may cause an infection for the patient or increase the risk of it. A practice where touching the sterile part of equipment is being avoided, in order to avoid contamination, is called aseptic non-touch technique. (Jones, 2014.)

Aseptic conscience refers to practitioners following and identifying the aseptic principles and when these are compromised. Education on concepts such as proper clothing, sterile field, sterilization, disinfection and traffic patterns are considered as the foundation for safe perioperative nursing. Aseptic technique eases the prevention of surgical site infections. (McNamara, 2011.) Aseptic conscience requires independent decision-making and responsibility as well as broad knowledge on patient safety. Aseptic technique demands that the whole staff working in the operating room should follow the same rules and working methods regarding asepsis. (Lukkari et al., 2013.)

## 2.3 Sterile and disinfected

A sterile matter does not contain any living microbes or bacterial and fungal spores. Sterilisation is a process, which aims to kill all living microbes and spores, where as disinfection only kills living microbes but does not remove spores. (Goodman & Spry, 2014). Sterile field refers to the area surrounding the patient, which aims to be free of all living microbes. The skin of the patient is disinfected and the sterile field is delimited with sterile drapes. The staff working inside the sterile field wears protective sterile clothing. (Lukkari et al., 2013.)

The circulating nurse starts with disinfecting the area, which requires surgery, and the skin is left to dry. During disinfection, the scrub nurse performs a surgical hand wash and puts on the sterile protective clothing. The scrub nurse initiates with the sterile field by delimiting the area with sterile draping and forming the Mayo table. At this moment, the surgeon is asked to commence surgical hand wash. Timing is important when forming a sterile field so that patient safety is not altered and the surgery is ready to begin. (Lukkari et al., 2013.)

## 2.4 Personal hygiene

It is a part of a perioperative nurse's professional competence to have good personal hygiene. Good personal hygiene includes taking daily showers, sufficient hair washing, as well as good mouth hygiene. It also includes having a clean shaved face. On a perioperative ward, long hair must be tied up, and touching or brushing it is to be avoided. Excessive talking and touching of mouth and nose should be avoided when working on an aseptic field hence the amount of microbes in the oral and nasal area. The staff should also have knowledge of the correct way to blow a nose or cough. A disposable tissue should be used when blowing a nose and it should be disposed right after. Coughing should be directed to the armpit of the non-active hand, while turning away from the patient. After blowing the nose or coughing, the hands are to be disinfected. Also strong perfumes should be avoided on a perioperative ward, because they might cause reactions to allergic and asthmatic patients. (Karma et al., 2016.)

**Hand hygiene** is one of the main infection prevention methods in perioperative nursing. When properly done, it includes the following parts: washing hands with soap, disinfecting the hands with an alcohol-based disinfectant, caring of the skin and the surgical hand washing. It is essential to take care of all kind of possible sores and keep the hands moisturised. Washing with soap should be done when hands are visibly dirty, otherwise alcohol disinfectant is to be used. Disinfectant should be used before and after every patient contact, between different work phases, before and after procedures, before and after wearing protective equipment, as well as when entering and exiting the perioperative ward. The hand disinfectant kills the bacteria and viruses in the hands while also preventing infections. When using it, hands should be rubbed together for at least 30 seconds or until the hands feel completely dry. The surgical hand washing is to be done prior to surgical operations. It removes the temporary microbial flora from the surface



of the hand leading to the permanent microbial flora being reduced. Before commencing the surgical hand wash, possible dirt will be removed from beneath the nails with a brush. After this, the hands will be washed carefully with soap. Following the hand wash, hands and arms should be disinfected three times with hand disinfectant. The first disinfection is done all the way up to the elbows and after this, during the two last disinfections, the area will be gradually reduced. (Karma et al., 2016.)

**Jewellery** or watches are not allowed in any perioperative nursing field. The reason behind this are the microbes that grow under them within the moisture. It also blocks the ability to wash hands properly. Long earrings and necklaces may contaminate the sterile field causing a risk for infections. Piercings are an infection risk for the nurses themselves because they break the skin allowing bacteria to enter. (Karma et al., 2016.) **Nails** should be short and clean when in the perioperative field, because more microbes accumulate under long nails. Long nails might cause harm to the patient's skin by causing scratches and also rupturing the surface of the protective gloves. Nail polish is an ideal sport for bacteria to accumulate and should not be used, because the hand disinfectant softens it, which may then lead to the cracking of the nail polish. Artificial nails are also forbidden due to them accumulating more bacteria and dirt underneath than natural nails. If the nurse has any infections on her nails, such as fungus, the problem has to be treated as soon as possible. (Karma et al., 2016.)

## 2.5 Protective equipment

On a perioperative ward, nurse's work uniform includes a short sleeved shirt, long pants, socks and work shoes. The uniform is changed daily, and has to be put on before entering the ward. The shoes should cover the feet and the sole should be so that it prevents slips. In the operating room, a cover for hair, nose, mouth, eyes and hands are used. The hair has to be fully covered because of the particles and microbes that may fall from it. It also protects the nurse's head from possible secretions from the patient. The disposable surgical cover for mouth and nose is always used on a sterile area. It protects the patient and the nurse from possible droplets spreading and airborne infections as well as blood and secretions. The cover has to be placed firmly on the nose bridge, fully covering both the mouth and the nose. Eye protection is used to prevent droplets of secretions from entering the eyes. Disposable gloves protect the nurses

from blood infections and spreading microbes to the patients. There are two kinds of protective gloves: sterile gloves and non-sterile gloves. The surgical staff uses sterile gloves during the operation whereas non-sterile gloves are used in non-invasive procedures or when in contact with secretions. For example, in the operating room, non-sterile gloves are used during skin disinfection and intubation. (Karma et al., 2016.)

## 2.6 Hygiene instructions by the Hospital District of Helsinki and Uusimaa

### **Hand hygiene**

Spreading of microbes happen usually through physical hand contact. Finger rings, jewellery or artificial nails should not be used as these prevent the proper fulfilment of hand hygiene. Moisture and dirt accumulate beneath them, providing a good surface for microbial growth. The use of nail polish is also prohibited. (HUS, 2017.) Hand disinfection should happen before and after patient contact or a procedure and also in between treatments according to the aseptic working order. Hands should also be disinfected before entering and exiting the procedure environment and before touching aliments. Disinfection should also take place when leaving the toilet. Hands should be washed with soap if they are visibly dirty, and after exiting the toilet and certain isolation rooms. It is also important to take care of nails as most of the bacteria occur in them. Hands should be disinfected with 3-5 millilitres of alcohol disinfectant. Hand should be rubbed together until they are completely dry. (HUS, 2017.)

### **Uniform and protective equipment**

The purpose of the use of aprons and gowns is to prevent the contamination of the uniform. They should be single-use and impermeable for moisture. Aprons and gowns should be used when washing the intimate parts of the patient or if there is a risk of secretions splashing. Aprons and gowns should also be used in certain isolation rooms. (HUS, 2017.) Hands should be disinfected before wearing protective gloves and after removing them. The purpose of protective gloves is to prevent the transfer of microbes and reduce the risk of the spreading of blood borne diseases. Sterile gloves are used in all surgeries and invasive procedures that require a high level of asepsis. Non-sterile procedure gloves are used in procedures, which require the use of gloves but are not invasive. (HUS, 2017.)

The uniform consists of a short-sleeved shirt, pants, socks and shoes. It should be changed to a clean one always when necessary. In the units where aseptic requirements are higher, a workstation specific uniform should be used and it should be changed daily. It is allowed to exit the unit and walk in the hospital area with the uniform and shoes. If shoes are contaminated with blood or other secretions, they should be cleaned immediately. The surgical facemask is single-use and always changed between procedures and patients. Everyone entering an operating room where a foreign particle and organ transplant surgery or a class 1 surgery is taken place should wear a surgical facemask. Everyone entering and working in an operating room should wear a head cover. A beard should be covered with a helmet-like head cover. The surgical team (surgeons and scrub nurses) should wear a sterile gown, sterile gloves, facemask and a head cover. (HUS, 2017.)

### **3 Purpose, aim and study questions**

The purpose of this thesis was to develop an aseptic checklist for registered nurses working in operating rooms. The aim was to find accurate evidence-based literature to form the aseptic checklist, which will develop and ensure the aseptic way of working inside the operating room. The aseptic checklist may be used as orientation material for nursing students and new nurses starting at the ward. The study question set for this thesis was: What is the content of the aseptic checklist for perioperative nursing?

## **4 Methods**

### **4.1 Literature review**

A literature review aims to review the existing knowledge and researches of a certain topic. The goal is to find certain gaps that require more studying and research. A meticulous plan and a strategy is the key to a good literature review. A literature review is a combination of four phases: defining the extent of the review, recognition of the major sources of information, reviewing the literature and writing the report. A literature review should also include an inclusion and exclusion criteria. Inclusion criteria contains the cropping of the publication year, language, methodology and measurement of the outcome. Exclusion criteria may include delimiting the search to specific groups

of people or certain areas of nursing so that the workload reduces. The literature is then divided into themes, which helps to identify the connections between results. There should be a valid reason when making the decision of including or excluding literature and data. Inclusion and exclusion criteria can be formed of a time frame, language, explicit methodology, measurements of the outcome and different field of nursing. (Carnwell & Daly, 2001.) The subject of the literature review is required to be limited to certain topics instead of a subject that is too extended (Maltby, Williams, McGarry and Day, 2010).

This thesis was conducted as a descriptive literature review based on different areas of asepsis and the HUS hygiene instructions given by a perioperative ward of a university hospital in Southern Finland. The target group of this work were the circulating nurses and scrub nurses. Anaesthetic nurses were excluded from this thesis as there has already been developed a similar checklist as a thesis for their needs. The areas covered in the final product of this thesis (aseptic checklist) were the proper implementation of hand hygiene in perioperative nursing and personal protective equipment and clothing in perioperative nursing. Also statements were formed from aseptic conscience in perioperative nursing and asepsis in perioperative nursing, even though these were not mentioned in the hygiene instruction received. An inclusion and exclusion criteria were included in the data collection.

The literature review worked as a guideline for developing the aseptic checklist. Four areas, as mentioned above, were included in the aseptic checklist. 10 statements were formed from both of the following areas: proper implementation of hand hygiene in perioperative nursing and personal protective equipment and clothing in perioperative nursing. The two other main categories were combined for the aseptic checklist and five statements were formed all together, as otherwise there would have been too many statements and this could affect the rate of replying to the checklist in future. The checklist aims to help in the identification of the areas that need improvement and concentration on the ward. The questions were true or false statements and written in Finnish. For instance: Hands should be washed with soap only if they are visibly dirty.

## 4.2 Data collection

The collection of data for a descriptive literature review is to be guided by the study question developed for the work (Kangasniemi et al., 2013). The literature for this thesis was searched from CINAHL, PubMed, Cochrane, Medic and JBI Ovid databases, using multiple search terms related to the different areas provided by HUS. Keywords and synonyms were searched from CINAHL Headings. Perioperative nursing or perioperative care, were used as a linking keyword with all of the search terms. Search terms were also translated in Finnish so that data collection from Medic database was possible. Search terms and the data collection process may be found in the appendices (Appendix 1.). In order to narrow down large amount of data and make the thesis more convenient, an inclusion and exclusion criteria were used (Table 1.).

Table 1. Inclusion and exclusion criteria

Inclusion criterion	Exclusion criterion
Time frame (2008-2018)	Material published before 2008
Languages (English and Finnish)	Other languages than English and Finnish
Perioperative nursing	Anaesthetic nursing
Geographical frame (Europe, USA, Canada, Australia and New Zealand)	Other countries apart from the ones that fit the geographical frame set for this work
Hygiene instructions provided by HUS (hand hygiene, personal hygiene, work clothing, protective equipment), aseptic conscience and general asepsis in perioperative setting	Other areas of asepsis than hand hygiene, personal hygiene, work clothing and protective equipment, aseptic conscience and general asepsis in the perioperative setting

## 4.3 Data analysis

Reading the data thoroughly and grouping it into categories will help when analysing the literature (Coughlan, Cronin and Ryan 2008). Content analysis is divided into inductive content analysis and deductive content analysis. It depends on the type of the study whether inductive or deductive method is used. Inductive content analysis is used when the data is analysed from single ideas to general theory. Deductive content analysis is used when analysing data from the general theory to single ideas. (Tuomi & Sarajärvi, 2002.) The main idea is to make connections between concepts and sentences extracted from the data and provide facts that may be used in practice. Theoretical issues are tested so

that better understanding of the data would occur. (Elo & Kyngäs, 2007.) Classification of the data in this work happened after all databases were searched using similar keywords, and nine (n=9) articles were found, which fit the inclusion and exclusion criteria set for this work.

**Inductive** content analysis is a method of data analysis, in which the concepts are grouped in a way that it provides an answer for the study question (Tuomi & Sarajärvi, 2002). **Deductive** content analysis is based on earlier studies and general theories and the aim is to develop single concepts and find connections between them (Elo & Kyngäs, 2007). When using the deductive approach, a frame of analysis is formed which consists of similar concepts that have been searched from the literature. The results of this method of analysis are the content of these concepts. (Kyngäs, Elo, Pölkki, Kääriäinen, Kanste, 2011.)

In this thesis the data was analysed using both the inductive and deductive approach of content analysis. After going through the articles (Appendix 2.) that were chosen for this work (n=9), sub-categories were formed based on relevant concepts extracted from the content. The next step was to find connections between the sub-categories so that the generation of upper categories was possible. After the upper categories were formed, four main categories arose from them and therefore the data could be classified into specific groups (Appendix 3.). This work contained four main categories: proper implementation of hand hygiene in perioperative nursing; personal protective equipment and clothing in perioperative nursing; aseptic conscience in perioperative nursing; asepsis in perioperative nursing. The classification process (Figure 1.) provided the results for this literature review, which were used as the base for the aseptic checklist. Two categories (proper implementation of hand hygiene in perioperative nursing and personal protective equipment and clothing in perioperative nursing) were linked to the HUS hygiene instructions, whereas the other two categories (aseptic conscience in perioperative nursing and asepsis in perioperative nursing) were based solely on the articles.

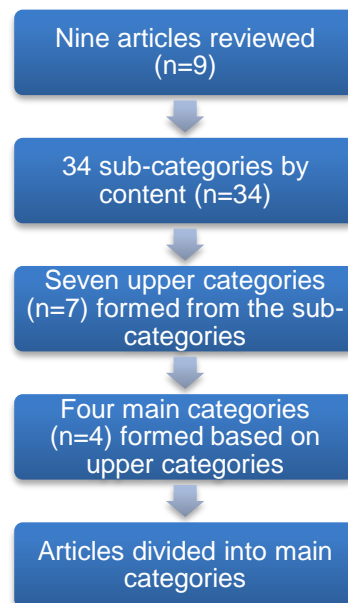


Figure 1. Classification process of the articles

## 5 Results

### 5.1 Proper implementation of hand hygiene in perioperative nursing

The proper implementation of hand hygiene in perioperative nursing has a major impact on preventing the spreading of microbes and pathogens. The proper implementation of the pre-surgical hand hygiene includes the correct way of performing a surgical hand wash and disinfection. The surgical hand disinfection with an alcohol-based solution is considered even more effective than using an antiseptic solution for the surgical hand wash and in this case, the surgical team should particularly focus on disinfecting hands properly. (Rintala et al., 2014.) Surgical hand wash is designed so, that it prevents the spreading of infections by removing microorganisms from the hands, nails and forearms, if skin is intact and healthy. (Slade, 2017.) Surgical wound infections are caused by bacteria, which are spread through insufficient hand hygiene (Arrowsmith & Taylor, 2014.) Correct hand hygiene should be carried out before and after patient contact. (The Joanna Briggs Institute, 2016.) Washing hand is a component of proper hand hygiene and can prevent the spread-

ing of infections. Nail polish and jewellery should be removed to ensure proper hand hygiene and artificial nails should also be removed when working in an environment where aseptic procedures are taken place as they accumulate a lot of bacteria. (The Joanna Briggs Institute, 2017.) Hands should be free of all foreign particles (Chu, 2016). However, according to Arrowsmith and Taylor (2014) a small study has been made about the correlation between the bacterial count of polished and unpolished nails, which in fact showed that polished and short nails had a lower bacterial count than natural nails.

## 5.2 Personal protective equipment and clothing in perioperative nursing

Infection control may be enhanced by the proper use of aprons, gowns and facemasks. Proper use of aprons and gowns includes the single-use of the protective wear. The protective equipment does not only protect the patient, but protects the health care worker as well. The protective wear prevents the spreading of infections and diseases through the uniforms. They also prevent the health care staff from getting in contact with the patient's blood and other secretions. Face masks are a cost-effective way to prevent the staff from inhaling infectious airborne particles and also provide protection for the patient as well. Eyes should be covered with eye protection, when there is a risk of infectious agents entering the eyes and passing through the conjunctiva. (Slade, 2016.) Shoe covers protect the shoes from body secretions and blood and therefore should be worn in the operating room as contaminated shoes increase the risk of spreading infectious agents. Shoe covers are not mandatory, but are recommended to be used, as they are a part of the surgical outfit. (Adam, Korniewicz and El-Masri, 2011.)

There are two types of gloves used in the perioperative setting: sterile and non-sterile. As other protective equipment, the use of gloves protects the patient as well as the health care staff. Sterile gloves are used in invasive procedures and non-sterile procedure gloves are used in non-invasive procedures. (Mann, 2018.)

## 5.3 Aseptic conscience in perioperative nursing

Aseptic conscience of the staff may prevent the spreading of infections. The importance of it should continuously be emphasised so that proper aseptic working ways would take



place. For instance, poorly implemented hand hygiene is unethical and may be seen as a measure of professional competence. Easing the self-measurement of time by placing timing devices near the sinks, placing pictures and posters on walls, or even developing disinfectants that work faster may affect the compliance. The issue with developing fast-working disinfectants is that, the amount of alcohol in them is extremely high causing possible skin irritation. Three minutes should be the optimal disinfection time in order to carry it out properly. Reacting towards the negligent attitudes of hand disinfecting should already take place during studies. Authorities, such as the superiors and teachers, should provide an example. (Rintala et al., 2014.)

Staying truthful when realising a break in the sterile technique, is important. Even though it is everyone's responsibility to observe breaks in asepsis, it is the ethical obligation of nurses to observe and report all breaks in it. The reporting and recording of breaks in asepsis should be seen as a positive issue instead of something uncomfortable and thus decrease the risk of getting a surgical site infection as well as enhance patient safety. (Adams et al., 2011.)

#### 5.4 Asepsis in perioperative nursing

The operating rooms should be prepared as well as possible before commencing the surgery and movement in and out of it should be minimised (Chu, 2016). Proper preparation of the operating room promotes good hygiene. Insufficient asepsis in any of the areas in perioperative nursing can cause a risk for infections. (The Joanna Briggs Institute, 2017.) Engaging in good aseptic practice, which is the responsibility of all perioperative personnel, could prevent 40-60% of surgical site infections. The perioperative nurses may be seen as the initial prevention mechanism against infections. Scrub nurses are seen to have the responsibility in maintaining the sterile field and instruments as the circulating nurses assist and monitor the aseptic practices of the overall surgical team. (Adams et al, 2011.) Infection control may also be strengthened by building operating rooms, which are designed to prevent air-borne infections by microscopic particles. The cost of this should not be considered a barrier as these measures may increase patient safety. (Chu, 2016.)

## 6 Discussion

### 6.1 Discussion of the results

The results of this literature review were based on three articles from several authors and six recommended practices and evidence summaries from the Joanna Briggs Institute. Due to the lack of actual up-to-date scientific articles about this topic, it was decided that the recommended practices by the Joanna Briggs Institute could be used as material for this literature review. The results of this work clearly showed a connection between preventing infections from spreading with proper implementation of hand hygiene and the correct use of personal protective wear. In addition, some important concerns between preventing infections from spreading and the aseptic conscience of health care staff arose from the data. As the Hospital District of Helsinki and Uusimaa provided the hygiene instructions, which were to be used as the base for the final product, concepts linked to those areas were searched especially from the collected material.

Proper implementation of hand hygiene in perioperative nursing was emphasised multiple times in various articles. Chu (2016) stated that aseptic technique reduces the risk of infections and prevents the spreading of microbes. Hands should be washed always when visibly dirty and hand disinfection should be carried out before and after patient contact to protect the patient and the staff. The Joanna Briggs Institute (2016) also discusses about the importance of disinfecting hands between patients and washing them if they are visibly dirty. As these results were consistent, found from more than one article, and backed up by the hygiene instructions of the Hospital District of Helsinki and Uusimaa, some statements were created to the aseptic checklist.

Multiple articles, except one, also stated that artificial nails, nail polish and jewellery should be removed before commencing a procedure, because these prevent the proper cleansing of the hands. The article, which had a different result than the rest of the articles, was the article written by Arrowsmith and Taylor (2014), which stated that polished and short nails had fewer bacteria than natural and unpolished nails. The result of this article was not added to the aseptic checklist as rest of the articles had opposite results and statements. However, more scientific research should be carried out about this issue. Rintala et al. (2014) states that the surgical hand disinfection with an alcohol-based solution is more

efficient than the normal surgical hand wash using an antiseptic washing solution. Other articles with a similar result were not found, meaning that more research on this subject should be conducted. Questions about this particular subject were not added to the checklist, as more research should be done before adding statements to an aseptic checklist, to back up the results.

Single-use equipment and the importance of changing them between patients were highlighted in many different articles. According to the materials, this may result in the decrease of spreading of infections and microbes. Slade (2017) states that changing protective equipment, such as aprons and gowns, between patients is to protect both the patient and the health care worker. According to the article, the use of protective equipment also prevents the spreading of microbes through the uniforms worn by the staff. Gloves should be worn properly according to the situations. In the perioperative setting as it is, the scrub nurse should use sterile gloves and the circulating nurse should use non-sterile procedure gloves. The importance of other personal protective equipment, such as face masks and eye covers, were also presented in the results. Statements were formed from these areas as they were considered to be a significant part of the asepsis in the perioperative setting and a need for underlining them was seen important. Furthermore, the hygiene instructions by the Hospital District of Helsinki and Uusimaa also pointed out these concepts. The results mentioned the use of shoe covers, but as the hygiene instructions by the Hospital District of Helsinki and Uusimaa did not mention these as part of the surgical outfit, statements about them were left out of the final product. Even though the use of shoe covers were not added to the aseptic checklist, more research about the use of them could be conducted in the future.

One outcome of a study chosen for this literature review presented that majority of the participants never or rarely observe breaks in the sterile technique (Adams et al., 2011.) This result may be linked to the inability of the aseptic rules to emphasise the importance of aseptic conscience in perioperative nursing. A study by Rintala et al. (2014) demonstrated that perioperative personnel disinfected their hands for the optimal time (three minutes) in only 40% of the cases. Drying the hands was also implemented incorrectly. This could be a result of ignorance and poor aseptic conscience. A few statements about aseptic conscience were added to the final product.

Chu (2016) mentions about moving in and out of the operating room during an on-going operation and how minimising it is considered as a part of the proper aseptic technique.

The hygiene instructions by the Hospital District of Helsinki and Uusimaa also highlight this matter. However, as only two categories were chosen as our areas of interest in the aseptic checklist, a statement about this concern was not added to the final product, as it was not seen to fit the groups chosen for this work. Preparing the operating room accordingly promotes good hygiene and insufficient asepsis poses an infection risk (The Joanna Briggs Institute, 2017). According to Adams et al. (2011), nurses are also seen as the primary mechanism in preventing surgical site infections even though they are not solely responsible for it. In this case, also surgeons and other personnel working in the operating room should be encouraged to work as aseptically as possible. Education on the importance of good aseptic practice and correct ways to prepare an operation should be continuously developed. Especially scrub nurses and circulating nurses should be regularly trained and reminded about the effects of maintaining the sterile field and monitoring closely the aseptic practices of the whole surgical team. Proper asepsis in the perioperative setting should be emphasised and specific researches should be conducted, so that patient safety is not altered and infections could be prevented as well as possible.

The contents of the aseptic checklist were composed on the basis of the areas the classification process disclosed. The results of this literature review stated that important areas concerning asepsis in the perioperative setting include hand hygiene and the proper uses of personal protective wear. Aseptic conscience was looked into, because it plays a major role in preventing infections and the spreading of microbes. Also other major concepts related to the general asepsis in the perioperative setting came up, but these were left out from the aseptic checklist as they require more in-depth reviewing. The hygiene regulations by the District Hospital of Helsinki and Uusimaa provided clear statements that were backed up by the data received from the literature review. The aseptic checklist contained two separate themes with 10 true/false statements and one theme, which contained five true/false statements. The nurses' level of knowledge about the proper aseptic practice should be tested frequently and in this case the checklist provided by this work could be taken into daily use on different perioperative units.

## 6.2 Discussion of the validity and reliability

Validity refers to whether the study measures what it is supposed to. When examining the generalisation of the results to the rest of the population, it is called external validity. Validity of the instrument is the base of the research. If the instrument does not measure what it is supposed to, the research will not be valid. Reliability of the instrument means that the instrument provides similar answers. The instrument is not considered to be reliable if it provides random results. (Kankkunen & Vehviläinen-Julkunen, 2009.) Reliability refers to an accurate and expected measurement (Gonzalez, Rowson and Yoxall, 2015). Reliability may also refer to the repeatability of the data collection process to receive similar results. Also the purpose and aim of the research should be convergent to increase the reliability of the research. (Tuomi & Sarajärvi, 2002.) The validity of this work was possibly increased as the data collection and analysis was done in a consistent and coherent way. The results of this work were aimed to be presented so that the methods of data collection and analysis were reliable and they may be repeated and still reach similar findings as the original ones. The articles used were selected from the countries within the geographical frame set for this thesis. The articles chosen, were from Finland, USA, Canada and Australia. A geographical frame was used in order to avoid possible language or translation barriers. These countries also share similar regulations and instructions concerning hygiene and asepsis as the target group of this work.

## 6.3 Discussion of the ethical considerations

The Finnish Advisory Board on Research Integrity (2012) states that the good conduct of research consists of matters such as honesty, ethical way of collecting data, respecting the work of others and getting a hold of the appropriate research permits. It also states that dishonest unethical actions for instance gross negligence and frauds such as plagiarism, misappropriation, fabrication, falsification are violations against good conduct of research. Plagiarism is a common, rapidly progressive fraud where one claims someone else's text as their own, leaving the appropriate citations out of the work (Mäkinen, 2006). Copying text that is written by someone else can lead to serious consequences and is a penalised action but it might also sometimes happen unintentionally (Coughlan, Cronin and Ryan, 2013). Misappropriation is the use of research results or ideas created by other people, whereas fabrication and falsification refer to presenting false findings and results on purpose (The Finnish Advisory Board on Research Integrity, 2012). The Research Ethics

Guidebook (n.d.) present the ethical principles of a literature review, which include treating the work of existing researchers fairly and finding out if the research material raises any ethical issues. It also states that respecting the existing work is important and it is unethical to have a study question, which has already been answered in previous researches. The responsible conduct of research can be utilised when writing a literature review.

Citing properly and writing references of the material used in this thesis will be focused on. This work was ran through an application called Turnitin, which checks for any signs of plagiarism, in order to ensure that there was no plagiarism in the text. As there are two authors of this thesis, misappropriation, fabrication and falsification are avoided by reading all the articles and material twice. All the material was read and analysed together, and the final report and the product were completed in agreement. The authors created the study question together and respected the existing work of other people. The ethicality of this thesis was evaluated by both of the authors.

The basic ethical principles in a research include veracity, justice, non-maleficence, beneficence and confidentiality. Veracity refers to being truthful to the participants and letting them know about the possible harmful factors as well as beneficial ones. It also includes a trustworthy relationship between the research and the participants, as well as respecting the autonomy, dignity and rights of the people involved in the study. Justice includes the fairness and equality towards all the people involved in the study, despite of their background. Non-maleficence means that there is no harm caused to the participants during the study process. It also includes defending the possible group of vulnerable participants. Beneficence of a research means that it aims to promote the common good and has a clear target, without causing harm to the participants or the community. Confidentiality means that information gained about participants and the rest of the data is preserved and handled with full confidentiality without external people. The collected data will not be accessible by others, without the permission from the participants. (Goodman & Moule, 2009.) This work aims to respect all of the basic ethical principles by having a clear purpose, aim and study question as well as collecting, analysing and reporting the findings in an ethical manner.

## 7 Conclusion

The results of this literature review show that there is an insufficient amount of scientific research done on the aseptic practices in the perioperative setting. There were major challenges when conducting the database search, resulting in the use of only three scientific articles and six recommended practices from the Joanna Briggs Institute. This thesis came to the conclusion that the hygiene and aseptic regulations are perhaps based on the habit of doing things a certain way for centuries, rather than them being based on actual up-to-date scientific research. Concerns that arose from this literature review were the lack of research done on the use of personal accessories and the importance of personal hygiene in relation to perioperative nursing. More research could be done on the use of personal accessories such as artificial eyelashes and excessive makeup. A single eyelash or excessive makeup worn by the perioperative personnel may shed on the patient during an invasive procedure, posing a patient safety issue. Furthermore, research could also be done on the importance of staff taking care of their personal hygiene and health, such as taking daily showers and treating infections, and their effect on infection control. The only problem with these kind of researches may be the invasiveness to one's personal space and the ethicality of researching such personal matters.

From the basis of the findings of this bachelor's thesis, it is recommended that more modern and up-to-date scientific research would be conducted on asepsis in the perioperative setting. Researchers, different organisations and groups should provide hygiene instructions for perioperative nursing that are consistent and based on scientific researches. Adding more areas about different aspects of asepsis and hygiene to the aseptic checklist should also be taken into consideration, as proper asepsis in the operating room promotes patient safety and reduces infections. As a conclusion, testing the level of knowledge is considered important and should be done as often as needed by using this aseptic checklist or further developing the concept of an aseptic checklist.

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## Appendices

### Appendix 1. Database searches

Table 1. Database search from Cinahl

Database and search terms	All results	Chosen by the title	Chosen by the abstract	Chosen by the full text	Approved
<b>Cinahl</b>					
Hand hygiene AND perioperative nursing	15	2	2	0	0
Personal hygiene AND perioperative nursing	4	1	1	0	0
Jewellery AND perioperative nursing	12	4	2	0	0
Uniform OR scrubs AND perioperative nursing	120	5	1	0	0
Nail polish AND perioperative nursing	4	1	1	0	0
Infection control AND perioperative nursing	85	9	2	1	1 (Adams et al.)
Microbes AND perioperative nursing	18	1	1	0	0
(Disinfection AND hands) AND perioperative nursing	13	1	0	0	0
Protective equipment AND perioperative nursing	14	2	2	0	0

Chosen for the literature review: n=1

Table 2. Database search from PubMed

Database and search terms	All results	Chosen by the title	Chosen by the abstract	Chosen by the full text	Approved
<b>PubMed</b>					
Hand hygiene AND perioperative nursing	35	3	2	0	0
Personal hygiene AND perioperative nursing	4	0	0	0	0
Jewellery AND perioperative nursing	5	0	0	0	0
Uniform OR scrubs AND perioperative nursing	138	0	0	0	0
Nail polish AND perioperative nursing	3	1	1	0	0
(Infection control AND asepsis) AND perioperative nursing	5	1	0	0	0
Microbes AND Perioperative nursing	17	0	0	0	0
(Disinfection AND hands) AND perioperative nursing	22	0	0	0	0
Protective equipment AND perioperative nursing	43	0	0	0	0

Chosen for the literature review: n=0

Table 3. Database search from Cochrane

Database and search terms	All results	Chosen by the title	Chosen by the abstract	Chosen by the full text	Approved
<b>Cochrane</b>					
Hand hygiene AND operating room nurs*	2	0	0	0	0
Personal hygiene AND operating room nurs*	2	0	0	0	0
Jewellery AND operating room nurs*	1	1	1	1	1 (Arrowsmith & Taylor)
(Uniform OR scrubs) AND operating room nurs*	30	4	1	0	0
Nail polish AND operating room nurs*	1	0	0	0	0
(Infection control AND asepsis) AND operating room nurs*	2	1	0	0	0
Microbes AND operating room nurs*	0	0	0	0	0
(Disinfection AND hands) AND operating room nurs*	1	0	0	0	0
Protective equipment AND operating room nurs*	5	2	0	0	0

Chosen for literature review n=1

Table 4. Database search from Medic

Database and search terms	All results	Chosen by the title	Chosen by the abstract	Chosen by the full text	Approved
<b>Medic</b>					
leikkaushoit* AND käsihygienia	2	1	1	1	1 (Rintala et al.)
leikkaushoit* AND henkilökohtainen hygienia	13	1	0	0	0
leikkaushoit* AND koru*	0	0	0	0	0
leikkaushoit* AND työasu	0	0	0	0	0
leikkaushoit* AND kynsilak*	0	0	0	0	0
leikkaushoit* AND infektoiden torj*	14	2	0	0	0
leikkaushoit* AND aseptiikka	15	0	0	0	0
leikkaushoit* AND mikrob*	43	5	0	0	0
leikkaushoit* AND desinf*	6	2	1	0	0

Chosen for literature review n=1

Table 5. Database search from Ovid JBI

Database and search terms	All results	Chosen by the title	Chosen by the abstract	Chosen by the full text	Approved
<b>Ovid JBI-The Joanna Briggs Institute EBP Database</b>					
Perioperative nursing AND infection control (Limitation: recommended practice)	3	1	1	1	1 Slade S., 2017
Personal hygiene AND perioperative nursing (Limitation: recommended practice)	1	0	0	0	0
Jewellery AND perioperative nursing (Limitation: recommended practice)	0	0	0	0	0
Basic hand hygiene (Limitation: recommended practice)	3	1	1	1	1 JBI 2016
Uniform (Limitation: recommended practice)	17	1	1	1	1 Mann E., 2018
Aseptic techniques (Limitation: recommended practice)	29	2	2	2	1 JBI 2017 2 Chu W., 2016
Face mask (Limitation: recommended practice)	23	1	1	1	1 Slade S., 2016
Microbes AND perioperative nursing (Limitation: recommended practice)	0	0	0	0	0
Clothing (Limitation: recommended practice)	100	1	1	0	0
Protective equipment AND perioperative nursing	14	2	2	0	0

Chosen for the literature review: n=6



## Appendix 2.

Table 1. Articles (n=9) classified in this review

Author(s), year and place of publication	Purpose	Data, data collection and data analysis	Main results	Results related to our study question, "What is the content of the aseptic checklist for perioperative nursing?"
<b>Main category 1: Proper implementation of hand hygiene in perioperative nursing</b>				
Arrowsmith&Taylor, 2014, USA	To find out the effect of removal and existence of nail polish and hand jewellery to post-operative infections.	Literature review, databases reviewed: Cochrane, Medline, EM-BASE and Cinahl.	A study reviewed in this literature review showed that there was a lower bacterial count on recently polished and short nails than unpolished nails.	There is a conflict between the results of this review with other researches used in this thesis, as other researches indicated that unpolished natural nails have the lowest bacterial count, but in this specific study it is shown that freshly polished nails had lower bacterial levels than natural nails.

Chu, 2016, Australia	To introduce the recommended practice for aseptic technique.	Recommended practice by The Joanna Briggs Institute based on the evidence summary by Chu W., 2016	Aseptic technique reduces the risk of infections and prevents the spreading of microbes. The proper aseptic technique is constructed from well-implemented hand hygiene. Artificial nails, nail polish and jewellery should be removed prior to the procedure that is being carried out. It also introduces the surgical non-touch technique and its relation to hand hygiene. Proper aseptic technique also seeks to minimize the movement to and from the operating room whilst a surgery is being carried out.	The work should include content about the removal of artificial nails, nail polish and jewellery as well as movement in and out of the operating room. It should also emphasize the importance of hand hygiene.
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Rintala et al., 2014, Finland	To find out the average time nurses and doctors used to disinfect their hand in the surgical setting.	477 observations in the surgical settings in the hospital district of Varsinais-Suomi.	In only 40% of the cases, the optimal disinfection time (3 minutes) was achieved. The attitudes of the nurses and doctors had the greatest impact on the level of disinfection. Doctors (especially males) followed the recommendations of the proper surgical hand disinfection the worst. "Wiggling" hands after applying disinfectant and applying it to wet hands were considered as major issues.	The aseptic checklist should include information about the proper way and time to disinfect hands in the surgical setting.
Slade S., 2017, Australia	To introduce the recommended practice for surgical hand scrubs to avoid infections.	Recommended practice by The Joanna Briggs Institute based on an evidence summary by Slade S., 2017.	Proper and careful surgical hand scrub and gloving is important in order to prevent surgical site infections. The skin in the hands and arms should be	Careful hand hygiene and use of protective gloves prevents infections.  Surgical hand scrubbing minimise the microbial

			intact, nails should be short and free of varnish, and hand jewellery should not be worn as these factors pose a risk for infections.	count in hands, nails and forearms and thus prevents surgical site infections.  Integrity of the skin as well as absence of artificial nails and jewellery plays a significant role in preventing surgical site infections.
The Joanna Briggs Institute, 2017, Australia	To introduce the recommended practice for the aseptic procedure preparation.	Recommended practice by The Joanna Briggs Institute.	There are two categories of aseptic procedures, clean and sterile. This article presents the proper way to prepare either one of these procedures. It emphasizes on the importance of hand hygiene and choosing the proper equipment.	Hand should be free of any foreign objects such as artificial nails. Nails should be short and no nail polish should be on them.  All jewellery and watches should be removed. Artificial nails should not be allowed as they accumulate a lot of bacteria.

				All skin injuries on hands should be covered.
The Joanna Briggs Institute, 2016, Australia	To introduce the recommended practice for basic hand hygiene.	Recommended practice by The Joanna Briggs Institute	Sufficient hand hygiene and disinfection is the major factor reducing transmission of bacteria and infections. Hand hygiene should be carried out before and after patient contact.	Hand disinfection should take place before and after every patient contact.
<b>Main category 2: Personal protective equipment and clothing in perioperative nursing</b>				
Adams, Korniewicz, El-Masri, 2011, Canada	To study the perioperative scrub personnel's aseptic practices.	Descriptive survey sent to 87 people working in the operating room.	Majority of the participants never or rarely observe breaks in the sterile technique. Majority of participants maintain the correct aseptic practice when scrubbing, wearing the gown, using the head cover and washing under the nails.	It is important to emphasize the importance of wearing the correct uniform and outfits.  Absence of shoe covers amongst the operating room nurses poses a risk to transmission of microorganisms as droplets of

				body fluids may fall on the shoes.
Mann E., 2018, Australia	To introduce the recommended practice for the use of protective gloves.	Recommended practice by The Joanna Briggs Institute based on an evidence summary by Mann E., 2018.	Gloves protect the nurse as well as the patient as they prevent the transmission of microbes. The type of gloves (sterile or non-sterile) should be worn according to the situation. Hand hygiene must occur before and after wearing gloves.	Gloves are one of the most important protective equipment that protects the patient as well as the healthcare personnel.  Sterile gloves are to be used in invasive procedures where body fluids occur.  Non-sterile gloves are to be used in procedures that do not require asepsis.
Slade S., 2016, Australia	To introduce the recommended practice for the wear of aprons, gowns, face masks and eye protection.	Recommended practice by The Joanna Briggs Institute based on an evidence summary by Slade S., 2016.	Personal protective equipment such as aprons and gowns are for single use only and should be changed between patients. This is to protect the	Personal protective wear should be worn appropriately depending on the situation.

			<p>health care worker and the patient from the spreading of infectious agents through uniforms. Eyes and mouth should be protected as well so that microbes are not spread from the patient to the health care worker and vice versa.</p>	<p>The main purpose of using gowns is to prevent the surgical team from passing any microorganisms to the patient.</p> <p>Face masks are used as droplet filters to protect the patients from the microbes of health care personnel as well as the health care personnel from breathing in airborne particles.</p> <p>Eye protection is used when there is a risk of body fluids entering the eyes, as infectious diseases have the ability of transmitting through the conjunctiva.</p>
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The Joanna Briggs Institute, 2017, Australia	To introduce the recommended practice for the aseptic procedure preparation.	Recommended practice by The Joanna Briggs Institute.	There are two categories of aseptic procedures, clean and sterile. This article presents the proper way to prepare either one of these procedures. It emphasizes on the importance of hand hygiene and choosing the proper equipment.	Sterile and non-sterile gloves are worn according to the need of them.  Other protective equipment should be used accordingly to avoid contact with body fluids.  Hair should be tied up so that it is not on the face.
<b>Main category 3: Aseptic conscience in perioperative nursing</b>				
Adams, Korniewicz, El-Masri, 2011, Canada	To study the perioperative scrub personnel's aseptic practices.	Descriptive survey sent to 87 people working in the operating room.	Majority of the participants never or rarely observe breaks in the sterile technique. Majority of participants maintain the correct aseptic practice when scrubbing, wearing the gown, using the head cover and washing under the nails.	It is important to stay truthful when realizing a break in the sterile technique.  It is part of ethical conduct of a nurse to report any breaches occurring in sterile asepsis. However, the majority of the nurses rarely observe or report



				<p>the breaks of asepsis committed by other nurses.</p> <p>Aseptic conscience in surgery is a significant factor in preventing surgical site infections and other possible complications.</p>
The Joanna Briggs Institute, 2017, Australia	To introduce the recommended practice for the aseptic procedure preparation.	Recommended practice by The Joanna Briggs Institute.	There are two categories of aseptic procedures, clean and sterile. This article presents the proper way to prepare either one of these procedures. It emphasizes on the importance of hand hygiene and choosing the proper equipment.	Recording and reporting all concerns to the people in charge related to asepsis is important.
Chu, 2016, Australia	To introduce the recommended practice for aseptic technique.	Recommended practice by The Joanna Briggs Institute based on an evidence summary by Chu W., 2016.	Aseptic technique reduces the risk of infections and prevents the spreading of microbes. The proper	Hospital-acquired infections greatly depend on the level of staff competence.

			aseptic technique is constructed from well-implemented hand hygiene. Artificial nails, nail polish and jewellery should be removed prior to the procedure that is being carried out. It also introduces the surgical non-touch technique and its relation to hand hygiene. Proper aseptic technique also seeks to minimize the movement to and from the operating room whilst a surgery is being carried out.	
<b>Main category 4: Asepsis in perioperative nursing</b>				
Adams, Korniewicz, El-Masri, 2011, Canada	To study the perioperative scrub personnel's aseptic practices.	Descriptive survey sent to 87 people working in the operating room.	Majority of the participants never or rarely observe breaks in the sterile tech-	40-60% of surgical site infections are said to be preventable if appropriate asepsis is carried out.

			<p>nique. Majority of participants maintain the correct aseptic practice when scrubbing, wearing the gown, using the head cover and washing under the nails.</p>	
<p>Chu, 2016, Australia</p>	<p>To introduce the recommended practice for aseptic technique.</p>	<p>Recommended practice by The Joanna Briggs Institute based on an evidence summary by Chu W., 2016.</p>	<p>Aseptic technique reduces the risk of infections and prevents the spreading of microbes. The proper aseptic technique is constructed from well-implemented hand hygiene. Artificial nails, nail polish and jewellery should be removed prior to the procedure that is being carried out. It also introduces the surgical non-touch technique and its relation to hand hygiene. Proper</p>	<p>The work should include content about the movement in and out of the operating room.</p> <p>Operating rooms should be designed to prevent airborne infections through tiny particles released from the skin. The cost of this should not be a barrier.</p>

			aseptic technique also seeks to minimize the movement to and from the operating room whilst a surgery is being carried out.	
Rintala et al., 2014, Finland	To find out the average time nurses and doctors used to disinfect their hand in the surgical setting.	477 observations in the surgical settings in the hospital district of Varsinais-Suomi.	In only 40% of the cases, the optimal disinfection time (3 minutes) was achieved. The attitudes of the nurses and doctors had the greatest impact on the level of disinfection. Doctors (especially males) followed the recommendations of the proper surgical hand disinfection the worst. "Wiggling" hands after applying disinfectant and applying it to wet hands were considered as major issues.	Lack of appropriate hand disinfection arise from attitudes. These negligent attitudes may be changed already in educational phase at university by influencing to the mindset about asepsis, and in work life by giving more feedback, viewing statistics, easing the self-measuring of time while disinfecting as well as with the correct example from the superiors.

The Joanna Briggs Institute, 2017, Australia	To introduce the recommended practice for the aseptic procedure preparation.	Recommended practice by The Joanna Briggs Institute.	There are two categories of aseptic procedures, clean and sterile. This article presents the proper way to prepare either one of these procedures. It emphasizes on the importance of choosing the proper equipment.	Two types of aseptic procedures, clean and sterile. Choosing the proper equipment is important.
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Table 1. Further classification of the categories

<b><u>Main category: Proper implementation of hand hygiene in perioperative nursing</u></b>	
<b>Sub-category</b>	<b>Upper category</b>
Nail polish and jewellery should be removed to ensure proper hand hygiene.	Prevention of spreading of microbes with natural, unpolished and jewellery-free hands.
Hand jewellery and nail polish prevent efficient hand hygiene.	
Artificial nails should be removed.	
Nails should be natural and short.	
Washing hands is a component of proper hand hygiene and can prevent spreading of infections.	Infection control.
Surgical wound infections are caused by bacteria, which are spread through insufficient hand hygiene.	
Surgical hand disinfectants prevent infections.	
Correct implementation of hand hygiene reduces infections.	
Skin integrity plays a significant role in preventing surgical site infections.	
Correct hand hygiene should be carried out before and after patient contact.	Correct implementation of hand hygiene.
Pre-surgical hand hygiene should be executed properly.	

Table 2. Further classification of the categories

<b>Main category: Personal protective equipment and clothing in perioperative nursing</b>	
<b>Sub-category</b>	<b>Upper category</b>
Infection control by wearing aprons and gowns properly.	Benefits of using personal protective wear.
Aprons and gowns protect the health care worker.	
Single-use protective wear protects the patient.	
Gowns prevent the spreading of microorganisms.	
Protective facial wear protects the health care worker and prevents the spreading of infections and diseases.	
The use of gloves protects healthcare staff and patients.	
Shoe covers should be worn as they prevent the spreading of microbes.	
Sterile gloves are used in invasive procedures.	Proper use of personal protective equipment.
Non-sterile gloves are used in non-invasive procedures.	
Eye protection is used to prevent the spreading of microbes through the conjunctiva.	

Table 3. Further classification of the categories

<b><u>Main category: Aseptic conscience in perioperative nursing</u></b>	
<b>Sub-category</b>	<b>Upper category</b>
Aseptic conscience of the staff may prevent the spreading of microbes.	Infection control by trustworthy aseptic conscience.
Poorly implemented hand hygiene is unethical.	
Nurses should report all breaks in sterile asepsis.	
Aseptic conscience in perioperative nursing prevents surgical site infections.	
Accurate and trustworthy recording and reporting is essential.	
Staff competence may have an impact on infections and their spreading.	



Table 4. Further classification of the categories

<b><u>Main category: Asepsis in perioperative nursing</u></b>	
<b>Sub-category</b>	<b>Upper category</b>
Aseptic technique prevents infections.	Infection control by proper asepsis and preparation.
Proper preparation promotes good hygiene.	
Insufficient asepsis can cause a risk for infections.	
Hair should be tied up neatly.	
Nearly half of the surgical site infections may be prevented by proper asepsis.	
Operating rooms should be designed in a way that prevents the spreading of air-borne infections.	
Attitudes of the staff towards hand disinfection affect the proper implementation of it.	