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## **Making a sterile table**

An educational material for nursing students

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Title of publication Making a sterile table: An educational material for nursing students		
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<p>Abstract</p> <p>The purpose of this thesis was to create PowerPoint slides as an easy-to-follow educational learning material on how to make a sterile table for nursing students of Satakunta University of Applied Sciences (SAMK). The objective of this thesis was for nursing students, to have updated information of skills and knowledge on making sterile table in right way and patient safety can be increased by using this way. Besides that, this project offers the nursing students reliable learning material, which helps SAMK for qualified education. What's more, the theoretical knowledge of implementation of evidence-based nursing practice for nursing skills of the authors have improved.</p> <p>Hybrid methodology was used in this project. The hybrid methodology is a combination of the waterfall and agile methodology. The learning material is made by reviewing other studies and research.</p> <p>This report is mainly consisted of theoretical background and implementation. The theory part is evidence-based, in which key concepts are discussed. The key concepts are asepsis, aseptic technique, sterile, sterile technique, hand hygiene and patient safety.</p> <p>The product of this project was a PowerPoint, in which is described the preparations of a sterile table and the situations where a sterile table is necessary, including images followed by step-by-step explanations is explained. After the PowerPoint was ready, feedback from nursing teachers of SAMK is sought.</p> <p>In conclusion, this PowerPoint has clearly demonstrated the right procedure of how to make a sterile table and suitable to be used as an educational material for nursing students.</p>		
<p><u>Key words</u>          Asepsis, Sterile, Sterile table, Aseptic technique</p>		

## CONTENTS

1 INTRODUCTION .....	4
2 THEORETICAL BACKGROUND .....	5
2.1 Patient safety .....	5
2.2 Asepsis in nursing .....	6
2.2.1 Asepsis .....	6
2.2.2 Aseptic technique .....	7
2.2.3 Hand hygiene and hand washing .....	9
2.2.4 Hand disinfectant .....	10
2.3 Sterile .....	11
2.3.1 Sterile technique.....	11
2.3.2 Making a sterile table .....	12
2.4 PowerPoint making .....	19
3 PURPOSE AND OBJECTIVES .....	20
4 PROJECT PLAN AND IMPLEMENTATION .....	21
4.1 Methodology .....	21
4.2 Target group .....	22
4.3 The stages of the project, timetable.....	22
4.4 Literature retrieval.....	23
5 EVALUATION.....	24
5.1 Project progress, stages, schedule .....	24
5.2 Resources and risks .....	24
5.3 Achievement of objectives and development of professional skills .....	26
5.4 PowerPoint production.....	27
5.5 Reliability and ethics.....	27

## REFERENCES

## APPENDICES

## 1 INTRODUCTION

According to WHO, of every 100 hospitalized patients at any given time, 6 to 7 will acquire at least one health care-associated infections (HCAI) in developed countries and 10 in developing countries. Infection prevention and control is paramount, regarding patient safety and quality of care, during any health-care procedures. Defective infection prevention and control causes harm and can kill. (WHO 2021.) A sterile table is needed necessarily and commonly in different circumstances of healthcare area (Pirkanmaan Sairaanhoidopiiri 2017). Anyone that is performing an invasive procedure should use sterile technique (Tennant, Rivers 2021). Aseptic technique aids the prevention of healthcare-associated infections (Eske 2018). Without aseptic technique, any invasive procedure, from chest surgery to simply inserting IV lines can become threatening and lethal (Webmd 2021). With the development of medical science and updating of the knowledge, it becomes more challenging for nursing students to find right learning materials of nursing practice. However, nursing science stands at the forefront of the most significant trends in the medical services sector today (Nurse practitioner 2020). Therefore, nursing science must be updated, and evidence based.

The purpose of this thesis was to create PowerPoint slides as an easy-to-follow educational learning material on how to make a sterile table for nursing students of Satakunta University of Applied Sciences (SAMK). The objective of this thesis was for nursing students, to have updated information to develop skills and knowledge on how to prepare a sterile table. SAMK is a higher education institution with different faculties which include health and welfare, Logistics and Maritime technology, Service business and technology (Satakunta University of Applied Sciences 2020). The learning material was made by reviewing other studies and research, in which is described the preparations of a sterile table and the situations where a sterile table is necessary, including images followed by step-by-step explanations is explained. The text will be evidence-based.

## 2 THEORETICAL BACKGROUND

The theoretical part of the thesis deals with the most important principles of making a sterile table for procedures that require an aseptic working area. The final product is a PowerPoint as an educational learning material for nursing students. The key concepts of this project are asepsis, sterile, sterile field, sterile table, aseptic technique, hand hygiene and asepsis in nursing. Evidence-based definitions and the importance of each term will be stated in the theoretical background of our thesis.

### 2.1 Patient safety

Patient Safety is a became a discipline of its own due to continuous aggregation of knowledge for procedures in the health care systems, the aim is to avoid harming patients through procedures. Medical practices and the risks associated with them are in a constant high and been difficult to guarantee this right to every patient. (WHO 2019.)

Infections are a big concern to the healthcare community, because they can cause several health complications and have a negative impact in the economy of healthcare facilities (Eske 2018). Health care-associated infections (HCAIs) are infections that patients acquire while receiving treatment for medical or surgical conditions and are the most frequent adverse event during care delivery (Haque, Sartelli et al. 2018). Of every 100 hospitalized patients at any given time, 6 to 7 will acquire at least one health care-associated infections (HCAI) in developed countries and 10 in developing countries. According to research, about 32% of patients get a post- operative infection during surgery, 10% patients get infected when they are receiving care, and 50-70% of injections given in some developing countries are unsafe. (WHO 2014.) In Finland, there are about 100,000 treatment-related infections each year, half of them in hospitals

and half in long-term care. The most common treatment-related infections are, surgical site infections, urinary tract infections, pneumonia, and a severe generalized infection in which the microbe grows in the blood. Some of the treatment-related can be treated easily. Some are more serious and prolong hospitalization and incur additional costs. In hospitals, treatment-related infections are often more severe than in long-term treatment. (THL 2020.)

Infection prevention and control (IPC) is paramount, regarding patient safety and quality of care, during any health-care procedures. Defective infection prevention and control is harmful and lethal. Quality health care delivery is impossible to achieve without effective IPC. (WHO 2021.) Healthcare-associated infections (HAIs) affect hundreds of millions of individuals worldwide. Performing hand hygiene is widely accepted as a key strategy of infection prevention and control (IPC) to prevent HAIs, as healthcare workers' contaminated hands are the vehicle most often implicated in the cross-transmission of pathogens in health care. (Vermeil, Peters et al. 2019.) The most important means for hospital staff to prevent infections are good hand hygiene, appropriate working practices and handling of care equipment. Besides that, use of protective equipment if necessary. (THL 2020.) According to a systematic review that made by Suvikas-Peltonen, Hakoinen, Celikkayalar, Laaksonen and Airaksinen (2017), 12 out of 26 studies concerned description of incorrect practices in aseptic drug preparation and administration that led to contamination as a result. Thus, better and possibly international procedures for safe parenteral practices need to be developed in hospitals. (Suvikas-Peltonen, Hakoinen et al. 2017.)

## 2.2 Asepsis in nursing

### 2.2.1 Asepsis

Asepsis is the state of being free from micro-organisms that may cause an infections or diseases. It is a countermeasure to avoid the dissemination of micro-organisms. (RegisteredNursing.org 2021.) A pathogen is an organism that causes disease. Different types of pathogens are existing in the environment, the most common types

are bacteria, viruses, parasites, and fungi. Different types of pathogens can be transmitted in different ways. Pathogens can be spread through skin contact, body fluids, particles in the air, contact with excrement, getting in contact with infected environments. (Healthline 2019.) Welch (2015) states that pathogens are microorganisms that can infect or cause diseases when in contact with host cell molecules. Pathogen can cause infections when in contact with the mouth, eyes, nose or urogenital openings, wounds or bites that can break through the skin barrier (Drexler 2010). Asepsis is needed during any invasive procedures in order to reduce the risk of infection from any pathogenic microorganism, therefore using sterile instruments and the non-touch technique (Dockery, Crawford 2012).

The aseptic approach should be followed by everyone, regardless of the amount of control. This means health givers committing to aseptic work practices and correcting mistakes as they arise, even if no one sees them. (Karma, Kinnunen et al. 2016.) Asepsis approach is applied in both surgery and small procedures, a small procedure means a procedure breaking the skin, mucous membranes, inserting foreign objects into the body or damaging a sterile part of the body which is done outside the operating room. Examples of small measures are liquid sampling, anesthesia of the spinal space, insertion of a central venous catheter or arterial catheter pleural puncture. (Tampereen yliopistollinen sairaala 2019.)

### 2.2.2 Aseptic technique

To protect patients from harmful bacteria and other pathogens during medical procedures, healthcare providers use an aseptic technique (Cherney 2018). Aseptic technique is a procedure used to prevent the spread of infection, which aims to prevent microorganisms on hands, surfaces and equipment from being introduced to susceptible sites (ANMF Education Team 2019). It refers to the actions that are implemented by the healthcare worker to protect the patient from pathogenic microorganisms during invasive clinical procedures (Brady, McCabe et al. 2013, 115). In the other word, it means following practices and procedures methodically as a measure to prevent contamination from pathogens, also as a counter measure to minimize risks of infections (Cherney 2018). A nurse's efforts to minimize the onset

and spread of infection are based on asepsis and the principles of aseptic technique (Perry, Potter et al. 2016, 74). Aseptic non-touch technique (ANTT) is a method of applying aseptic technique in a universal manner. The technique focuses on identifying key parts and key sites and taking appropriate measures to prevent the transmission of infection to the patient through hand hygiene, a non-touch technique, the use of aseptic fields and the use of sterilized equipment and equipment that has been decontaminated appropriately to render it aseptic. (Brady, McCabe et al. 2013, 115.) Key sites refer to incisions and insertion sites for invasive medical tools. Key parts are the components of the procedure that get into contact with the patient in a medical equipment, any liquid infusion. (The Association for Safe Aseptic Practice 2015.)

There are medical asepsis technique and surgical asepsis technique. Medical asepsis, or clean technique, includes procedures used to reduce the number of and prevent the spread of microorganisms. Hand hygiene, barrier techniques, and routine environmental cleaning are examples of medical asepsis. Surgical asepsis, or sterile technique, includes procedures used to eliminate all microorganisms from an area. Nurses in the operating room, labor and delivery, and procedural areas practice sterile asepsis. (Perry, Potter et al. 2016,115.) The goals of these techniques are to create and maintain an environment that reduces or is absent of disease-producing organisms and to prevent the transfer of these organisms (Linton 2015). Surgical aseptic techniques can also be used in the following situations as shown in figure 1.

During procedures that require intentional perforation of a patient's skin, such as insertion of an intravenous (IV) catheter

When the integrity of the skin is broken, such as applying a dressing over a surgical incision or burn

During procedures that involve insertion of devices or surgical instruments into normally sterile body cavities, such as insertion of a urinary catheter.

Figure 1. Situations in which the surgical aseptic techniques can be used (Perry, Potter et al. 2016, 75).



### 2.2.3 Hand hygiene and hand washing

Hand hygiene is a general term that refers to any action that results in clean hands (Australian Commission on Safety and Quality in Health Care 2019). During healthcare, hands are the primary pathways of pathogen transmission. Therefore, hand hygiene is the paramount way to interrupt harmful pathogens and prevent HAI. (WHO 2009a.) Hand washing is always the number one way to prevent the spread of infections (Criscitelli 2014). Good hand hygiene is the best single way to fight microbial infections and prevent treatment-related infections. Careful hand cleaning with a hand wash is important in the care and upkeep of all social and health care clients. (THL 2021.) Hand hygiene compliance led to substantial HAI reductions hospital wide (Sickbert-Bennett 2016). The World Health Organization published a hand hygiene approach that defines the five key moments when health-care workers should perform hand hygiene (Figure 2). For protecting patients from infections that are difficult to treat, it is important for health workers to perform hand hygiene at the five key moments. It is recommended to use an alcohol-based rub or soap and water to wash hands if hands are visibly dirty. (WHO 2014.)

There are different hand cleaning products for supporting hand hygiene, such as alcohol-based (hand) rub, antimicrobial (medicated) soap, plain soap and antiseptic hand wipe. Different hand hygiene practices can be implemented, such as antiseptic hand washing, hand cleaning, hand rub and hand disinfection, the list goes on. (WHO 2009a.) Making a sterile table is an aseptic procedure, almost all the work of making a sterile table is done by hands. Keeping good hand hygiene is crucial before setting a sterile field.

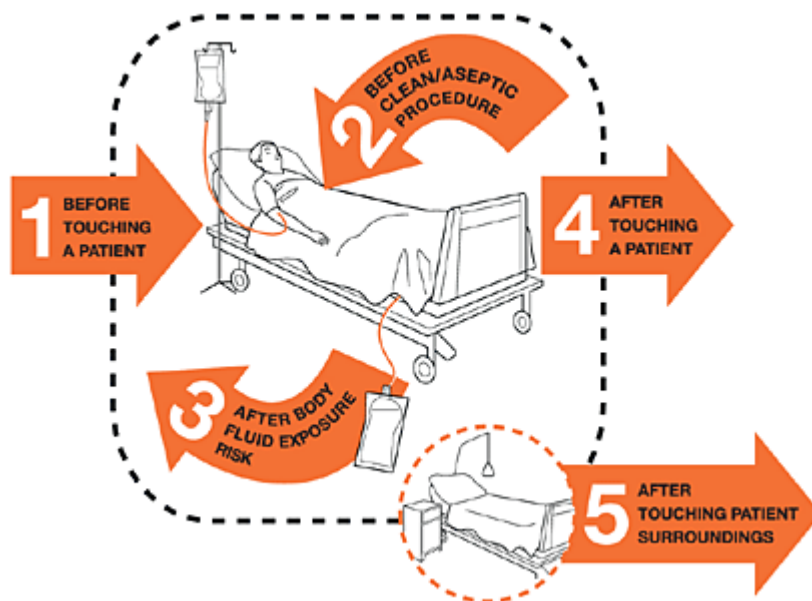


Figure 2. Five moments of Hand Hygiene (WHO 2009a).

#### 2.2.4 Hand disinfectant

Currently, hand disinfectant made with alcohol are the only handy way for quickly and effectively dealing with a wide variety of harmful microorganisms on hands. The presence of skin care products, alcohol based handrubs and liquid soap will keep being encouraged in the future on health-care facilities. (WHO 2010.) Hands can be disinfected properly by taking enough hand sanitizer (3-5ml), rubbing the rinse all over the hands until the substance has evaporated and hands are completely dry, disinfection should take 20 to 30 seconds for adequate disinfection efficiency (Kiviranta 2020).

Alcohol antiseptics commonly is made of ethanol, isopropanol and/or n-propanol. Alcohol denatures the protein of microorganisms to achieve the antimicrobial effect. (WHO 2009b.) At its most effective, ethanol is in a 60-90% solution, killing most microbes in 5-30 seconds (Karhumäki, Jonsson et al. 2021, 82). Two alcohol-based handrub formulations are recommended by WHO usage at home for preparation or in a facility, no more than 50 liters. (WHO 2010.) Unlike other antibiotics and antiseptics, handrubs constant usage don't make any microorganism more resistant. Therefore, the more you use it properly the less likely the outspread of a bacteria that is antibiotic resistant to happen. (WHO 2020.)

## 2.3 Sterile

Sterile, is the absence of all living microorganisms (Criscitelli 2014). A sterile field is a sterile surface on which to place sterile items or equipment that is considered no microorganisms. (Perry, Potter et al. 2015, 89). A sterile field should be prepared for patients undergoing surgical or other invasive procedures (AORN 2013). The sterile field purpose is to avoid contamination and limit the outbreak of pathogens that may lead to infections to a bare minimum (Tennant, Rivers 2021). Preventing contamination of the sterile field involves using specific techniques, actions, and activities to maintain sterility during operative and other invasive procedures (Kennedy 2013).

Sterile fields should be set right before any invasive procedure and the sterile field cannot be left unsupervised. Delaying the use of a sterile field after it is set, raises the risk of contamination of the field and any instrument inside it by airborne microbes. (Tennant, Rivers 2021.) An established sterile field may be covered with sterile drapes in certain limited circumstances. After a sterile field is established, it should be monitored continuously to ensure that no events or breaks in sterile technique occur that could cause contamination. (Kennedy 2013.)

### 2.3.1 Sterile technique

Sterile technique is the strictest form of aseptic technique (Webmd 2021). The use of sterile technique ensures the protection of patients and prevents the perioperative personnel from acquiring or spreading infections. This reduces the chance of surgical-site infections. (Criscitelli 2014.) Anyone that is performing an invasive procedure should use sterile technique (Tennant, Rivers 2021). Figure 3 displays the general principles of sterile technique.

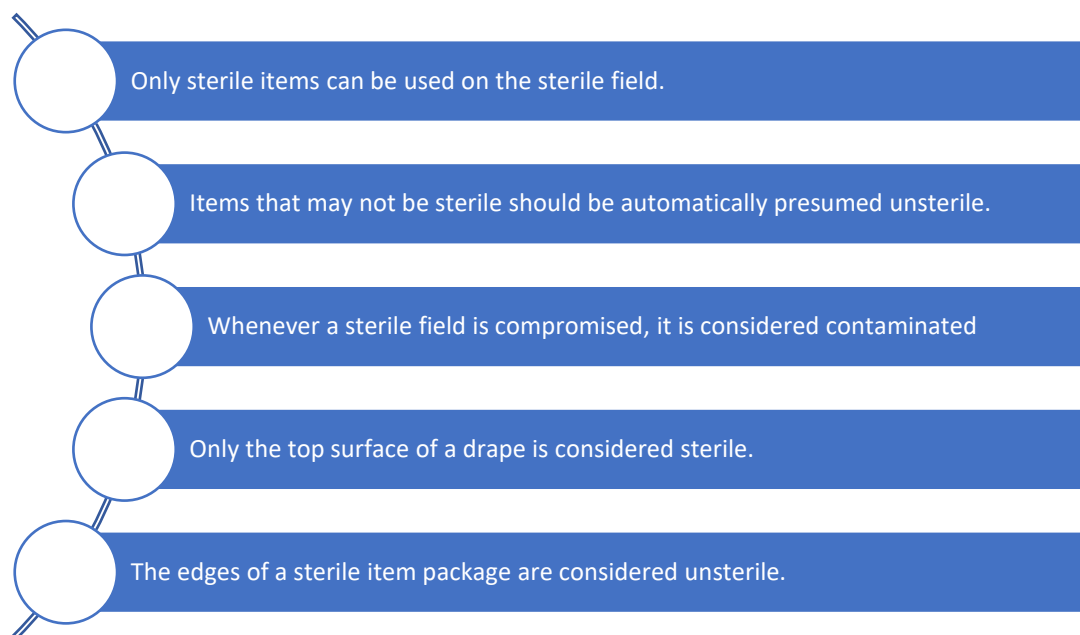


Figure 3. General principles of sterile technique (Criscitelli 2014).

### 2.3.2 Making a sterile table

A sterile operating table is necessary for procedures where there is a need to temporarily place sterile operating equipment on the table (Tampereen yliopistollinen sairaala 2019). Sterile procedures are required prior and throughout invasive patient care procedures in order to maintain an area free from pathogens and avoid infections. Surgical hand scrub, sterile gloves, and a sterile field are ways to prevent infections from any invasive procedures. (Doyle, McCutcheon 2015, 11.) A sterile table is needed necessarily and commonly in different circumstances of healthcare area. These circumstances include operating rooms, invasive procedures, such as treating a wound less than 24 hours old, setting central venous catheter, other procedures such as outpatient clinics, wards, and emergency services. (Pirkanmaan Sairaanhoidopiiri 2017.)

A sterile operating table can be prepared in a place reserved for it before the procedure and brought into the procedure while it is covered and in the operating room, after the positioning the patients of the procedure (Lapin sairaanhoidopiirin 2020). A sterile table must not be made in advance. If the table exceptionally has to be prepared in

advance, it is covered with a sterile disposable protective cloth large enough. Even in small procedures, such as wound suturing, the instrument descent table is protected with a sterile disposable cloth. A sufficiently large cloth is chosen to protect the entire surface of the table and partly the legs of the table. (Oulun yliopistollinen sairaala 2021.) Picture 1 shows an example of sterile table.



Picture 1. Sterile table (Cao 2021).

Assessment is the first step and involves critical thinking skills and data collection; subjective and objective (Toney-Butler, Thayer 2021). According to Association of perioperative Registered Nurses (AORN), the sterile field should be prepared in the location where it will be used and should not be moved. The sterile field should be prepared right before the time of use. (AORN 2013.) A back table that has a large surface is needed to allow all the supplies can be set in the sterile field (Tennant, Rivers 2021). Before making a sterile table, anticipate number and variety of supplies needed for the procedure, which ensures that the procedure is organized to prevent break in technique (Perry, Potter et al. 2015, 89). Before opening any supplies, the sterile package for integrity, discoloration, sterility, and expiration date, the instrument container for sterility, seal integrity, lid and filter tightness should be checked (Oulun yliopistollinen sairaala 2021).

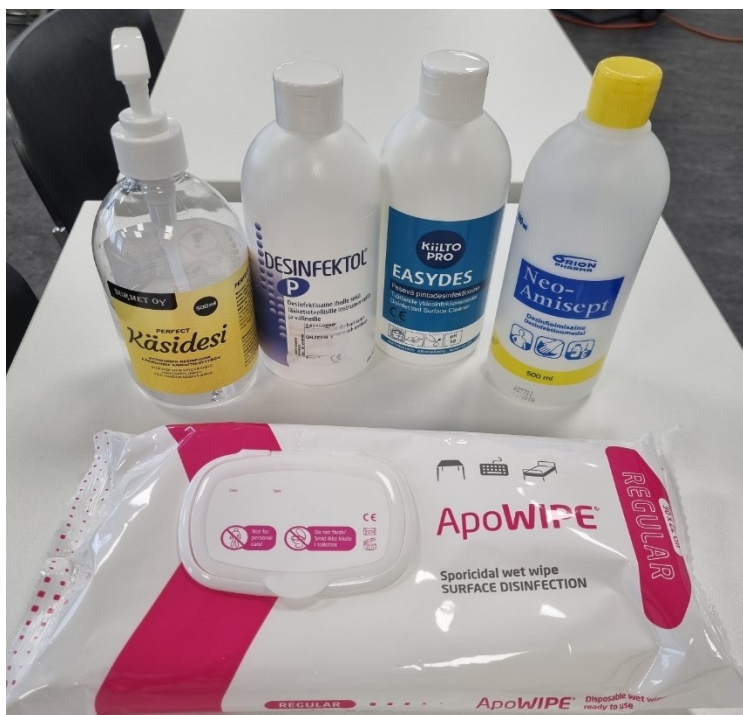
The planning stage is where goals and outcomes are formulated that directly impact patient care based on evidence-based practice (EDP) guidelines (Toney-Butler, Thayer 2021). There are two persons involved in making a sterile table, the handler of the instruments and their recipient, the recipient of the instruments may be the person performing the procedure or the person assisting in the setting of the procedure table. The procedure room is cleaned between procedures. Room traffic must be kept to a minimum. (Lapin sairaanhoitopiirin 2020.) The equipment needed are sterile pack (commercially prepared or prepared by facility), sterile gloves, sterile equipment and solutions specific to the procedure, waist-high table or countertop surface, mask (Perry, Potter et al. 2015). The purpose of personal protective equipment is to ensure the asepsis of the procedure and to protect the worker from blood and secretions (Lapin sairaanhoitopiirin 2020).

Implementation is the step which involves action or doing and the actual carrying out of nursing interventions outlined in the plan of care (Toney-Butler, Thayer 2021). A table should always be disinfected before using as sterile table (Turun yliopistollinen keskussairaala 2020). Disinfectants are used to disinfect environmental surfaces, heat-resistant equipment and skin and mucous membranes. Table surface and feet should be disinfected by effective disinfectant. (Karhumäki, Jonsson et al. 2021, 81.) Picture 3 and picture 4 show wearing clean gloves and disinfecting a table.



Picture 3 and 4. Using disinfectant wiping working table (Cao 2021).

A prerequisite for successful disinfection is that the substance can act on the microbe and the concentration of the substance is sufficient. Ethanol destroys harmful substances bacteria and yeasts, as well as most viruses by rapidly destroying microbial cell proteins and inhibiting the activity of enzymes. At its most effective, ethanol is in a 60-90% solution, killing most microbes in 5-30 seconds. By adding other disinfectants to ethanol, even better disinfection and cleaning performance can be achieved. Ethanol is especially suitable for disinfecting clean surfaces and equipment. Ethanol is a safe and effective disinfectant and is also well suited for skin and hand disinfection. (Karhumäki, Jonsson et al. 2021, 81- 82.) Picture 5 shows some examples of different ethanol product.



Picture 5. Different ethanol products as disinfectant (Cao 2021).

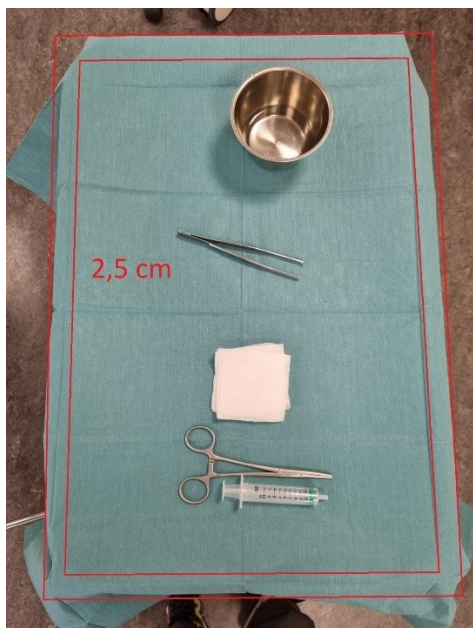
Surgical hand disinfection is performed before procedures with particularly high hygiene requirements (Tampereen yliopistollinen sairaala 2019). Disinfect hands and wear a factory-clean mouth-nose mask beforehand (Oulun yliopistollinen sairaala 2021). Washing hands and putting sterile gloves before touching any sterile supplies. Sterile supplies should be opened for only one patient at a time in the operating room or other procedure room. (AORN 2013.) Remove the table protective cloth or surgical

cover from its protective packaging, then open and apply the sterile protective cloth by touching only the outer corners of the cloth (Oulun yliopistollinen sairaala 2021). As shown in picture 6 and picture 7, lift the lid of a package upwards and back away from the table before placing the lid over it; this is to prevent dust or particles to fall into the tray. (Tennant, Rivers 2021.) Outer surface of package is considered unsterile (Pirkanmaan Sairaanhoidopiiri 2017). A 2.5-cm (1-inch) border around any sterile drape or wrap (Picture 8) is considered contaminated (Perry, Potter et al. 2016, 90). If a sterile table is prepared for a surgery's sake in a surgery room, other people except the dressed persons shall keep a distance of at least 50 cm from the sterile table (Oulun yliopistollinen sairaala 2021). Figure 4 displays the general principles of making a sterile table.



Picture 6 and 7. Stepping back before opening a sterile package (Cao 2021).





Picture 8. Unsterile border exists along the edges of the table (Cao 2021).

Sterile supplies are handled with sterile protective gloves.

A surgical mouth-nose shield is used for preparation, and if necessary, a hair cover and a sterile protective jacket.

Instruments should not be dropped on a sterile table.

Instruments should not be extended over a sterile table.

Sterile instruments are taken from their packaging so that they do not touch the edges of the package and become contaminated.

If there is any doubt about the sterility of the device, the device will be re-sterilized or the disposable product will be discarded.

Figure 4. Principles of making a sterile table (Pirkanmaan Sairaanhoitopiiri 2017).

A sterile object below a person's waist is considered contaminated (Perry, Potter et al. 2015, 89). Items introduced to the sterile field should have their packages open, separated, and moved, always maintain the integrity of the items and the sterile field. The methods refer that, in order to keep a sterile field, the prevention of unsterile objects or unscrubbed team members from leaning or reaching over the working area. (AORN 2013.) When adding sterile items to the sterile field, the assistant holds each

side of the package, peels the package, and display the item without touching it (Picture 9). Accident contamination should be prevented. If sterile solution is needed, using sterile technique to pour the solutions to the sterile field. Verify contents and expiration date of solution, and make sure that receptacle for solution is located near or on sterile work surface edge. Removing sterile seal and cap from a bottle in an upward motion to prevent contamination of bottle lip and maintain sterility of inside of cap (Picture 10). Solution bottle is held away from the sterile field with label facing up and bottle lip 2.5 to 5 cm above inside of sterile receiving container, pour solution slowly, avoid splashing (Picture 11). In this circumstance, the edge and outside of bottle are considered contaminated. Permeated sterile barrier because of splashing liquids is considered contaminated. (Perry, Potter et al. 2015, 92-93.)



Picture 9. Adding a sterile item to a sterile field (Cao 2021).



Picture 10. Removing sterile seal and cap from a bottle (Cao 2021).



Picture 11. Adding sterile solution (Cao 2021).

Sterile fields should be constantly monitored. Once set, a sterile field cannot be left unwatched until the procedure in question is concluded. (AORN 2013.) An established sterile field may be covered with sterile drapes in certain limited circumstances (Kennedy 2013). These circumstances such as when a surgery or an invasive procedure must stop or delay immediately for a short period of time.

Unexpected outcomes could happen during the whole process of making a sterile table. In this situation, related interventions should be performed. If a sterile item fell off sterile field, add a new sterile item to the field, unless the field becomes contaminated; in the event of contamination, discontinue sterile field preparation and begin again. If sterile field comes in contact with contaminated object, or liquid splatters onto drape, causing strike through, in this case, the field preparation should stop and start over with new equipment. (Perry, Potter et al. 2015, 93.) If the table exceptionally has to be prepared in advance, it is covered with a sufficiently large sterile cloth and no more than two hours before the procedure. (Turun yliopistillinen keskussairaala 2020.)

## 2.4 PowerPoint making

PowerPoint is one of the most widely used technological tools in educational contexts (Herting 2020). PowerPoint has become a ubiquitous tool for instructors who teach college students. Almost two decades of student learning research has examined the

impact of traditional instruction versus instruction aided by PowerPoint. (Baker, Goodboy et al. 2018.) Teaching with PowerPoint, at its best, can get students' attention, creating a connection between the professor and students, increasing spontaneity and interactivity. In addition to improving audience focus, PowerPoint's potential strengths include well-structured communication of knowledge; highlights for particularly important points; and presentations those simultaneously engage students with different learning styles. Skills in the use of PowerPoint presentations can be broadly divided into two stages: skills in preparation and in delivery. (Inoue-Smith 2016.)

PowerPoint is a visual medium. There is an art and science to creating well designed slides (Gilliland 2010). According to Stephen (2010), an effective presentation has a clear structure, with a beginning, middle, and end. The number of slides depending on the material and the audience, use the number of slides that need to reach the particular audience, to ensure that they will grasp and remember the points of the presentation. The text in good PowerPoint slides should be clear and legible. Besides that, using colour and texture to organize and emphasize, using transitions and animation to direct attention, using tables to organize and summarize and using sounds and pictures to grab attention are also suggested. Labels, titles, and keys serve as crucial guides to the general structure and important points in your presentation. (Kosslyn 2010.) Fonts are an important part of slide design. There are many considerations when using fonts such as the number of fonts. Designers suggest sticking to two fonts, one for headings and another for the body text. Think large to small when using fonts. Main titles should be larger than subtitles. (Gilliland 2010.)

### 3 PURPOSE AND OBJECTIVES

The purpose of this thesis is to create PowerPoint slides as an easy-to-follow educational learning material on how to make a sterile table for nursing students of SAMK. The project reveals the benefits of a controlled environment when

preparing medicines, cleaning wounds, and other small procedures which require asepsis.

The objective of this thesis is for nursing students, to have updated information of skills and knowledge on making sterile table in the right way so patient safety can be increased by using this way. Besides that, this project offers the nursing students reliable learning material, which helps SAMK for qualified education. What's more, the theoretical knowledge of implementation of evidence-based nursing practice for nursing skills of the authors have improved.

## 4 PROJECT PLAN AND IMPLEMENTATION

### 4.1 Methodology

The hybrid methodology is used in this project. Hybrid methodology is a junction of different methods that generates an optimized form. Hybrid methodologies are tools that can be used to address aspects of the projects. (Westland 2016.) The waterfall methodology is an approach, where the users' requirements are set at the beginning of the project, and then project plan is created to achieve those requirements. In this model each step of the project follows into the next, unable to correct anything from the precious part. (ProjectManager 2021.) Agile methodology a different approach where it is common to update and adapt the objectives and as the project moves forward. (Association for project managment 2017). This method was selected because of its structure and flexibility to make changes during the project process. This is particularly useful since the thesis researchers are doing assessment frequently during the process, besides that, supervisor is constantly providing feedback.

## 4.2 Target group

The direct target group refers to the group of people you want to direct your product, and whom you want to impact positively. The indirect target group includes people in the in contact with the initial target group. (Hinze 2017.) The target group for this thesis are nursing students at SAMK. The University of Applied Sciences needs more learning material in English.

## 4.3 The stages of the project, timetable

According to Note (2015) , there are five stages of a project life cycle. They are, initiating, planning, executing, monitoring, and closing. There are basically three phases and five stages in this project. The three phases are planning, implementation and evaluation. The five stages are following the same five stages of project life cycle as mentioned above. Getting an idea and pre-planning as the initiating stage. In this stage, making a sterile table as thesis topic was chosen, PowerPoint as the final product was decided, a script of time schedule was discussed between researchers. In the stage of planning, more specific things are arranged. For instance, project purpose, objectives, methods are decided, database are chosen, project stages, risks, financing, and ethical issues are arranged. Executing stage includes collecting reliable sources, literature reviewing, and writing project report. In the monitoring phase, assessment and supervision are needed to correct the variances the process of the project plan (Note 2015). Close project or phase is the process of finalizing all activities for the project, phase, or contract (Project Management Institute 2017).

This project initiated in August 2020 with choosing working partner and project topic. Several meetings between authors and supervisor have been set before February to decide a PowerPoint as the final product and a script of working time schedule. Project plan has been done and agreement with SAMK was made after that. The project was not progressing during the summer break since both authors had summer job to do. The main implementation part was in September and October, during which theoretic background was completed, pictures were taken, and PowerPoint slides were made.

The thesis report was written and published in the end of October 2021. Until then, the whole project terminated. Table 1 display the timetable of the project.

Table 1. Project timetable

Initiating stage August- February 2021	<ul style="list-style-type: none"> <li>✓ Choosing topic of project</li> <li>✓ Thesis partner meeting</li> <li>✓ Deciding PowerPoint as the final product</li> <li>✓ Deciding script of time schedule</li> </ul>
Planning stage March- August 2021	<ul style="list-style-type: none"> <li>✓ Project plan presentation</li> <li>✓ Acceptance of project plan</li> <li>✓ Agreement signed with SAMK</li> </ul>
Executing stage September 2021	<ul style="list-style-type: none"> <li>✓ Theory research</li> <li>✓ Writing theoretical background</li> <li>✓ Taking pictures</li> <li>✓ Making PowerPoint</li> </ul>
Monitoring stage October 2021	<ul style="list-style-type: none"> <li>✓ PowerPoint submission and getting feedback</li> </ul>
Closing stage October- November 2021	<ul style="list-style-type: none"> <li>✓ Writing thesis report</li> <li>✓ Evaluation</li> </ul>

#### 4.4 Literature retrieval

SAMK Finna, Google, Google scholar, Pubmed and EBSCOhost as databases were used in the project. Article search was limited to 2010-2021 while doing literature search. There are few theories from the year 2009 was used in this project was because they are still reliable and evidence-based knowledge nowadays. In the databases mentioned above, plenty of literature can be found both in English and Finnish. Although there were approach limits for some articles, and due to the language barrier, it was a challenge for the authors who do not speak Finnish as their mother tongue to acquire enough recommendations or instructions in Finnish, it was still manageable to gather enough sources for the thesis.

The key words that were used for literature retrieval were sterile, sterile field, sterile technique, asepsis, aseptic technique, asepsis in nursing, hand hygiene, patient safety,

infection control. Relevant books, articles, reports, and websites were used as sources for this project. Information has been chosen in critical way to make sure that they are evidence-based. Besides that, constructive suggestions, and comments about choosing reliable resource have been given from supervisors. Relevant literature can be found in Appendix 1.

## 5 EVALUATION

### 5.1 Project progress, stages, schedule

The project progress was evaluated and supervised during the whole process. Two participants were working well together. The stages of this project are clear from initiating to project closing. At the beginning, the two authors planned to complete the project before the summer of 2021, but it turned out that this project was underestimated, and the first schedule was too tight for the two authors. The project was suspended during the summer break because both authors were doing summer job. However, the project continued right after that. Eventually, the project was complete and final report was written in October, which is earlier than the plan.

### 5.2 Resources and risks

Resources are people, equipment, place, money, or anything else that the researchers need in order to do all of the activities that they planned for. Every activity in the activity list needs to have resources assigned to it. (Watt 2014.) Two participants who are also the authors of this thesis and supervisors of the two authors were involved in this project. Laptops or desktops as working devices were needed. The SAMK's simulation room for nursing students and the equipment for making a sterile table of SAMK was used for taking pictures. SAMK Finna, Google, Google scholar, Pubmed and EBSCOhost as databases were used in the project.



There are different kinds of risks in this project. Physical risks come firstly from injuries and develop to physical discomfort, pain and illness. Psychological risks are negative feelings derived from work such as, anxiety, depression, guilty and loss of confidence. Social/Economic risks can come from changes in the income of the research, leading to embarrassment, loss of respect of others, labelling. All of those with a negative repercussion. (University of Oregon 2021.) The project risks that actually happened during the process and how the two authors managed them are shown in Table 2.

Table 2. Project risks and risk management (University of Oregon 2021)

	Risks	Risk management
Physical	Exhaustion, both researchers must work to maintain a lifestyle in addition to the thesis. This caused both the researchers to burnout.	To avoid that the researchers will abide by healthy diets, healthy sleep habits, exercising and taking regular breaks (Scoot, 2020).
	Eyestrain is condition where the eyes become tired being overused, it happened when the eyes must keep focused on the computer screen.	To prevent eyestrain from happening, for every 20 minutes, researchers use the computer they will gaze at a distant object (at least 20 feet away) for at least 20 seconds (Healthline, 2018).
	Sitting for a long time hurt the back and the neck.	Therefore, using an ergonomic chair can aid on the prevention of bad posture during working hours (Healthline, 2015).
Psychological	Anxiety and distress to keep up with the schedule and deliver everything on time	For that a schedule was created.
	Anxiety to make sure we deliver a project on SAMK's standards.	For that constant feedback from the supervisor is given to the researchers.

	Sleep deprivation, the stress from doing this research affected the sleep.	For that both researchers have followed a healthy sleep schedule and use melatonin when necessary.
	Deception, from failing to achieve the criteria from the supervisor and the university.	To avoid that the researchers have kept in mind that, working on a thesis is in fact a long process
Social economic	Instead of taking more opportunities to work researchers were focusing on the thesis.	For that, researchers have followed a humbler lifestyle until the thesis is delivered.

### 5.3 Achievement of objectives and development of professional skills

The project will give the nursing students of SAMK good instruction of how to make a sterile table. The project has revealed the benefits of a controlled environment when preparing medicines, cleaning wounds, and other small procedures which require asepsis. After being educated by using this PowerPoint, the nursing students should have updated information of skills and knowledge on making sterile table in the right way, patient safety can also be increased by using this method. Besides that, this project has offered the nursing students reliable learning material, which helped SAMK for qualified education.

The professional and personal development of the students increased during this project. The project increased the knowledge of its authors about sterile, asepsis, hand hygiene and preparation of a sterile table. Besides that, more knowledge about patient safety, infection and its protection and precautions are enhanced. The thesis project provided the authors with evidence-based outlooks and alternatives to take care of the execution of aseptic methods in the workplace. This project also has taught the lesson that, following ethical principles when doing research and writing thesis reflects good scientific practice, making responsible research is not only beneficial to science, but also beneficial for improving authors personal professional skills and sense of ethics. The ability of doing research and obtaining evidence-based knowledge is improved for both authors.

#### 5.4 PowerPoint production

The production of the PowerPoint went well since both authors already had skills of making a basic PowerPoint. Besides that, research about how to make a good educational PowerPoint has been implemented. What's more, instructions of how to make the PowerPoint more professional has been given by the supervisors. Evidence-based theory has been used in the PowerPoint and pictures with good quality have been taken, in addition the usage of SAMK PowerPoint template. The initial plan was to send this PowerPoint to nursing students, so they could make an evaluation and give the authors feedback. However, the teachers of SAMK can make the decision if the material is qualified. Eventually the PowerPoint as the product of this project has been approved as educational material for nursing students of SAMK. Screenshots of the part of PowerPoint slides are in Appendix 2, in which shows the steps of making a sterile table.

#### 5.5 Reliability and ethics

The thesis project has been done objectively based on already available information and reliable sources have been used in the work. Most sources, such as THL and WHO were used in this project. The major of the sources is limited to 2010-2021 while doing literature search. Even though very few resources are before the year of 2010, they are still reliable nowadays. Although some of the sources are textbooks and so-called "second-hand sources", they have been made as textbooks for nursing teaching material in polytechnic nursing courses, vouching for the reliability of the information presented.

Finnish scientific community has agreed on a shared guideline for research ethics on Responsible Conduct of Research and the handling of suspected violations in the so-called RCR guideline (TENK 2012). Following RCR guideline when doing research and writing a thesis report reflects that the researcher has ethical and moral obligations. In this project, plenty previous theses were reviewed by following the RCR guidelines

and ethical principles. Pictures of the main implementation part were taken by the two authors of this project. Other pictures in this project were cited by using citation form that is allowed by SAMK. The student's check list in the Ethical guidelines for thesis work was used during the process of the project (ARENE 2018). Plagiarism is widespread even in developed countries and can be avoided by being honest while writing articles. Strict adherence to the journal guidelines and being honest can help to reduce this burden on the scientific society. (Roka 2017.) Self-plagiarism is the act of an individual using parts of previous writings on the same subject in a different publication, without citing it formally by the use of quotes (World Association of Medial Editors 2017). The thesis report is checked by the plagiarism detection system before publishing.

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## APPENDIX 1

Table of previous literature.

<b>Author of research, publication year, country</b>	<b>The purpose of research/project/literature review</b>	<b>Target group, number of participants, data collection method, analyzing method/project method</b>	<b>Results/ product of project</b>
Tennant K, Rivers CL. Sterile Technique. 2021, United States of America	How to establish a sterile field for medical procedures, and the preparation for it	Health professionals from ECPI University and WJB Dorn VAMC. Two participants. - Qualitative method.	How to prepare a sterile field and many ways how to wash hands before preparing sterile fields.
Vermeil, T., Peters, A., Kilpatrick, C., Pires, D., Allegranzi, B. & Pittet, D. 2019, United States of America	How hand hygiene has developed across the years, from using chlorine to alcohol and how it helped to reduce cases of hospital infections inside hospitals.	Health professionals from the University of Geneva Hospitals and Switzerland and Health professionals from the Faculdade de Medicina da Universidade de Lisboa, Portugal. Six participants. Qualitative Method.	Washing and disinfecting your hands with alcohol before medical procedures helps on the prevention of hospital infections.
Suvikas-Peltonen, E., Hakoinen, S., Celikkayalar, E., Laaksonen, R. & Airaksinen, M. 2017, Finland	Many patient deaths have been reported because of administration of contaminated intravenous medicines due to incorrect aseptic techniques. The aim was to review the literature for (1) incorrect practices in aseptic drug preparation and administration and (2) recommendations for safer practices in hospitals	Health professionals from the Faculty of Pharmacy, University of Helsinki. Four Participants. Qualitative method.	Review common mistakes nurses do or forget to address during invasive procedures and their consequences.

Kennedy, Lynne, 2013, United States of America	To enable the learner to take an active role in implementing recommended practices for sterile technique in his or her perioperative practice setting.	International health professionals	Using sterile technique helps prevent the surgical environment from becoming contaminated and thus can help reduce the incidence of surgical site infection. The AORN “Recommended practices for sterile technique” provide guidance for setting up, maintaining, and monitoring a sterile field.
Australian Nursing & Midwifery Journal, 2019	To provide an aseptic technique tutorial on the continuing professional education	International health professionals	A tutorial article.
Sickbert-Bennett, Emily E; DiBiase, Lauren M; Willis, Tina M Schade; Wolak, Eric S; Weber, David J; Rutala, William A, 2016, United States of America	The purpose of the thesis was to explain performing hand hygiene can reduce healthcare-associated infection.	Health professionals.	A significantly increased hand hygiene compliance rate ( $p < 0.001$ ) and a significantly decreased healthcare-associated infection rate ( $p = 0.0066$ ).



# Making a sterile table

Simin Cao  
Tero Sakari Aitasalo

KATSE TULEVAISUUTEEN.  
THINK FUTURE.



## CONTENT

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KEY CONCEPTS

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PRINCIPLES OF STERILE TECHNIQUE

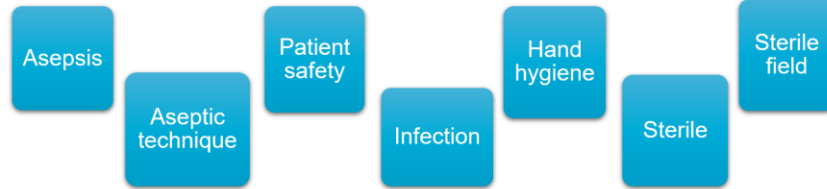
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MAKING A STERILE TABLE





## KEY CONCEPTS






**Asepsis** is the state of being free from micro-organisms that may cause an infections or diseases. It is a counter measure to avoid the dissemination of micro-organisms (RegistredNurses.org, 2021).

**Aseptic technique** refers to the actions that are implemented by the healthcare worker to protect the patient from pathogenic microorganisms during invasive clinical procedures (Brady, McCabe et al. 2013, 115). It means following practices and procedures methodically as a measure to prevent contamination from pathogens, also as a counter measure to minimize risks of infections (Website of Healthline, 2018).

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**Patient Safety** Patient Safety is a became a discipline of its own due to continuous aggregation of knowledge for procedures in the health care systems, the aim is to avoid harming patients through procedures. (WHO 2019.)

**Infections** are a big concern to the healthcare community, because they can cause several health complications and have a negative impact in the economy of healthcare facilities (Jamie Eske 2018). Of every 100 hospitalized patients at any given time, 6 to 7 will acquire at least one HCAI in developed countries and 10 in developing countries (WHO 2014).

**Hand hygiene** is the most crucial way to avoid the transmission of harmful pathogens and prevent HAI. (WHO 2009a.) Hand washing is always the number one way to prevent the spread of infections(Criscitelli 2014).

At present, alcohol-based handrubs are the only known means for rapidly and effectively inactivating a wide array of potentially harmful microorganisms on hands (WHO 2010).

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**Sterile**, is the absence of all living microorganisms (Criscitelli 2014).  
A **sterile field** A sterile field is a sterile surface on which to place sterile items or equipment that is considered no microorganisms. (Perry, Potter et al. 2015, 89).  
A **sterile operating table** is necessary for procedures where there is a need to temporarily place sterile operating equipment on the table (Tampereen yliopistollinen sairaala 2019).

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## PRINCIPLES OF STERILE TECHNIQUE

(Criscitelli, 2014)



Only sterile items can be used on the sterile field



Items that may not be sterile should be automatically presumed unsterile



Whenever a sterile field is compromised, it is considered contaminated



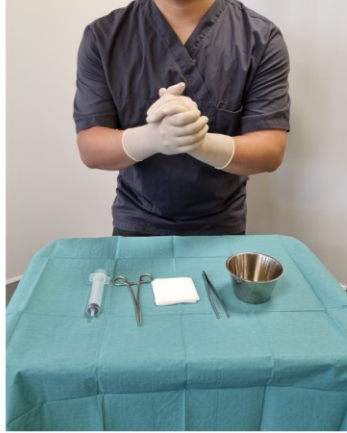
Only the top surface of a drape is considered sterile



The edges of a sterile item package are considered unsterile

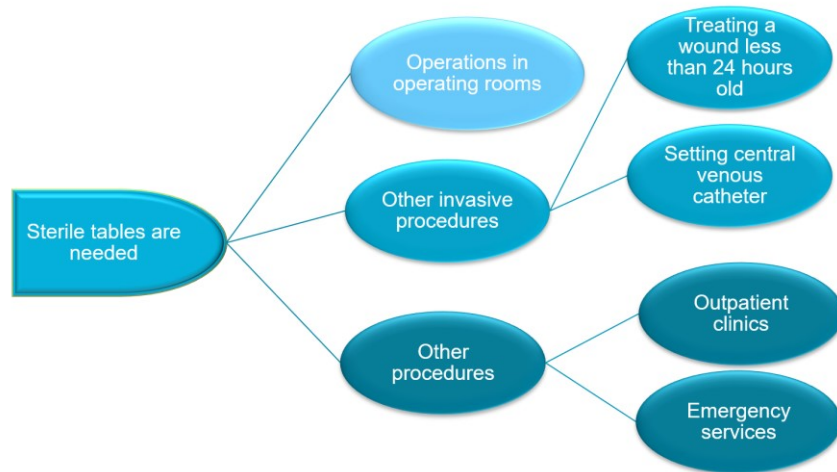
samk 

## AN EXAMPLE OF A STERILE TABLE



(Cao, 2021)

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(Pirkanmaan Sairaanhoidopiiri 2017)

samk 



## PRINCIPLES OF MAKING A STERILE TABLE

Sterile supplies are handled with sterile protective gloves

A surgical mouth-nose mask is used for preparation, and if necessary, a hair cover and a sterile protective jacket

Instruments should not be dropped on a sterile table

Instruments should not be extended over a sterile table

Sterile instruments are taken from their packaging so that they do not touch the edges of the package and become contaminated

If there is any doubt about the sterility of the device, the device will be re-sterilized or the disposable product will be discarded

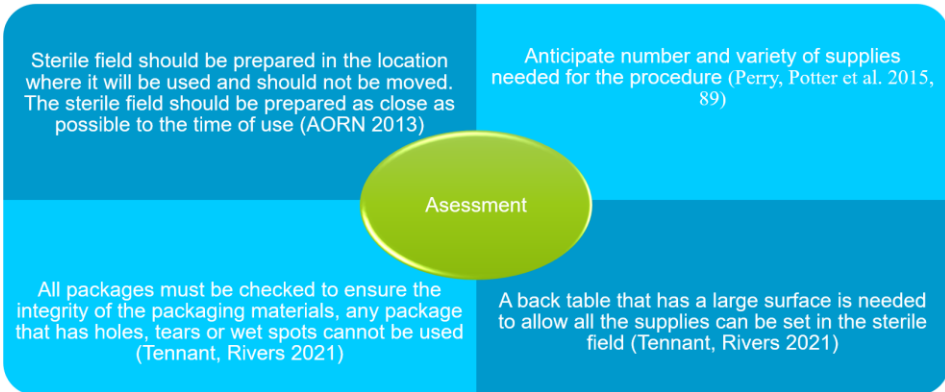
(Pirkanmaan Sairaanhoidopiiri 2017)

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## MAKING A STERILE TABLE



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The equipment needed are sterile pack (commercially prepared or prepared by facility), sterile gloves, sterile equipment and solutions specific to the procedure, waist-high table or countertop surface, mask. (Perry, Potter et al. 2015.)

Two nurses are needed, the handler of the instruments and their recipient, the recipient of the instruments may be the person performing the procedure or the person assisting in the setting of the procedure table (Lapin sairaanhoitopiirin 2020).



Implementation

1. Perform hand hygiene and wear clean gloves.
2. Disinfect the whole table (include lower surface and higher surface and table feet) and allow to them thoroughly dry.



(Cao 2021)



3. Perform hand hygiene by using hand disinfectant and wear sterile gloves.
4. Lift the lid of a package straight up and step back before flipping the lid over; this will ensure that dust or particles will not fall into the tray. (Tennant, Rivers 2021.)



(Cao 2021)



Items introduced to the sterile field should be opened, dispensed, and transferred by methods that maintain the sterility and integrity of the item and the sterile field. The methods refer to that the items should be delivered to the sterile field in a manner that prevents unsterile objects or unscrubbed team members from leaning or reaching over the sterile field. (AORN 2013.)

5. When adding sterile items to the sterile field, the assistant holds each side of the package, peels the package, and display the item without touching it. The movements is completed beside the sterile field.



The edges of a sterile item package are considered unsterile

(Cao 2021)



6. Adding sterile solution

- Verify contents and expiration date of solution
- Removing sterile seal and cap from a bottle in an upward motion to prevent contamination of bottle lip and maintain sterility of inside of cap
- Solution bottle is held away from the sterile field with label facing up and bottle lip 2.5 to 5 cm above inside of sterile receiving container, pour solution slowly, avoid splashing

(Perry, Potter et al. 2015, 92-93.)



The edge and outside of bottle are considered contaminated



Permeated sterile barrier because of splashing liquids is considered contaminated

Make sure that receptacle for solution is located near or on sterile work surface edge

(Cao 2021)

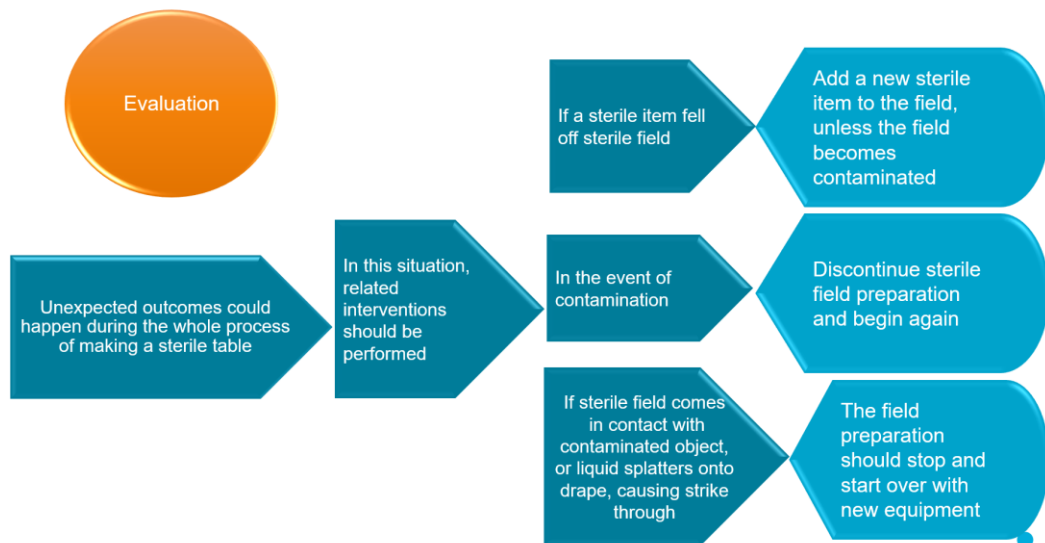


7. Outer surface of package is considered unsterile. A 2.5-cm (1-inch) border around any sterile drape or wrap is considered contaminated (Perry, Potter et al. 2016, 90).



(Cao 2021)

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(Perry, Potter et al. 2016, 93)

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