



jamk.fi

**Nursing Intervention in pre-
vention of sepsis in post-opera-
tive unit:
A literature Review**

Nischal CK
Chrispine Mtebe

Bachelor's thesis
August 2019
Health and Social Studies
Degree Programme in Nursing

Jyväskylän ammattikorkeakoulu
JAMK University of Applied Sciences

Author(s) Nischal CK, Chrispine Mtebe	Type of publication Bachelor's thesis	Date August 2019
	Number of pages 26	Language of publication: English
		Permission for web publication: x
Nursing Intervention in prevention of sepsis in post-operative unit: A literature Review		
Degree programme Nursing		
Supervisor(s) Palovaara Marjo & Jalonen Anu		
Assigned by		
<p>Abstract.</p> <p>The thesis aimed to provide information to nurses to prevent the risk of sepsis in the postoperative unit. The purpose of the literature review was to provide relevant information to reduce the risk of sepsis and prevention of it in the postoperative unit.</p> <p>The research was done using a literature review method and the articles were used for this study were retrieved from Cinahl and Pubmed. The appropriate article was chosen based on the titles, abstracts, published year and full text which answered the research question. Content analysis was applied. For the selection of the articles that are used for the study, the inclusion and exclusion criteria were used.</p> <p>The 10 articles were chosen to be reviewed, after that, it was categorized into the main theme and subcategory. The three main themes: Tracking the patients, diagnosed with sepsis and its treatment and monitoring carefully patients' early signs of sepsis.</p> <p>In conclusion during this study, post-operative unit nurses have great responsibility where nurses should play a vital role to detect the signs of sepsis. Tracking the patients to prevent sepsis. Follow evidence-based guidelines and monitoring patients' early signs of sepsis.</p>		
Keywords (subjects) Nursing intervention, Sepsis, Prevention, Post-operative		
Miscellaneous		

Contents

1. Introduction	1
2. Sepsis.....	2
2.1 Sepsis in post-operative care	2
2.2 Post-operative nursing care	2
3. Purpose and Aims.....	8
4. Literature review	9
5. Data Analysis	13
6. Findings	13
7. Discussion	18
8. Conclusion and recommendations	20
Reference.....	22
Appendix	25

Tables

Table 1: Pico	9
Table 2: Inclusion Criteria	10
Table 3: The Screening Process Through Applied Inclusion Criteria	11
Table 4: Themes For Data Analysis And Synthesis	14

1. Introduction

Sepsis can be defined as life-threatening organ dysfunction caused by a dysregulated host response to infection. If not recognized early and managed promptly, sepsis can lead to different complication like septic shock, failure of multiple organs in the body and even can lead to death. Any type of infectious pathogen can potentially cause sepsis. Antimicrobial resistance is a key factor influencing clinical unresponsiveness to treatment and prompt evolution to sepsis and septic shock. Patient with sepsis resistant pathogens has been found to have a higher risk of hospital mortality. The global epidemiological burden of sepsis is difficult to discover. More than 30 million people are predictable to be affected worldwide every year, which leads to 6 million deaths. It is reported that the problem of sepsis is more likely highest in low- and middle-income continent (WHO, 2018).

Sepsis is life-threatening, common and on the increase. In 2014 alone, there were 1.7 million sepsis hospitalizations and 270,000 sepsis deaths in the U.S. Than in 2017, it was reported that even though sepsis is only present in 6% of hospitalizations, it took 15% of in-hospital deaths (infection control, 2018). Sepsis is accountable for an extensive number of morbidity and mortality rates in the United Kingdom. Yearly, it causes the death of more people than breast and bowel cancer combined. Community patients are major candidates for sepsis due to comorbidities, palliative status, and recent surgery and wound care. Primary identification and quick treatment are vital in reducing the number of fatalities from the illness. Every nurse is responsible to carry out clinical observations and assess whether sepsis is suspected (Joanne, 2017).

The thesis aims to provide information to nurses to prevent the risk of sepsis in post-operative ward. The purpose of the literature review is to provide relevant information to reduce the risk of sepsis and prevention of it in the postoperative unit.

2. Sepsis

2.1 Sepsis in post-operative care

Sepsis in post-operative care occur after surgical procedures and it can affect the superficial and deep layers of the incision, organs or spaces that have been operated or traumatized during the operation procedure. Sepsis is among the post-operative problem related to increased morbidity, mortality and increasing in hospital costs to the patient. It is also increasing the length of hospital stay and these patients have the risk of admitted to an intensive care unit and can lead to death if not well managed. Besides, the emotional and physical suffering of the affected patient due to prolonged illness and hospitalization it's among the complication of sepsis to post-operative patients which causes more time missing from their normal life activities, social life and family disturbance due to the deteriorating of their status and insecurity concerning the health problem. (Borges & Ferreira, 2016.)

2.2 Post-operative nursing care

Until fully recovered from the aesthetic agent a patient remains in PACU. Stable blood pressure, adequate respiration function, adequate oxygen saturation level compared with baseline and natural movement are indicators of recovery. To determine the patient readiness for discharge from the PACU the following measures are analyzed steady vita sign, orientation to person, place, events and time, uncompromised pulmonary function, pulse oximetry reading, indicating adequate blood oxygen saturation, urine output, under control of nausea and vomiting and minimal pain (Smith, Kisiel & RadFord, 2016).

The post-anesthesia care unit (PACU), which is also called the recovery room is located together to the operating rooms. Patients recovering from anesthesia are kept in this unit. To experience, highly skilled nurses, anesthesiologist, surgeon, advanced hemodynamic and pulmonary monitoring and support special equipment and medications are easy to access. PACU is divided into three phases in phase I, used during the immediate recovery phase, intensive nursing care is provided. PACU phase II, the patient is prepared for self-care in the hospital and during phase III of PACU, the patient is prepared for discharge. (Smeltzer, Bare, Hinkle & Cheever, 2008.)

The nursing care required for the patient is vital when the patient is experiencing pain. Care should not be limited to the administration of medication. The nurse has a unique role in supporting the patient through their acute pain experience. The nursing intervention which can be suitable to use to support patient in this way providing information to allay the patients fear and anxieties, providing general comfort measures ensuring that the patient is not too hot or cold and that they are supported with pillows, distraction techniques and relaxation techniques (Smith, Kisiel & RadFord, 2016).

Most patients in the community that nurses meet on a day-to-day basis are susceptible to infection and sepsis. Palliative and immunosuppressed patients who have cancers and long-term conditions with those who have invasive devices such as urinary catheters, peripherally inserted central lines, and gastrostomies are susceptible to infection and sepsis. On addition to that, patients with breaks in their skin integrity due to wounds, pressure ulcers, and diabetes mellitus increase susceptibility to sepsis. Jones, (2017)

All mentioned above clinical problems influences patients in the high-risk category and should be closely observed systemically. Additionally, a large population of community patients is older people, over the age of 75 are more likely to be weak and maybe immunosuppressed making them a susceptible to sepsis. According to National Confidential Enquiry into Patient Outcome and Death (2015), Patients who have had surgical treatment in the previous 6-week period are also susceptible to the illness, this is due to breaks in the skin which make them susceptible to infection and sepsis. Finally, patients who repeatedly use antibiotics are also at risk of developing sepsis. High use of antibiotics means that patients are becoming resistant which makes difficult for an infection to be treated effectively in those repeat offenders. (ibid, 2017).

Prevalence of sepsis

The global epidemiological burden of sepsis is difficult to discover. More than 30 million people are predictable to be affected worldwide every year, which leads to 6 million deaths. It is reported that the problem of sepsis is more likely highest in low- and middle-income continent (WHO, 2018). Sepsis is life-threatening, common and on the increase. In 2014 alone, there were 1.7 million sepsis hospitalizations and 270,000 sepsis deaths in the U.S. Than in 2017, it was reported that even though sepsis is only present in 6% of hospitalizations, it took 15% of in-hospital deaths (infection control, 2018).

Signs and symptoms of Sepsis

According to Croce (2009), Sepsis naturally starts with the systemic inflammatory response syndrome (SIRS), the body's reaction to an insult that results in the stimulation of the immune response. This inflammatory reaction is the body's way of struggling to maintain homeostasis. As infection is one trigger for SIRS, there are also other causes which are noninfectious causes, including trauma, burns, myocardial infarction, or inflammatory routes such as pancreatitis. Consequently, the patient to have SIRS without being septic. When the patient has two or more of the following signs and symptoms is diagnosed as SIRS

- Body temperature less than 36°C or above 38°C
- Heart rate of more than 90 beats per minute
- Respiratory rate greater than 20 beats per minute (Hyperventilation)
- The partial pressure of carbon dioxide (PaCO) less than 32 mm Hg (normal 35 to 45 mm Hg)
- White blood cell counts greater than 12,000/mm or less than 4,000/mm (normal 5,000 to 10,000/mm. (ibid., 2009)

Sepsis is existing when a patient has SIRS plus a recognized infection. Infection can be due to bacteria, viruses or fungi. Severe sepsis is problematical by organ dysfunction, hypotension, or poor perfusion, and is considered the most common cause of death in non-coronary critical care units. Signs of organ dysfunction includes; Changed mental status, Critical oliguria (urine output less than 0.5 mL/kg/h), Hyperglycemia in the absence of diabetes, Hypoxemia, Coagulopathy (international normalizing ratio (INR) greater than 1.5) and stomach ileus (ibid, 2009).

Causes of sepsis

Jane & Sharon 2018 is explained Sepsis as a clinical syndrome that happens as an outcome of infection. Bacteria is explained as best common pathogens, but other organisms as viral, fungal and parasitic can also lead to sepsis. Sepsis happens when an inflammatory reaction is generated after chemicals to be released into the bloodstream to fight against infection. This change can lead to multi-organ failure and can lead to death.

Diagnosis of sepsis

International agreement descriptions occur for sepsis and these must be secondhand by all healthcare professionals. In sepsis diagnosis, a series of physiological and laboratory collections together with a clinical suspicion of a new infection as the cause of the abnormalities must be considered for preserving an awareness of sepsis. Sepsis is a continuum extending from uncomplicated sepsis to severe sepsis and leads to septic shock, where commonly multi-organ failure occurs. Sepsis is defined as a systemic inflammatory response, where two or more systemic inflammatory response syndrome are existing to an infection. Severe sepsis is diagnosed when one or more body organs start to fail as an outcome of sepsis while septic shock is diagnosed when indication for getting insufficient oxygen and nutrients to the tissues and organs of the body are presented and characterized by hypotension (low blood pressure) or other indication of decreased perfusion such as a high serum lactate, a rapid heart rate, and rapid breathing. (Wayne & Ron 2013.)

Pathophysiology of Sepsis

According to Kortgen, Hofmann & Bauer (2006), Sepsis is triggered by the invasion of microbes into the bloodstream causing in a systemic host response as a possible complication of infection of any site. Initiation of immunocompetent cells of the essential unspecific immune system by recognition of pathogen-associated molecular patterns (PAMPs) this means cell wall products, exotoxins, bacterial DNA and viral RNA by specific receptors of immunocompetent cells. Beginning of macrophages and neutrophils with the emission of pro-inflammatory cytokines impact cascade systems, for example, the coagulation and the complement system lead to dysfunction of endothelial with capillary leakage and perfusion disorders. Failure of Macro and microcirculatory with pulmonary result in tissue hypoxia. On the other hand, the hypoxia-induced necrosis apoptosis, the programmed cell death induced by cytokines and mitochondrial dysfunction or hypoxia contributes to organ dysfunction.

Management of sepsis

According to O’Leary (2014), when sepsis is suspected, timely intervention with recommended bundle components and early goal-directed therapy is essential. To address the growing incidence of sepsis, a panel of experts gathered to develop recommendations for sepsis management. Guidelines Committee for the Management of Severe Sepsis and Septic Shock was published with The Surviving Sepsis Campaign (SCC).

The guidelines include groups of interventions that should be completed within 3, 6, and 24 hours, as well as ongoing support. The initial recovery within the first three hours of diagnosis of sepsis includes measuring lactate level followed by administering 30 ml/kg of crystalloid to treat either hypotension or increased lactate and obtaining blood cultures before starting administration of an antibiotic, this is followed by ordering broad-spectrum antibiotics. Fluid resuscitation is needed to restore intravascular volume in hypotensive patients or those with abnormal lactate. (ibid, 2014.)

Administering 30 ml/kg of fluid over 10–15 minutes can provide to a patient quick increase in volume when compared to increasing maintenance fluids, which can take several hours. Healthcare Improvement Institute recommended immediately administration of broad-spectrum antibiotics after blood cultures; this is to improve sepsis outcomes by reducing mortality to sepsis patients. (ibid, 2014.)

During management, administering vasopressors, measuring central venous pressure (CVP), central venous oxygen saturation (ScvO₂) and again measuring lactate level are in continually. Vasopressors are used in management for arterial pressure more than 65 mm Hg. When determined arterial hypotension or initial lactate more than 4 mmol/l, a central venous catheter should be placed and fluid resuscitation repeated until a central venous pressure (CVP) greater than 8 mm Hg and ScvO₂ greater than 70% is maintained (ibid, 2014).

The 24-hour management bundle can be started immediately but should be completed within 24 hours. This bundle of management includes administering a low-dose corticosteroid when the addition of vasopressors does not maintain adequate blood pressure also blood glucose and for mechanically ventilated patients, inspiratory plateau pressure less than 30 cm H₂O (ibid, 2014).

Supportive therapy should be considered during management to diminish the incidence of complications, this includes maintaining adequate nutrition to the patient, prevention of deep vein thrombosis, stress and pressure ulcers prevention in addition of that, prevention of further infections should be taken in consideration also is address patient management in the management guidelines (ibid, 2014).

3. Purpose and Aims

The aim of the thesis is to describe how nurses can prevent postoperative sepsis. The purpose of the literature review is to provide relevant information to reduce the risk of sepsis and prevention of it in the postoperative unit.

Research question

How nurses can prevent sepsis in postoperative care?

4. Literature review

The literature review seeks to synthesize published research findings that relate to the topic of your interest. The literature review regularly exposes gaps in the current knowledge base. The important aspect of the literature review is to create a research question, you need to classify what you aim to investigate in the form of a question. Next is the determination of what other authors previously have discovered and written about your research question. This method is through searching for articles from different database like Pubmed, Cinahl and Evidence-based medicine guidelines (Neill, 2017).

4.1 Literature search

Data for this research was collected from the article databases of CINAHL and Pubmed. An initial search on academic databases showed plenty of publications on the issue of nursing intervention for preventing sepsis in the post-operative unit. Hence, in this study summary was provided so that readers can get an answer from different angles and sources without having to go through the literature one after another. Different combinations of relevant keywords were tested at the beginning of the data search in Cinahl database or Pubmed. The best results were obtained with the combination of the sepsis and preventing sepsis.

Picos Table	
Population	Nurses
Phenomena	Sepsis prevention
Context	Postoperative care
Types of studies	In English, peer-reviewed, literature review

Table 1: PICO

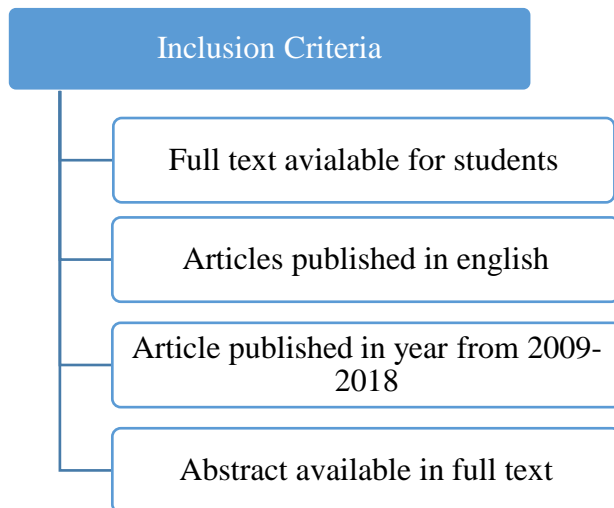


Table 2: Inclusion Criteria

The above table 1 is explaining a systematic search from the database in literature review which present information about the target population, a phenomenon of interest, the context which is mentioned in Pico table and table 2 is explaining the inclusion criteria of the search. To sustain reliability and minimize bias, a protocol was maintained before the actual search was conducted. The article, journal used for this study should fall within the criteria. The results we got limited into the 10 years periods from 2008-2018. We tried to search the latest data as much as possible which is more evidence-based nursing, published in English and full text available for JAMK students. Publications that did not meet the above inclusion criteria were automatically omitted.

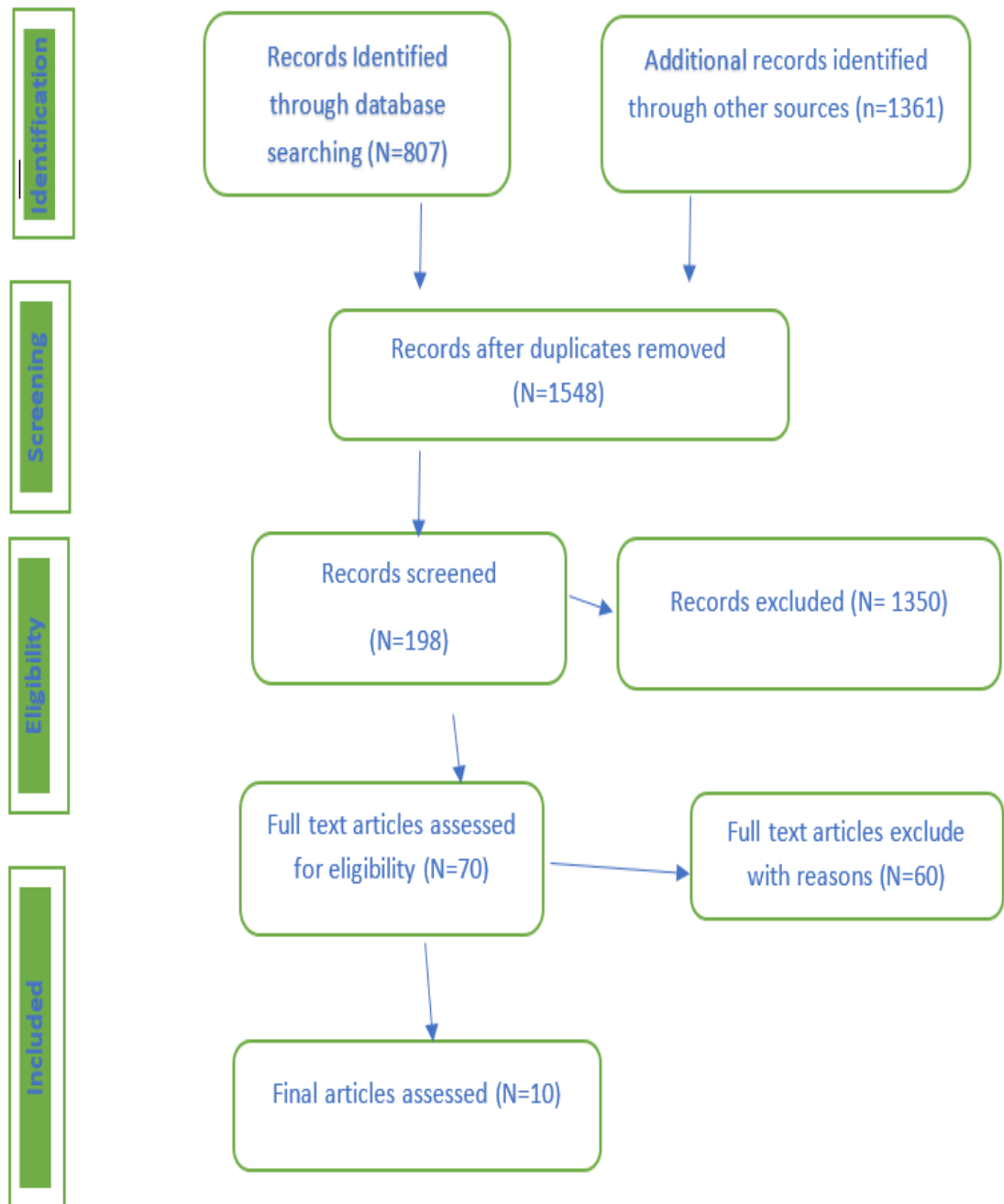


Table 3: The Screening process through applied inclusion criteria

4.2 Data extraction and analysis

To do the critical appraisal. Firstly, the authors assessed the articles separately and afterwards authors compare the results. The combine articles were evaluated and scored together. From the combined results, for ten articles where the average score was 35 among all articles, on the other hand, the minimum score was 33 and the maximum score was 40. The scored table is mentioned in the appendix. (Hawker & Payne et al, 2002.)

The content analysis of available work is a method of evaluating the content of a body of work to gather information about things. Data extraction was obtained through a content analysis of the components of the interventions described in the studies. The content of ten articles was analyzed and gathered which answers research questions and further divided into the main and subcategory. Initially, the information collected from the first assessment of the article was gathered. After that, the key themes were recognized and described. The content analysis was look closely assessed and approved by the authors. (Helleman, Goossens, kaasenbrood &Achterberg, 2014.)

Research member went through articles individually, which answer research questions later combined the articles that answer research questions. Information references were distributed then the finding was separated into groups main category and subcategory. Arrangements of themes were formed and then interpreted together by the research members.

5. Data Analysis

For the literature search, articles were read, and coding is done so that a piece of evidence is well-known as much as possible. To evaluate and analyze research questions the searched relevant literature and extracted data are important. Assessment is an organized process of investigative research paper to find its consequence, strong point, and weaknesses. At this point, the literature to be revised have been collected. After the assessment has been done, an Excel spreadsheet was filled to summarize the information on the articles, such as author, authors, year of publication, titles, the methodology of the studies, and main findings. Outcomes from each paper were reviewed to address the research question. The aim is to collect different studies and generate fresh interpretation that is more significant than reading individual papers separately. The Results and discussion part of the paper were read and coded based on the key findings. After that, the main theme was established by grouping comparable category. Papers were reexamined to make sure that the themes fit the assigned code. (Rew, 2010.)

6. Findings

The reviewed studies (N=10) were published from 2011- 2019. From the selected articles we did an evaluation. We made mind map which highlight quotes and important; Code quotes; Sort quotes into sub-category and main category, form themes and patterns and interpret patterns together by the research members. The studies were published in Turkey (n =1), British (n = 2), Uk & Ireland (n = 1), USA (n = 3), Berlin (n =1), Australia (n = 2) and America (n =1).

The data collected from the reviewed articles for the research work led to the formation of themes after studying and combining the articles. The results of the analysis are presented in Table 4. The three themes were developed based on research finding and eight sub-themes. The main themes were as follows: Tracking the patients, monitoring carefully patients and diagnosed with sepsis.

Research question	Themes	Sub-Themes
How nurses can prevent sepsis in postoperative care?	Tracking the patients	<ul style="list-style-type: none"> • Early recognition and management of Sepsis • Sever infection control in ICU
	Monitoring carefully patients' early signs of sepsis	<ul style="list-style-type: none"> • Following infection control guidelines • Nurses proving quality care • Assessment in post-operative care
	Diagnosed with sepsis	<ul style="list-style-type: none"> • Storing and preparing medication in a clean area • Patient education

Table 4. Themes for data analysis and synthesis

1. Tracking the Patients

To prevent sepsis nursing intervention were effective in post-operative care. Nurses have a vital role in the sustain patient functions, including excretion. The responsibilities include deciding risk groups, preventing of postoperative urinary retention development, early understanding of urinary retention by using appropriate nursing interventions. Nurses should measure and record patient urine amount hourly, recording of the fluids given to the patient orally or by IV and recording of the time for patients first urination. (Simsek & Karaoz, 2017.)

1.1 Early recognition and management of Sepsis

Management of the sepsis and early recognition of the sepsis is vital and should be managed according to trust`s sepsis bundle with the recovery and rapid commencement of the appropriate antibiotic. Enterocutaneous fistula identifying the source of

the sepsis is a priority and any abscesses within the abdomen should be drained percutaneously. Radiology imaging-guided drainage may not be possible if collections are unreachable. On the other hand, if it last more than 10 days after original surgery the surgeon will find entering the peritoneal cavity challenging due to fibrotic adhesions. therefore, making the surgical technically very difficult. In these cases, the minimum amount of surgery should be undertaken to enable adequate drainage of the infection, resection of any perforation and the formation of stomas. Thus, management of the sepsis and early recognition is important. (Metcalf, 2019.)

1.2 Severe infection control in ICU

According to Waele & Bus, (2014), severe infections in surgical patients may be the reason for admission in some but may also develop while in the intensive care unit. Infections need to be taken seriously to prevent mortality. In surgical intensive care unit patients either admitted with infection mostly postoperative or they develop it during their admission for another primary diagnosis. However, both specific problem in terms of timely diagnosis allows to early therapy. Postoperative symptoms like fever and limitations of organ dysfunction to the multivariate model, identify patients requiring additional source control measures.

2. Monitoring carefully patients' early signs of sepsis

Wound infections, hypotension, and fever are the most Post-operative complications which can result in sepsis. It is important to the health care providers to monitor carefully all the chances of the patient after the operation to recognize all early signs of sepsis. Healthcare providers should carefully assess the patient before surgery to determine their risk of developing complications this include, Good history taking and assessment of the surgical site. Healthcare providers also should monitor the patient for the development of postoperative complications during hospitalization and at least 30 days after discharge. (Kendrick, Ercolano & McCorkle 2011.)

2.1 Following infection control guidelines

Serious postoperative infection is a costly complication of respiratory and GI tumour resection. Adapting preventable infections following solid tumour resection and associated financial burden will require hospitals to comply with established infection switch guidelines and to identify more effective which cost fewer prophylactic

measures. Whereas, following infection guidelines control sepsis and prevent costly treatment. (Avritscher, Cooksley & Elting, 2014.)

2.2 Nurses proving quality care

Nurse as a leader, we have the responsibility to ensure we are providing the highest quality of care to our patients in health care units. Nurses as frontline care providers must have the expert knowledge and skills to identify the patient whose condition is worsening because of newly developed sepsis. Nurse as a leader, I strongly feel that effective communication is a cornerstone of patient and nursing safety. Through good communication between patient and nurse, we can recognize and gather more information which can help in the assessment of care. (Plexman 2011.)

2.3 Assessment in post-operative care

According to Jones (2017) Nurses have a major role to assess the patient before and after the operation to recognize any signs of sepsis. Measuring Vital signs or patient observations after the operation are an important part of assessing whether somebody has the potential to develop sepsis. Through Vital signs or patient observations, nurse can establish whether a patient's condition is deteriorating or improving. Measuring all the vital signs can help to identify a systemic indicator of sepsis to the patient. At the same time, the nurse should remember that only one set of observations may not indicate sepsis. As the first line of defense for patients with sepsis, nurses are a critical part of the equation. Your ability to recognize the signs and deliver timely, effective care can mean the difference between life and death. (Jones 2017.)

3. Diagnosed with sepsis

A patient was admitted at Federick Memorial hospital, seemingly mild urinary tract infection. Most of the patient were diagnosed with sepsis but they were later admitted to the intensive care unit and got treated and released. The following needs were identified to prevent the sepsis additional education for the staff and physician to handle the medication. Early recognition and treatment of sepsis. Emergency department for a sepsis protocol, triage for both emergency department patients and inpatients which include screening nurses and rapid improvement team of sepsis. (OR manager, 2014.)

3.1 Storing and preparing medication in a clean area

Due to unsafe practices in the administration of the propofol and other injectable medication post-operative infection and sepsis occur. Reuse of syringes on multiple patients and unsafe medication practices, use of single-use medication vials for multiple patients and not able to follow the aseptic technique and adhere to infection control practices leads to outbreaks of infections and bacterial growth which causes sepsis. Therefore, sterile injectable medication, safe injection practices, and safe medication administration must be followed to prevent sepsis. (King & Ogg, 2012.)

3.2 Patient education

As it is explained with Whitely & Sinclair (2017). The lack of patient education about wound care after the operation can result in wound complication with a chronic wound infection which can lead to Sepsis. As nurses we have the major role of educating patients on how to care the wound for going to operation, this will bring awareness to the patient on how to prevent the wound from being infected. Without adequate education, simple wounds can become chronic and that without adequate follow-up, outcomes can be compromised. (Whitely & Sinclair 2017.)

7. Discussion

7.1 Discussion of key results

The purpose of this literature review was to describe how nurses can prevent postoperative sepsis. The literature review is to provide relevant information to reduce the risk of sepsis and prevention of it in the postoperative unit. The literature search articles were read, and coding is done so that facts is well known as much as possible. Processed by flowing material analysis. Results showed 3 main category and 7 subcategories. Main categories: tracking the patients, monitoring carefully patients' early signs of sepsis and diagnosed and treated. Subcategories early recognition and management of sepsis, severe infections control in ICU, following infection control guidelines, nurses providing quality care, assessment in post-operative care, storing and preparing medication in a clean area and patient education. However, the current study findings showed the importance of how nurses can prevent postoperative sepsis. By comparison to the previous and latest research work as much as possible the research has been studied.

7.2 limitation of the study

The research focused on how nurses can prevent postoperative sepsis. The search terms used while searching for information in English "Sepsis Prevention" AND "Post-operative" OR "Post-Operative" AND Nurs*" First the results from the search terms we had 16,979 articles related to the search terms and then we limited it to English language than years from 2009-2019, then to full text, then to research articles and peer-reviewed and we end up with 843 articles from Cinahl search and 843 from 216 from pub med. The number of hits that we get was still too high for us to go through all the articles. Then we limit the number by limiting the years. We limit from 2011 to 2019. We first read the research question, memorize it. Then we went through titles of the research articles which answers the research question and we exclude which did not answer the research question. After we choose the articles which answer our research question, we end up with 10 articles.

The critical appraisal was done separately and afterward compare our results. From the selected articles we did an evaluation. We made mind map which highlight quotes and important; Code quotes; Sort quotes into coded groups (sub-category and main category), form themes and patterns and interpret patterns in quotes. The studies

(N=10) reviewed were published from 2011- 2019. The studies were published in Turkey, British (2), Uk & Ireland, USA (3), Berlin, Australia (2) and America.

7.3 Ethical consideration

To avoid and resolve ethical issues, as researcher, article based on health research has been chosen. Health research has relied on ethical principles to protect the rights and wellbeing of research participants. Ethics explains standards for conduct that differentiate between appropriate and unappropriated behavior which plays a vital role in the research. Health and clinical services researchers rely on ethical principles and practices to ensure that they treat research participants equally and manage research risks and benefits. (Mikesell, Bromley, Khodyakov, 2013). Ethical consideration was considered while conducting this research. The article and journal were chosen which has sufficient detailed, information and research done on a human being.

7.4 Bias

Avoiding bias is a tough task in the research process. Free of bias can be rarely possible if the designed study is done carefully but it cannot be guaranteed totally. The researcher should aware of potential bias in all phases of research. The process increases the likelihood of applying strategies that aim to reduce bias and increase legitimacy accuracy, reliability, and generalisability of evidence. (Honor, Helen & Catherine, 2014).

The scientific database paid by Jamk university of applied sciences which is free for students has been assessed which is reliable articles and research work is strictly tightened with reliable articles. The researcher assessed the paid article a journal provided by Jamk university of applied sciences and freely available PubMed database. The researchers selected articles were based on the research questions. Avoiding bias were taken most important during the research. But still, some bias could be a notice in terms of selection. The research was focused on the English language so bias based on language is considered.

7.5 Validity and reliability

The study used a literature review methodology where previous studies to the summary on how nurses can prevent postoperative sepsis. Postoperative care is the highlight in this study, which could apply to all articles. To avoid personal prejudice and support on increasing the effectiveness of classification methods by enlisting the assistance of a co-worker, two researchers were conducting the review by identifying and analyzing the topics together.

The validity and reliability of this study is founded on the evidence that the information used in this study was retrieved from well-known JAMK's online Database over its website www.jamk.fi that gives students of the academic institution to access its online researched articles, authors were able to access valid and reliable information from three databases that are, CINAHL (Ebsco), Academic search elite and Medline, respectively. On addition to that, the articles that were chosen to answer the research question were based on current information (2011 to 2019). Through article selection, authors were sure that there was clearness in the process of articles selected for the study, known as "Inclusion and Exclusion criteria", as can be seen in table.2. According to (Croucher & Cronn-Miles, 2015). Being sure about collected data to maintain the quality of reliability and to accomplish proper scientific research is one of the major ethical considerations refers to how reliable data is going to be handled.

8. Conclusion and recommendations

An appraisal of all the articles read for this study emphasizes on the idea that sepsis is life-threatening organ dysfunction and if not recognized early and managed promptly, sepsis can lead to different complication like septic shock, failure of multiple organs in the body and even can lead to death. Sepsis is among the post-operative problem related to increased morbidity, mortality and increasing in hospital costs to the patient. According to the different research done by authors, the global epidemiological burden of sepsis is difficult to discover. More than 30 million people are predictable to be affected worldwide every year, which leads to 6 million deaths.

This study has been able to answer the research question on how nurses can prevent sepsis in post-operative care as follows; wound infections, hypotension, and fever are the most Post-operative complications which can result to sepsis. It is important to the

health care providers to monitor carefully all the chances of the patient after the operation to recognize all early signs of sepsis. Healthcare providers should carefully assess the patient before surgery to determine their risk of developing complications this include, Good history taking and assessment of the surgical site. Nurses have a major role to assess the patient before and after the operation to recognize any signs of sepsis. Measuring Vital signs or patient observations after the operation are an important part of assessing whether somebody has the potential to develop sepsis. Through Vital signs or patient observations, nurse can establish whether a patient's condition is deteriorating or improving.

Likewise, nursing management should be given enough resources to acquire updated knowledge in the prevention of sepsis in post-operative patients. Continuous sepsis prevention training, follow up, evaluation and feedback would enhance nursing personnel level of sepsis prevention in post-operative care. There is a need to undertake further research to examine how nurses can prevent sepsis in post-operative care. Further research is needed to demonstrate how sepsis can be avoided in post-operative care to reduce the number of morbidity and mortality to the patients.

Reference

Avritscher, E. B. C., Cooksley, C. D., Rolston, K. V., Swint, J. M., Delclos, G. L., Franzini, L., Elting, L. S. 2014. Serious postoperative infections following resection of common solid tumors: outcomes, costs, and impact of hospital surgical volume. *Supportive Care in Cancer*, 22(2), 527–535. Assessed on 15.2.2019.

<https://doi-org.ezproxy.jamk.fi:2443/10.1007/s00520-013-2006-1>

American association of critical care nursing. Assessed on 26.11.2018. Retrieved from:

<https://slideplayer.com/slide/4450335/>

Breen, Sarah-Jane; Rees, Sharon 2018 Barriers to implementing the Sepsis Six guidelines in an acute hospital setting. Assessed on 19.11.2018. Retrieved from:

<http://search.ebscohost.com.ezproxy.jamk.fi:2048/login.aspx?direct=true&db=rzh&AN=129546572&site=ehost-live>

Consider a wider range of potential complications to improve patient safety. (2014). *OR Manager*, 30(10), 15. Retrieved from

<http://search.ebscohost.com.ezproxy.jamk.fi:2048/login.aspx?direct=true&db=rzh&AN=103902977&site=ehost-live>

De Waele, J., & De Bus, L. 2014. How to treat infections in a surgical intensive care unit. *BMC Infectious Diseases*, 14(1), 193. Assessed on 15.12.2018.

<https://doi-org.ezproxy.jamk.fi:2443/10.1186/1471-2334-14-193>

Della Croce H. 2009. Surviving sepsis: the role of the nurse. Retrieved from:

<http://search.ebscohost.com.ezproxy.jamk.fi:2048/login.aspx?direct=true&db=rzh&AN=105393989&site=ehost-live>

Daniels, R., & Nutbeam, T. Eds.. 2009. *Abc of sepsis*. Assessed on 10.12.2018. Retrieved from:

<https://ebookcentral.proquest.com>

Helleman, M., Goossens, P. J. J., Kaasenbrood, A., & Achterberg, T. 2014. Evidence Base and Components of Brief Admission as an Intervention for Patients with Borderline Personality Disorder: A Review of the Literature. *Perspectives in Psychiatric Care*, 50(1), 65–75. Assessed on 19 august 2019.

<https://doi-org.ezproxy.jamk.fi:2443/10.1111/ppc.12023>

Hawker, S., S. Payne, et al. 2002. "Appraising the Evidence: Reviewing Disparate Data Systematically." *Qualitative Health Research* 12(9): 1284-1299. Assessed on 21.08 2019

Infection Control, 2018. CINHAL. Assessed on October 31, 2018. Retrieved From:

<http://web.b.ebscohost.com/ehost/pdfviewer/pdfviewer?vid=8&sid=ca7ae90d-5bf5-4036-a36a-1a89c80f16fe%40sessionmgr103>

- Jones, J. 2017. Managing sepsis effectively with national early warning scores and screening tools. *British Journal of Community Nursing*, 22(6), 278–281. Assessed on 10.12.2018.
<https://doi-org.ezproxy.jamk.fi:2443/10.12968/bjcn.2017.22.6.278>
- Joanne, J. 2017. Managing sepsis effectively with national early warning scores and screening tools. Assessed on October 31, 2018. Retrieved From:
<http://web.a.ebscohost.com/ehost/pdfviewer/pdfviewer?vid=15&sid=bec60ac1-c8c5-4d90-9070-ff0f30e22bba%40sessionmgr4006>
- Jones, J. 2017. Managing sepsis effectively with national early warning scores and screening tools. *British Journal of Community Nursing*, 22(6), 278–281. Assessed on 15.3.2019.
<https://doi-org.ezproxy.jamk.fi:2443/10.12968/bjcn.2017.22.6.278>
- Kortgen A, Hofmann G, & Bauer M. 2006. Sepsis-current aspects of pathophysiology and implications for diagnosis and management. *European Journal of Trauma*, 32(1), 3–9. Assessed on 10.12.2018. Retrieved from:
<http://search.ebscohost.com.ezproxy.jamk.fi:2048/login.aspx?direct=true&db=rzh&AN=106269043&site=ehost-live>
- King, C. A., & Ogg, M. 2012. Safe injection practices for administration of propofol. *AORN Journal*, 95(3), 365–372. Assessed on 15.12.2018.
<https://doi-org.ezproxy.jamk.fi:2443/10.1016/j.aorm.2011.06.009>
- Kendrick M, Ercolano, E., & McCorkle, R. 2011. Interventions to Prevent Postoperative Complications in Women with Ovarian Cancer. *Clinical Journal of Oncology Nursing*, 15(2), 195–202. Assessed on 15.12.2018.
<https://doi-org.ezproxy.jamk.fi:2443/10.1188/11.CJON.195-202>
- Lynn R., October 10, 2010. The systematic review of literature: Synthesizing evidence for practice. *Journal for specialists in pediatric nursing*. Assessed on 10.12.2018.
- Malone, H., Nicholl, H., & Tracey, C. 2014. Awareness and minimization of systematic bias in research. *British Journal of Nursing*, 23(5), 279–282. Assessed on July 17, 2019. Retrieved from
<http://search.ebscohost.com.ezproxy.jamk.fi:2048/login.aspx?direct=true&db=rzh&AN=104050652&site=ehost-live>
- Mikesell, L., Bromley, E., & Khodyakov, D. 2013. Ethical Community-Engaged Research: A Literature Review. *American Journal of Public Health*, 103(12), e7–e14. Assessed July 11, 2019.
<https://doi-org.ezproxy.jamk.fi:2443/10.2105/AJPH.2012.301605>
- Metcalf, C. 2019. Considerations for the management of enterocutaneous fistula. *British Journal of Nursing*, 28(5), S24–S31. Assessed on 15.12.2018
<https://doi-org.ezproxy.jamk.fi:2443/10.12968/bjon.2019.28.5.S24>

Neill, C. 2017. Writing & Research. Writing a Literature Review. Radiation Therapist, 26(1), 89–91. Assessed on 15.12.2018. Retrieved from:

<http://search.ebscohost.com.ezproxy.jamk.fi:2048/login.aspx?direct=true&db=rzh&AN=123551121&site=ehost-live>

O’Leary, C. 2014. Evidence-Based Management of Sepsis. Clinical Journal of Oncology Nursing. Assessed on 26.11.2018. Retrieved from:

<https://doi.org/10.1188/14.CJON.280-282>

Plexman, K. 2011. Nurses Making a Difference...Giuliano KK, Lecardo M. Staul, L. Impact of protocol watch on compliance with the surviving sepsis campaign. Am J Crit Care. 2011;20(4), 313-321. American Journal of Critical Care, 20(6), 424–425. Assessed on 15.12.2018.

<https://doi-org.ezproxy.jamk.fi:2443/10.4037/ajcc2011619>

Robson, Wayne; Daniels, Ron 2013 Diagnosis and management of sepsis in adults Assessed on 20.11.2018. Retrieved from:

<http://search.ebscohost.com.ezproxy.jamk.fi:2048/login.aspx?direct=true&db=rzh&AN=104313238&site=ehost-live>

Storch Borges, E., & Machado Ferreira, S. C. 2016. Relevant actions in the control of surgical site infections in neurosurgery: an integrative review. Assessed on 15.12.2018. Retrieved from

<http://search.ebscohost.com.ezproxy.jamk.fi:2048/login.aspx?direct=true&db=rzh&AN=120757571&site=ehost-live>

Simsek, Z. Y., & Karaoz, S. 2017. Effect of Nursing Interventions on Prevention and Management of Postoperative Urinary Retention for Patients with Orthopedic Surgery under Spinal Anaesthesia. International Journal of Caring Sciences, 10(1), 522–531. Assessed on 15.12.2018. Retrieved from

<http://search.ebscohost.com.ezproxy.jamk.fi:2048/login.aspx?direct=true&db=rzh&AN=123010483&site=ehost-live>

Whiteley, I., & Sinclair, G. 2017. Wound care case study: management of a thigh abscess. Journal of Stomal Therapy Australia, 37(2), 12–14. Assessed on 15.3.2019 Retrieved from:

<http://search.ebscohost.com.ezproxy.jamk.fi:2048/login.aspx?direct=true&db=rzh&AN=123816702&site=ehost-live>

WHO, World health organization. Assessed on 10.12.2018. Retrieved From:

<https://www.who.int/news-room/fact-sheets/detail/sepsis>

WHO, 2018. Sepsis. Assessed on October 31, 2018. Retrieved From:

<http://www.who.int/news-room/fact-sheets/detail/sepsis>

.

Appendix

Scored and comments of the selected articles

Quality of the articles	
Author	1 abstract /title
Simsek, Zuleyha Yaban; Karaoz, Sureyya	4
Avritscher, Elenir B C; Cooksley, Catherine D	4
Kendrick, Margaret; Ercolano, Elizabeth; McCorkle, Ruth	4
Whiteley, Ian	5
Ashley S keith;Brenda Niu; Amy Valent;Methodius Tuuli;Aaron Caughey	5
De Waele, Jan; De Bus, Liesbet	4
OR MANAGER	4
King, Cecil A; Ogg, Mary	5
Christine Metcalf	5
Tazbir, Janice	4
Logan S, Quinn D, Brault D, Vandal V, Paré B, Clarke S.	4
Drahmak, D. M	4
The World of Critical Care Nursing	5

2 Introduction and aims	3 methods and data	4 sampling	5 Data analysis	6 Ethics and bias	7 Results
4	5	3	5	4	5
4	4	5	4	4	4
3	4	4	4	3	3
5	4	4	3	4	4
4	3	5	4	5	4
3	5	4	3	5	4
5	5	4	5	5	4
4	3	3	4	4	4
4	5	4	4	4	4
4	4	5	4	4	4
5	5	5	5	4	4
4	4	4	4	5	4
5	4	4	5	5	4

Continue next page

8 Transferability or generalizability	Implications and usefulness	total
4	5	39
5	4	38
4	4	33
5	3	37
4	4	38
5	5	38
4	4	40
4	4	35
4	5	39
4	4	37
4	4	40
4	5	38
4	4	40

Comments	
Very good	
This article provided useful data to prevent maternal mortality.	
This article explain developing countries maternal mortality situations.	
This core concept provided by this article is clear and easy to understand.	
The article provides a clear concept to prevent sepsis.	
The article really good evidence to prevent sepsis in SICU.	
The title of the article is straight and has clear evidence based guidelines.	
The journal provides useful safety methods to prevent sepsis.	
The journal focused on wound care to prevent sepsis.	
Good and useful	
Good and useful	
Good and useful	
Good and useful	