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Supporting the Mother's Recovery after Cesarean Section

A Narrative Literature Review

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Thesis abstract

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A cesarean section is the surgical delivery of one or more babies through an incision in the abdomen. Between 1990 and 2021, the worldwide rate of delivery by cesarean section increased from 7% to 21% of all births. Although Finland has the lowest cesarean section rate in the European Union at 16.5% in 2017, several factors have contributed to a steady rate increase. Cesarean sections are life-saving procedures, but they come with unique risks. This thesis focused on addressing complications that the mother can experience during recovery from a cesarean section. These included postpartum pain, surgical wound issues, challenges with breastfeeding, gastrointestinal complications, thrombosis, post-traumatic stress disorder, and postpartum depression. The goal of this thesis was to improve care and recovery for the mother during the postpartum period following a cesarean section. The purpose of this thesis was to provide information about the best methods for supporting the mother's recovery after cesarean section. The research question that the thesis addressed was: How can the mother be supported through the potential challenges encountered after a cesarean section? Narrative literature review was the chosen research method. A total of 50 articles were selected and analyzed using inductive content analysis.

The data analysis resulted in the formulation of eleven themes, each consisting of different methods to support the mother following a cesarean section. The themes are as follows: skin-to-skin contact care; physical activity; early reintroduction of a normal diet; pharmacological intervention; wound care; patient education; mental health support; assessment and monitoring; social support network; acupressure; and natural remedies and tools at home. These results demonstrate a multitude of ways that a post-cesarean mother's recovery can be supported during the postpartum period. Nurses and midwives are the primary advocates for their patients and their patient's care. Nurses, midwives, and other healthcare professionals who work with post-cesarean mothers are encouraged to apply the findings of this review in order to offer the best support to the mother during the postpartum period. Additional evidence-based research is recommended to further validate some of the interventions found in this review.

¹ Keywords: Cesarean Section, Maternal, Postpartum, Recovery, Support

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Terms and Abbreviations

ABUHB	Aneurin Bevan University Health Board
BMI	Body mass index
CBT	Cognitive behavioral therapy
CDMR	Cesarean delivery on maternal request
DACC	Dialkylcarbamoyl chloride
DVT	Deep veinous thrombosis
EPDS	Edinburgh Postnatal Depression Scale
INR	International Normal Ratio
IPC	Intermittent pneumatic compression
LMWH	Low-molecular-weight heparin
NPWT	Negative pressure wound therapy
PPD	Postpartum depression
PTSD	Post-traumatic stress disorder
SOC	Sense of coherence
SOD	Superoxide dismutase
SSI	Surgical site infection
TAS	Total antioxidant status
VTE	Venous thromboembolism
WHO	World Health Organization

1 INTRODUCTION

The delivery of one or more fetuses through an open abdominal incision is known as a cesarean section (Sung & Mahdy, 2022, p. 2). As of 2021, one in five deliveries is done via cesarean section worldwide (WHO, 2021). In Finland, cesarean sections are performed at a rate of 16,5%, with rates continuing to rise annually (Eurostat, 2019). The high percentage of cesarean deliveries makes it imperative that information is available for healthcare professionals and mothers about ways to manage the unique challenges which can arise following a cesarean section. According to Goodman (2014), midwives and nurses are considered the main advocates for their patient's education and care. Jones et al. (2011, p. 25) also note that patient education has been found to increase patient's psychological wellbeing, improve their overall wellness, and improve their recovery. Due to these factors, it is important that clear information is provided to healthcare professionals, so that patients can be provided with high-quality education and care.

Cesarean sections, although sometimes unavoidable, can potentially put the mother at increased risk for different complications during the postpartum period (World Health Organization, 2021). The main complications that this thesis will be addressing are postpartum pain, surgical wound issues, challenges with breastfeeding, gastrointestinal complications, thrombosis, post-traumatic stress disorder, and postpartum depression. From these main complications, various methods will be discussed in this thesis on how to best support the mother through the recovery period after a cesarean section.

The goal of this thesis is to improve the care and recovery for the mother during the postpartum period after cesarean section. The purpose of this thesis is to provide information through a narrative literature review about the best methods for supporting the mother's recovery. The results of our thesis will be a resource for nurses, midwives, and other healthcare professionals that work with mothers who have had a cesarean section.

2 CESAREAN SECTIONS

2.1 Definition and indications of a cesarean section

A cesarean section, also sometimes called a c-section or cesarean delivery, is defined as a surgical procedure requiring incisions through the walls of the abdomen and uterus for delivery of offspring (Merriam-Webster, n.d.). A cesarean section may be indicated for various reasons and may be necessary for the delivery of one or more infants. The World Health Organization (2021) explains that the need for a cesarean section is sometimes unavoidable due to the presentation of the fetus being abnormal, fetal distress, or prolonged/obstructed labor.

The indications for cesarean section can be divided into two categories: absolute and relative (Mylonas & Friese, 2015). According to Médecins Sans Frontières (2019), an absolute indication directly threatens the life of either the mother or child, leaving a cesarean section as the only option. A relative indication is decided based on a risk assessment, where the risks versus benefits of a cesarean section are explained to the mother and she makes the final decision. As stated by Mylonas and Friese (2015), the absolute indications for cesarean section are the following: absolute disproportion, chorioamnionitis (amniotic infection syndrome), maternal pelvic deformity, eclampsia, HELLP syndrome, fetal asphyxia/fetal acidosis, umbilical cord prolapse, placenta previa, abnormal fetal position, and uterine rupture.

Planned elective cesarean section otherwise known as cesarean delivery on maternal request (CDMR) has been stated by Mylonas & Friese (2015), as “an elective cesarean in the absence of any medical or obstetric contraindication for attempting vaginal delivery”. Deng et al. (2021, p.2) defined CDMR as cesarean delivery request with social factors and cesarean delivery without medical indications. CDMR has been acknowledged by researchers as a contributing factor to the increase in incidence of cesarean sections (Deng et al., 2021, p.2). Some of the reasons that have been attributed to the increase in women choosing CDMR include the convenience of delivery scheduling, worries of possibility of urinary incontinence, and change in sexual feelings after vaginal delivery (Guo et al., 2021, p.1). Other factors contributing to the rise in CDMR, especially among

women in western countries, include fear of complications for the child, previous traumatic births, depression, abuse, other psychosomatic/psychiatric reasons, and tocophobia, which is described as a strong fear of spontaneous childbirth (Mylonas & Friese, 2015).

2.2 Prevalence of cesarean sections around the world and in Finland

According to the World Health Organization (2021), the rates of cesarean sections worldwide have increased from 7% in 1990 to 21% as of 2021. This means that 1 in 5 deliveries is done via cesarean section. Cesarean sections have even become more common than vaginal deliveries in the Dominican Republic, Cyprus, Egypt, Turkey, and Brazil. Four out of ten births (43%) are by cesarean section in Latin America and the Caribbean. Countries which are least developed, such as countries in Sub-Saharan Africa, have the lowest rates of cesarean sections at 5%. Betran et al. (2021, p. 1) predicts that in the next decade the rate of worldwide cesarean sections will increase from 21% to 28.5%.

In 2017, Finland had the lowest rate for cesarean sections across the European Union, with a rate of 16.5% (Eurostat, 2019). Despite this, Finland is still seeing a steady rise in the rate of cesarean sections (YLE, 2018). YLE went on to explain that the rise in cesarean sections is thought to be partly due to the increase of mothers over the age of 35, as well as an increase in overweight mothers. The rate of mothers over the age of 35 rose to 22,5% in 2017.

2.3 Postpartum challenges for the mother after cesarean section

Cesarean sections are essential for the safety and wellbeing of the mother and baby in certain circumstances; however, it is important to note that as with all surgeries, cesarean sections also have risks (WHO, 2021). According to the World Health Organization (2021), cesarean sections can lead to a slower postpartum recovery period, possible complications during future pregnancies, increased risk for infection, and can postpone breastfeeding and skin-to-skin contact. A study in Australia (Kealy et al., 2010, p. 8) interviewed women about their personal experiences following one or more cesarean section procedures. The study revealed various challenges that were encountered during recovery including pain and reduced mobility, abdominal wound issues, vaginal bleeding,

and urinary incontinence. Another study (Benton et al., 2019, p. 20) showed that having an emergency cesarean section led to an increased risk of developing either postpartum depression (PPD) or post-traumatic stress disorder (PTSD). Each of these challenges deserve to be addressed, however, due to limited time and resources, this thesis will focus on the issues of pain, wound complications, breastfeeding challenges, gastrointestinal problems, thrombosis, post-traumatic stress disorder, and postpartum depression.

2.3.1 Postpartum pain

Nearly all women have some discomfort and pain during the first few days after cesarean section, and some women have pain that can last several weeks (National Health Service, 2019). A study at the Oslo University Hospital, Ullevål (Bjørnstad & Ræder, 2020, p. 2-4), surveyed pain during the first 24 hours following cesarean section and found that the hospital's standard multimodal pain prophylaxis was inadequate in over half of the patients (68%). The findings of this study aren't widely generalizable due to the small study sample and varying pain relief protocols between hospitals and nations. However, they do draw attention to the need for improved pain prophylaxis and more personalized pain management, even in a westernized medical environment. A study conducted in Helsinki, Finland, found that 23% of mothers had persistent pain one year after giving birth by cesarean section compared to 8% of mothers who had given birth vaginally (Kainu et al., 2016, p. 1537-1538). Another finding of the same study was a correlation between pain on the first day postpartum and pain after one year, regardless of the method of delivery. It was also shown that moderate to severe persistent pain at one year postpartum is more likely to be experienced by women who have undergone a cesarean section (7%) than a vaginal delivery (4%), although most women in both groups who experienced pain at one year postpartum described it as mild. Kealy et al. (2010, p. 5-9) found that women felt unprepared for the discomfort they experienced following their cesarean section. Both short and longer-term pain which lasted beyond four to six weeks and interfered with activities in daily life were described. There was a lack of clear and consistent instruction from healthcare professionals about what pain medications are safe for use while breastfeeding, which led women to take sub-therapeutic doses or opt out of taking medication entirely to prevent harm to their infant(s) (Kealy et al., 2010, p. 5). These are

concerning findings and indicate a need for more comprehensive patient education and consistency across information given by healthcare providers.

2.3.2 Wound issues

Various wound issues such as infections, altered sensation, and bad scarring, have been reported following cesarean sections (Kealy et al., 2010, p. 6). According to Pallasmaa et al. (2010, p. 899), wound infections occur in 3.2% of women after a cesarean section in Finland. Among other problems ranging from mild to severe, infections can result in disfiguration of the scar which women described as unexpected and unsightly (Kealy et al., 2010, p. 7). Pallasmaa et al. (2010, p. 899) only collected data within the timeframe of the hospital stay, whereas Opøien et al. (2007, p. 1097) studied the number of surgical site infections (SSIs) on day of discharge (1.8%) as well as within an observation period of 30 days postpartum (8.9%). The increase of infections during the period following hospital discharge highlights the need for high quality wound care education for patients. In the study of persistent pain by Kainu et al. (2016, p. 1538), it was noted that women who experienced persistent pain after cesarean section indicated that the pain, aching, or tenderness was located at the site of the surgical scar. In addition, most women in the study who had undergone a cesarean section, regardless of whether they experienced persistent pain or not, reported numbness around the incision/scar site. These findings are consistent with the described experiences of women in Australia (Kealy et al., 2010, p. 6) who had numbness, itchiness, or heightened sensitivity at the incision site.

2.3.3 Breastfeeding challenges

Breastfeeding is known as the most optimal infant feeding method for both maternal health and the healthy growth and development of babies. Understanding and enabling breastfeeding is a public health priority because of the importance of human milk and lactation for health, family satisfaction, and economics (Renfrew et al., 2012, p. 3). According to the World Health Organization (2013), babies should be exclusively breastfed in the first six months of life. However, some problems that develop in the early postpartum period after cesarean section affect breastfeeding (Tully & Ball, 2014, p. 2). A good knowledge of the factors that contribute to breastfeeding outcomes after cesarean section

is needed to improve the support given to mothers during recovery. Tully & Ball (2014, p. 2) further explained that breastfeeding difficulties after cesarean section when compared to vaginal delivery occur for many reasons including: later maternal-infant first contact, maternal postpartum emotional distress, lower infant neurobehavior scores, infant latching difficulty, later breastfeeding initiation, less maternal oxytocin and prolactin in response to suckling, maternal incision pain, maternal tiredness, less volume of milk, delayed onset of lactogenesis II, lack of labor hormones, influence of surgical anesthesia, and postpartum medications.

2.3.4 Gastrointestinal complications

Gastrointestinal complications are one of the main complications in patients following cesarean section (Adeli et al., 2013, p. 2). Ileus, flatulence, nausea, and vomiting are some of the most commonly occurring gastrointestinal issues following cesarean section which can possibly lead to mother's discontent and prolonged hospitalization (op. cit., 2013). Ileus, according to Adeli et al. (2013, p. 2), occurs because of peristalsis decrease, manipulation of the intestine and immobility, these lead to intestinal gas retention, abdominal distension, nausea, and abdominal pain. Several studies have also suggested that post-operative feeding time can be one of the factors that can affect gastrointestinal complications.

2.3.5 Thrombosis

A study in Sweden (Larsson et al., 2021, p. 3-7) showed that the risk for thrombosis and other cardiovascular problems in patients following a cesarean section was higher than in patients who had a vaginal delivery. This study also showed that the risk for cardiovascular complications was higher for patients who had an emergency cesarean section than for those who had an elective cesarean section. Blondon et al. (2016, p. 572- 596) found that the risk for venous thromboembolism was four times higher for patients who had a cesarean section than for those who had a vaginal delivery. Larsson et al. (2021, p. 3-7) noted that the women who showed a greater risk for having cardiovascular complications following cesarean section were those who had a high BMI, preeclampsia, greater maternal age, and those who used tobacco products.

2.3.6 Post-traumatic stress disorder

In general, around 1 to 7% of women develop post-traumatic stress disorder (PTSD) following childbirth (Lopez et al., 2017, p. 1). PTSD is defined as an anxiety disorder which can occur after different kinds of traumatizing events (op. cit., p. 1). According to a study done by Boorman et al. (2013, p. 258), there was a strong association between having an emergency cesarean section and having a traumatic birth, which has been shown to lead to PTSD. Around 1 to 6% of traumatic births lead to the development of PTSD four to six weeks following delivery.

2.3.7 Postpartum depression

Postpartum depression (PPD) is a major depressive disorder that can occur within four weeks postpartum (Moameri et al., 2019, p. 471). Moameri et al. (2019, p. 471) did a systematic review analyzing the association between PPD and cesarean section. The results showed that there is an association between the two. More specifically, the results showed that the complications that can occur from cesarean section are significant risk factors for PPD. Xu et al. (2017, p. 120-126) noted that more studies are needed to examine the link between the specific types of cesarean section and the risk for PPD.

3 PATIENT EDUCATION AND GUIDANCE

The goal of patient education is to improve the patient's recovery by helping them understand their illnesses/conditions, what preventative measures or healthy lifestyle changes they can adopt, and how to follow their prescribed care routine (Fereidouni et al., 2019, p. e6). Many studies have documented the benefits of high-quality patient education from nursing staff members (Jones et al., 2011, p. 25). Jones et al. (2011, p. 25) went on to explain that some of the benefits of patient education are the improvement of the patient's psychological well-being, their overall wellness, and an increase in the number of patients that follow the prescribed care routines during recovery. Rice et al. (2018, p. 370-374) ran a study which found that nurse-led patient education reduced the amount of hospital admissions and readmissions for patients with heart failure.

A study in Finland (Gröndahl et al., 2019, p. 7) showed that by improving patient education, there is an improvement in the quality of nursing care. This study also showed that, in Finland, there is a need for better communication between the patient's family members and a need for the patient's management strategies to be considered when providing patient education. Fereidouni et al. (2019, p.e6) found that there were several key issues in nurse-led patient education. These issues include a need for more nurses, the need for better continuing education courses for nurses provided by hospitals and care facilities, and the need for standardized patient education.

4 GOAL AND PURPOSE OF THE THESIS

The goal of the thesis is to improve care and recovery for the mother during the postpartum period after cesarean section. The purpose of the thesis is to provide information through a literature review about the best methods for supporting the mother's recovery after cesarean section.

Research question: How can the mother be supported through the potential challenges encountered after a cesarean section?

5 METHODOLOGY

5.1 Literature Review

The chosen methodology for this thesis was narrative literature review. This method focused on gathering literature related to a specific topic and analyzing and synthesizing its contents to provide a comprehensive report of current knowledge on that topic (Cronin et al., 2008, p. 38). Because the aim of this thesis was to identify, compile, and report information already present in scientific literature, narrative literature review was deemed the most appropriate methodology. The key steps in the literature review process included: selecting the topic; searching for literature; gathering, reading, and analyzing the literature; and writing the review (op. cit., p. 39-43).

5.2 Data Collection

The data collection process for this thesis consisted of multiple stages. The first stage was to conduct the initial searches within different databases. The databases used were CINAHL, PubMed, Sage Journals, and SeAMK Finna. Key words used for the searches include: cesarean section, postpartum, recovery, nursing, care, pain, pain management, wound, wound infection, wound care, breastfeeding, gastrointestinal tract, thrombosis, deep venous thrombosis, post-traumatic stress disorder, and postpartum depression. Boolean phrases and equivalent terms were used. The searches were limited to peer reviewed results written in the English language which were published in the last ten years (2012-2022) and available in full text. There was a combined total of 3,969 results from the initial searches. Following the initial database searches, the next stage consisted of eliminating duplicates and narrowing down the results by reading the article titles and abstracts. Articles were selected based on the inclusion criteria specified in Table 1. The final stage of data collection overlapped with the first step of the data analysis. Each article was read through and thoroughly examined to determine whether it answered our research question. At the end of the data collection process, there were 50 results which were relevant to our research question.

The data searching and collection was conducted by all three authors during March and April of 2022.

Table 1. Inclusion criteria for data collection.

Inclusion criteria
Peer reviewed
Available in the English language
Published within the last 10 years (2012-2022)
Available in full text
Research report or evidence-based guide which presents research results and/or recommendations
Discusses post-operative and/or postpartum care for cesarean section
Discusses method(s) of support which are within the scope of nursing and/or midwifery practice and/or which can be implemented independently by the patient
Answers the research question

5.3 Analysis

The data collected for this thesis was analyzed using the inductive content analysis method. This method of analysis consists of the following basic steps: data reduction, data grouping, and the organization of data into concepts or themes which answer the research question (Kyngäs et al., 2020, p. 14). Kyngäs et al. (2020, p. 14) go on to explain that the aim of inductive content analysis is to produce abstracts of the raw data, which consisted of the selected literature for this thesis, that sum up the main concepts and point towards potential theoretical relationships.

According to Kyngäs et al. (2020, p. 14), a researcher should be thoroughly acquainted with the research data before beginning the analysis process. The data collected for this thesis was read through several times by the authors to gain a clear and accurate

understanding of its contents and meaning. Once familiarized with the articles in their entirety, the next step was to identify points within the articles that answered the research question (op. cit., p. 15). These points were then coded (Table 2) and grouped into themes (Figure 1). The themes drawn from the data informed the content and organization of the results.

Table 2. Example of the coding process for sentences which address the research question taken directly from the article text.

Article citation	Sentence quoted from article text	Summary of sentence	Data code(s)
Ogunkua & Duryea, 2021	Skin-to-skin contact is encouraged immediately after delivery to promote breastfeeding initiation within the first hour of life.	Immediate skin-to-skin contact for early initiation of breastfeeding.	Skin-to-skin contact for breastfeeding initiation
Zheng et al., 2022	By comparing the two groups of parturients with postpartum depression status, lactation status, breastfeeding status, uterine involution, duration of lochia, and VAS pain score, it was found that skin contact care (SCC) would significantly relieve postpartum depression in uterine parturient women, promote breast lactation, increase breastfeeding rate, facilitate uterine involution, relieve chronic uterine inflammation and postpartum pain, and has clinical application and promotion value.	SCC significantly relieves postpartum depression, promotes breast lactation, increases breastfeeding rate, facilitates uterine involution, relieves chronic uterine inflammation, and reduces postpartum pain. SCC has clinical application and promotion value.	SCC relieves PPD SCC promotes breast lactation SCC increases breastfeeding rate SCC facilitates uterine involution SCC relieves chronic uterine inflammation (regarding duration of lochia) SCC reduces postpartum pain
Beake et al., 2017	Interventions identified included immediate or early skin-to-skin contact	Immediate or early skin to skin contact	Skin to skin contact ASAP

Antonakou & Papoutsis, 2021	Health professionals need to ensure undisturbed immediate or early skin-to-skin contact for mothers and their newborns after a cesarean birth.	Ensuring immediate and undisturbed skin to skin contact	Early skin to skin contact
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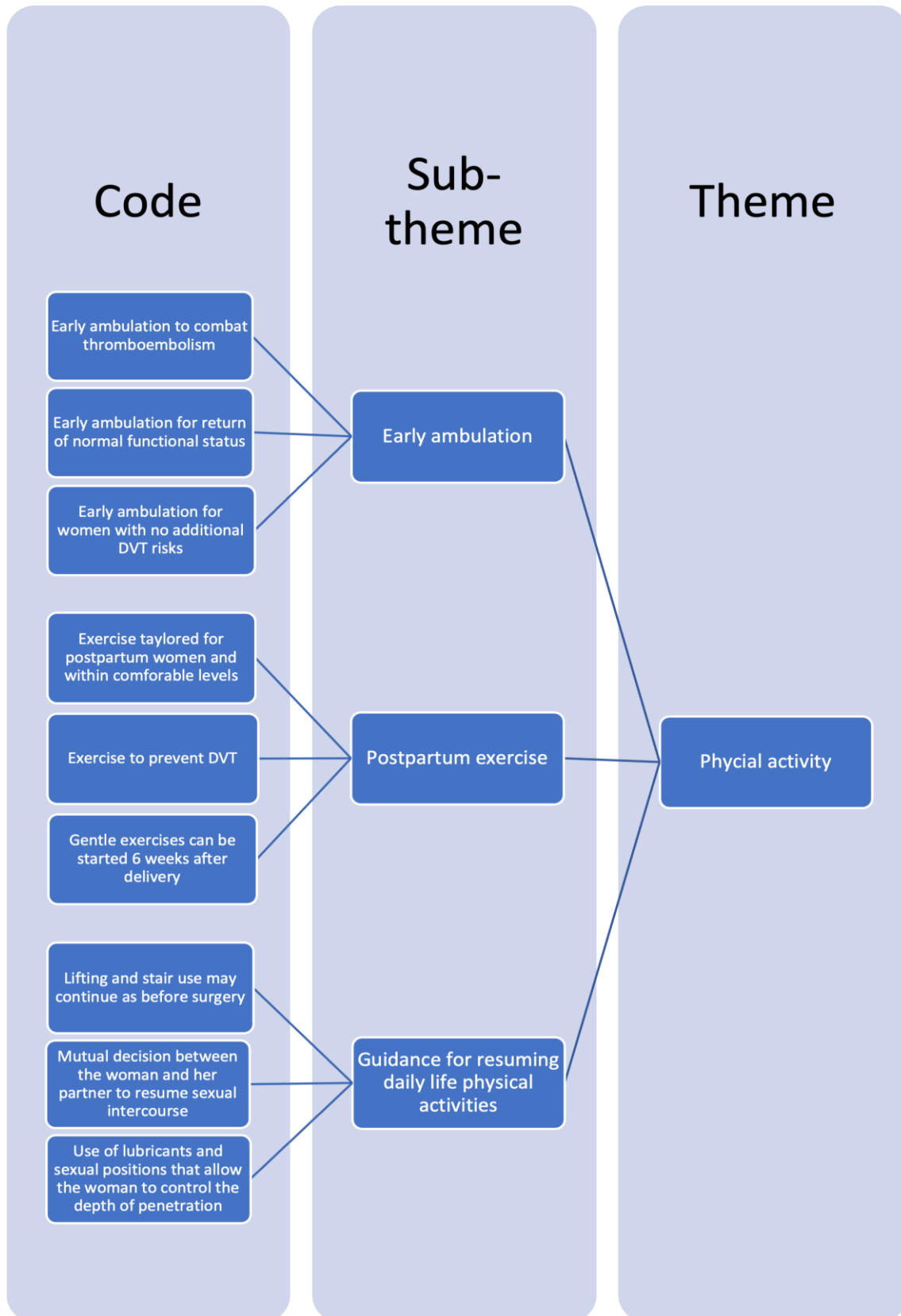


Figure 1. Example of grouping the codes into sub-themes and grouping the sub-themes into themes.

5.4 Ethicality and reliability

Because the research methodology of this thesis was a literature review, the study data was made up of publicly accessible literature, and the typical ethical challenges that primary researchers must navigate were not encountered (Suri, 2020). Despite this, literature reviews have their own characteristics which require special consideration. In literature review, there is a risk for bias which arises when the reviewer only selects literature which supports their personal standpoint (Coughlan & Cronin, 2021, p. 12). Because of this, the methods used to select the literature should be clearly outlined. It is also crucial that the selected literature is relevant to the topic, that all key pieces of literature are included, and that the final report adequately represents the whole dataset of literature (Coughlan & Cronin, 2021, p. 12). These considerations guided the data collection and analysis processes, as well as the writing of the overall thesis. Additionally, the authors referenced and followed the guidelines in the “Ethical Recommendations for Thesis Writing at Universities of Applied Sciences” resource developed by The Rector’s of Finnish Universities (2019) throughout the thesis writing process to ensure ethical and responsible conduct.

The thesis was written in accordance with the official Seinäjoki University of Applied Sciences instructions for written work, which provided a reliable structure and method of citation for the text. During the writing process, the authors participated in thesis workshops and seminars and were given feedback from the thesis supervisors. These ensured that the research and writing methods received proper guidance.

None of the authors have any type of conflict of interest surrounding this thesis.

6 RESULTS OF THE LITERATURE REVIEW

6.1 Skin-to-skin contact care

According to Ogunkua & Duryea (2021), for enhanced recovery after cesarean section to be successful, early initiation of breastfeeding needs to be supported. They went on to say that one of the ways that these can be achieved is by initiating immediate skin to skin contact. This finding is further supported by a study done by Zheng et. al. (2022) where post-cesarean mothers were subjected to skin-to-skin contact to evaluate its effect on lactation, depression and improvement of physical health. They found out that skin-to-skin contact can significantly relieve postpartum depression, promote breast lactation, increase breastfeeding rate, and facilitate uterine involution. They also found out that skin-to-skin contact was able to relieve chronic uterine inflammation and postpartum pain. Beake et al (2017, p. 6-11) reviewed several studies done to assess the feasibility of immediate or early skin-to-skin contact following cesarean section and its effect on breastfeeding. They found that skin-to-skin contact resulted in improved breastfeeding outcomes, and that a calmer and more relaxed approach to breastfeeding enabled the baby to latch well. Antonakou & Papoutsis (2021, p. 150-344) found in their review that early initiation and longer duration of skin-to-skin contact after cesarean section has a positive effect on breastfeeding. They further stated that skin-to-skin contact immediately after birth allows for transmission of initial bacterial from mother to newborn. Due to the boost in the oxytocin secretion stimulated by skin-to-skin contact, the risks of postpartum hemorrhage, anxiety, maternal stress, pain and depressive symptoms were reduced (Antonakou & Papoutsis 2021, p. 150-344). Cirpanli & Hicyilmaz (2022, p. 69-77) proposed that skin-to-skin contact should be initiated immediately after birth in the operating room rather than in the recovery room, that breastfeeding should be started one hour after birth, and that skin-to-skin contact should be continued until the end of the first breastfeeding session. A meta-analysis done by Karimi et. al. (2019, p.1-9) found that mother-infant skin-to-skin contact has a positive effect on the duration of first breastfeeding and its success rate. Antonakou & Papoutsis (2021, p. 150-344) further recommends that mothers should be given undisturbed bonding time with their newborn by limiting the separation time between the mother and their newborn. They went on to suggest ways in which this can be achieved, including postponing the newborn bath till after 24 hours, performing clinical examinations

on the newborn while on their mother's arm, and by limiting unnecessary transfer of the mother while breastfeeding.

6.2 Physical activity

The data presented three methods of maternal support under the theme of physical activity. These included early ambulation, postpartum exercise, and guidance for resuming daily life physical activities, which are each described in more detail below.

6.2.1 Early ambulation

Ambulation is one of the initial steps for the patient's return to their normal pre-procedure functional status (Ogunkua & Duryea, 2021, p. 18), therefore, starting a manageable level of ambulation as early as possible can help the mother start to feel more like herself. Early ambulation following the resolution of anesthetic effects on the mother's body is also understood to decrease the risk of thromboembolic events (Ogunkua & Duryea, 2021, p. 18). For women with no additional risk factors for deep venous thrombosis (DVT) beyond the postpartum state and the surgical delivery, early ambulation is a recommended method of thromboprophylaxis (Quinlan & Murphy, 2015, p. 180; Bates et al., 2012, p. e692S).

6.2.2 Postpartum exercise

Along with early mobilization, mothers should be encouraged to start doing light exercises following a cesarean section to help prevent deep vein thrombosis (Chatterjee, 2013, p. 296). Walking as a form of exercise is considered especially beneficial. Chatterjee (2013, p.296) recommends that mothers should be encouraged to increase how far they're walking gradually. Other gentle exercises, such as yoga, pilates, and swimming, should be started roughly six weeks following delivery. Quinlan and Murphy (2021, p. 179) offer the guidance that post-cesarean section mothers may resume their pre-surgery exercise routines as soon as they feel comfortable doing so. It is, however, recommended that the exercise routines be tailored for postpartum women.

6.2.3 Guidance for resuming daily life physical activities

Patients should receive consistent counseling throughout their care regarding their post-procedure return to activity (Quinlan & Murphy, 2015, p. 179). Quinlan and Murphy (2021, p. 179) state that women may typically resume their pre-procedure lifting, stair use, and driving habits as soon as they feel physically comfortable with each task. Regarding sexual intercourse, it's important that women and their partners make the decision to resume sexual activity mutually (Quinlan & Murphy, 2015, p. 179). Additionally, the use of vaginal lubricants and sexual positions that allow the woman to control the depth of vaginal penetration are recommended.

6.3 Early reintroduction of a normal diet

Quinlan and Murphy (2015, p. 179) state that although it has been common practice to withhold oral fluids and food for a period of time following abdominal operations, this policy has been shown to offer no benefit over early reintroduction of oral fluids and food after an uncomplicated cesarean section. Ogunkua and Duye (2021, p. 18) recommend that ice chips and water should be given to the patient within one hour of arrival in the post-anesthesia care unit (PACU), and that resumption of the patient's regular diet should occur within four hours of the operation in the absence of contraindications.

6.4 Pharmacological intervention

Pharmacological intervention was a strong theme throughout the data, representing first-line care for a few of the most prevalent post-cesarean challenges. Antibiotic care, pharmacological pain management, and anticoagulant therapy are the three support methods identified under this theme.

6.4.1 Antibiotic care

One dose of prophylactic antibiotics is recommended for all women undergoing cesarean section (Quinlan & Murphy, 2015, p. 180). In cases of endomyometritis (a clinical diagnosis characterized by uterine tenderness, fever, and leukocytosis), a combination of

broad-spectrum antibiotics or a third-generation cephalosporin alone is administered intravenously as primary treatment (Quinlan & Murphy, 2015, p. 180). Initial treatment for post-cesarean wound infections and urinary tract infections is also broad-spectrum antibiotics, followed by targeted antibiotic therapy based on wound and urine culture sensitivity results (Taylor et al., 2020, p. 51; Quinlan & Murphy, 2015, p. 180).

6.4.2 Pharmacological pain management

Post-cesarean patients should receive an adequate analgesic regimen beginning early in postoperative care (Quinlan & Murphy, 2015, p. 179). This is especially important due to the patient's unique circumstances as a new mother, whereby the ability to resume physical activity and breastfeed without discomfort are impacted by their level of pain (Antonakou & Papoutsis, 2021; Quinlan & Murphy, 2015, p. 179). Initial pain control is often obtained through narcotics that were given preoperatively by intrathecal administration or by patient-controlled anesthesia pumps (Quinlan & Murphy, 2015, p. 179). Ideally, a multimodal pain medication regimen has been started in the operating room and continues postoperatively (Ogunkua & Duye, 2021, p. 18). If this isn't the case, one should be initiated upon arrival in the PACU. A medication regimen which emphasizes the use of paracetamol, also called acetaminophen, and non-steroidal anti-inflammatory drugs (NSAIDs) is preferred (Ogunkua & Duye, 2021, p. 18). As soon as the patient is able to eat and drink, their pain medications should transition to being administered orally (Quinlan & Murphy, 2015, p. 179). Quinlan and Murphy (2015, p. 179) explain how using a schedule for the administration of oral pain medications can effectively manage additional pain, which is likely to occur with things such as movement.

6.4.3 Anticoagulant therapy

Quinlan and Murphy (2015, p. 180), Nicolaidis et al. (2013, p. 137-138), and Bates et al. (2012, p. e692S-e593S) state that women who have at least one additional risk factor for DVT beyond the postpartum and postoperative conditions should be prophylactically treated with low-molecular-weight heparin (LMWH) or mechanical prophylaxis while in the hospital. They further recommend that both pharmacological and mechanical prophylaxis methods be started for women who have multiple risk factors. For patients who were

receiving pharmacologic DVT prophylaxis prior to their cesarean delivery, the medication may be safely resumed 6 to 12 hours following the surgery (Quinlan & Murphy, 2015, p. 180-181). Nicolaidis et al. (2013, p. 137-139) recommends that for women who do not want to continue self-injections of LMWH, the conversion to warfarin should be held until five to seven days following delivery. This is due to the risk of postpartum hemorrhage and perineal hematoma. This study goes on to say that LMWH should be stopped once the international normal ratio (INR) has been between the target range of 2.0 to 3.0 for at least two days consecutively. However, for high-risk patients with a history of venous thromboembolism (VTE) or thrombophilia, this study states that anticoagulant therapy should be continued for a minimum of six weeks postpartum.

6.5 Wound care

Wound care plays a key role in the prevention and management of issues related to the surgical wound following a cesarean section. The education and training of healthcare professionals in wound care, use of individualized wound dressings, and scar prevention and care were each important methods of support identified in the literature.

6.5.1 Education and training of healthcare professionals in wound care

The enhancement of education and training around wound care for healthcare professionals (namely midwives and nurses) who provide care for cesarean section wounds has been shown to reduce the incidence of wound infection (Bullough et al., 2014, p. 75-76; Kitson-Reynolds, 2021, p. 5). Professionals working with surgical wounds must be provided with practical education and training about managing the wounds and proper application and removal of the wound dressings (Bullough et al., 2014, p. 75-76).

6.5.2 Use of individualized wound dressings

The application of dressings which effectively prevent surgical site infections (SSI) is a key factor to reducing the incidence of SSIs following cesarean delivery (Stanirowski et al., 2016, p. 434). The literature offers recommendations for various types of wound dressings

based on the individual risk factors of patients as well as the consideration of their cost effectiveness.

Several studies indicate that the use of prophylactic negative pressure wound therapy (NPWT) for high-risk patients is an effective intervention to reduce the incidence of SSIs following cesarean section (Bullough et al., 2014, p. 74-76; Gillespie et al., 2021; Kitson-Reynolds, 2021, p. 4-7; Yu et al., 2018, p. 8). High-risk patients in this context are defined as those over a certain BMI threshold, namely BMI \geq 30 (Gillespie et al., 2021; Kitson-Reynolds, 2021, p. 5) or BMI \geq 35 (Bullough et al., 2014, p. 74). Aside from the overall reduction of the rate of infection, exactly how NPWT benefits patients and which patient groups should receive NPWT is somewhat contested in the literature. Some evidence suggests that NPWT benefits wound healing by removing fluid, reducing hematoma and seroma formation, reducing bacterial contamination, splinting the wound edges and reducing suture line tension, reducing wound dehiscence, and increasing blood flow and promoting the formation of granulation tissue (Bullough et al., 2014, p. 74-76; Kitson-Reynolds, 2021, p. 4). Kitson-Reynolds (2021, p. 4) also cites evidence that NPWT significantly shortens the length of hospital stay. Some of these findings are contradicted by the results of the systematic review and meta-analysis done by Yu et al. (2018, p. 6-8), where they found that although NPWT reduces overall wound complications in addition to SSIs, there was not statistically significant evidence that it reduced wound dehiscence, seroma, endometritis, or hospital readmission. The study by Gillespie et al. (2021) found a small but significant increase in the negative side-effect of skin blistering from NPWT, which should also be taken into consideration when weighing its risks and benefits. More research needs to be conducted about NPWT's mechanism of action and its secondary effects, both positive and negative, but there is strong consensus in the data that NPWT reduces SSIs in high-risk post-cesarean section patients.

Although there is some evidence to support the use of NPWT in post-cesarean section women with BMI $>$ 30, the 2021 NICE recommendations for best practice encourage the application of NPWT for those with BMI $>$ 35 when weighing the patient benefits and cost-effectiveness of the therapy (Kitson-Reynolds, 2021, p. 5). In their dressing evaluation and audit, Clarke and Livesey (2021, p. 49-53) examined the implications of a new and more economical wound management pathway when compared to the use

of NPWT for women with BMI \geq 35 and standard surgical dressings for everyone else. In the new wound management pathway, bacteria-binding dialkylcarbamoyl chloride (DACC) impregnated dressings (Leukomed® Sorbact®) were indicated for post-cesarean women with BMI \geq 30- $<$ 50, gestational diabetes, or history of a previous cesarean section with complications, and single-use NPWT dressings were indicated for women with BMI \geq 50, type 1 diabetes, previous numerous cesarean sections, or an especially high risk of infection due to other factors (op. cit., p. 50). The introduction of the new wound management pathway did not result in any changes in the rate of surgical site infections, suggesting that NPWT dressings and DACC dressings can be co-positioned in wound care without a negative impact on the SSI rate (op. cit., p. 51-52). Other benefits from the introduction of the DACC dressings included better patient mobility, ease of showering, and the absence of buzzing sounds produced by the NPWT battery packs (op. cit., p. 51). Additionally, women who were treated with the DACC dressing in the evaluation reported no difference in level of pain and that they were overall satisfied with the DACC dressing. Considering the results of this evaluation and the implications for the cost of wound management in this patient population, the wound management pathway detailed above should be considered as best practice (Clarke & Livesey, 2021, p. 49-53).

Other studies have shown that the use of DACC dressings for all women undergoing cesarean sections, not only those at high-risk for infection, can reduce the incidence and severity of SSIs while remaining cost effective (Stanirowski et al., 2016, p. 427-435; Taylor et al., 2020, p. 51-53). An evaluation of an initiative by the Aneurin Bevan University Health Board (ABUHB) maternity services to lower SSI rates in post-cesarean women in the United Kingdom found that the use of DACC dressings (Leukomed® Sorbact®) was instrumental in said effort (Taylor et al., 2020, p. 51-53). Benefits were first seen with the decision to use DACC dressings for women with BMI $>$ 30, followed by the implementation of DACC dressings for all cesarean section patients (op.cit., p. 51). The previous wound care pathway for these patients included the use of standard post-operative dressings and removal of the dressing 24 hours after the surgery to allow the surgeon to assess the wound, after which a new dressing was applied (op. cit., p. 51). With the introduction of the DACC dressings, a new timeline for removal was initiated, and the DACC dressings were left in place for 4-5 days, allowing

the wound to remain undisturbed and at lower risk for contamination (op. cit., p. 51). Although the impact of the time of dressing removal/dressing change was not under specific analysis in this study, other evidence (Ridley, 2016, p. 170-171) suggests that leaving the dressing in situ for an extended period plays a significant role in lowering the risk of infection.

Varying recommendations regarding the timeline of cesarean section wound dressing removal are present in the literature. Winter (2018, p. 3) and Quinlan and Murphy (2015, p. 178) state that the dressing should be removed 24 hours after the cesarean section. This timeline for dressing removal provides the benefit of early visual assessment and monitoring of the wound. However, recent evidence suggests that keeping the wound covered for an extended period decreases the risk of surgical site infections (Ridley, 2016, p. 170-171). These findings were the result of a trial that examined the rate of surgical site infection between use of the standard wound dressing and removal time (24 hours after the operation) and the Opsite Post-Op Visible dressing or Mepilex safetac dressing which were left intact for 5 days. Although the Opsite Post-Op Visible dressing was found to be more successful in terms of secure adhesion throughout the application period when compared to the Mepilex safetac dressing, both dressings resulted in improved infection and readmission rate, suggesting that leaving the dressing intact for more than 24 hours is an effective method to reduce infection (Ridley, 2016, p. 171).

The use of Surgihoney in cesarean wound dressings has been presented as another effective method to prevent wound infection (Dryden et al., 2014, p. 113-114). Surgihoney is a sterile wound care product adapted from natural honey and intended for use as a prophylactic dressing component for wounds (op. cit., p. 111). In addition to the potent antimicrobial properties of Surgihoney which have been shown to significantly reduce infection rates in cesarean section wounds (from 5.42% before the intervention to 2.15% using Surgihoney), the established wound healing characteristics of honey are likely to promote wound healing (op. cit., p. 113).

6.5.3 Scar prevention and care

According to Diehl (2012, p. 34), mechanical force such as stretching or contraction of the skin in the incision area can be a trigger for the formation of keloid scars. It is therefore beneficial to avoid tension and stretching in that area once the wound has closed (op. cit., p. 36). A simple method of scar prevention is the use of paper tape (op. cit., p. 36). A randomized controlled trial found that the application of paper tape over the wound for 12 weeks postoperatively significantly decreased scar volume, and where 41% of the control group developed hypertrophic scars, none of the study group did (op. cit., p. 36). Moist wound healing, where special dressings to prevent the wound from drying out are used, is suggested as a way to help avoid abnormal scarring, optimize tissue repair, and reduce the healing time (Winter, 2018, p. 3). Literature supports the use of a topical silicone-based gel sheeting to cover the wound as an effective method to achieve protection of the wound while maintaining hydration (Diehl, 2012, p. 36; Winter, 2018, p. 4-5). Finally, application of topical superoxide dismutase (SOD), a potent antioxidant with anti-inflammatory, anti-fibrotic, and anti-pruritic properties, is recommended by Diehl (2012, p. 36) due to anecdotal benefits for both keloid and hypertrophic scars. There is a lack of published data regarding the effect of SOD, however, it is currently prescribed for scar care by surgeons around the world with apparently successful results (op. cit., p. 36).

6.6 Patient education

Beake et al (2017, p. 6-11) reviewed two studies done in which the interventions were early post-cesarean section maternal-infant contact and post-cesarean breastfeeding support and guidance. It was found that mothers had early breastfeeding initiation and good rates of exclusivity with these interventions. Cirpanli & Hicyilmaz (2022, p. 69-77) found that supporting mothers on how to correctly latch the baby onto the breast and giving breastfeeding counselling were effective interventions for increasing breastfeeding rates. Healthcare professionals need to provide practical guidance on different breastfeeding positions that women might find helpful and comfortable after surgery (Antonakou & Papoutsis, 2021, p. 150-344). These could include positions like the side lying position, the rugby/football hold or under the arm position, and the lying back breastfeeding position. Gateneh et al. (2021, p. 51) recommend that women who undergo

cesarean section be given specialized health promotional interventions such as parent education and support for early initiation of skin-to-skin contact. It is further recommended that adolescent mothers be provided with breastfeeding support which is customized to their age and needs (Cirpanli & Hicyilmaz, 2022, p. 69-77).

Noyman-Veksler et al. (2015, p. 452) found in their study that providing both the patient and the patient's family members with psychoeducation helped to prevent both postpartum depression and PTSD symptoms during the postpartum period after a cesarean section. They explained that it was especially beneficial to educate the family members on how they could best support the patient during the recovery period. In another study by Shorey et al. (2021, p. 12), it was recommended that mothers be provided with psychoeducation to help prevent the relapse of depression and anxiety after a cesarean section. Brandao et al. (2018, p. 2093) found that providing information before the operation on what happens during a cesarean section was especially important for mothers who already have anxiety or depression, in order to prevent or reduce PTSD symptoms.

Providing clear information to the patient about their prescribed wound care can be instrumental in lowering the rate of infections (Taylor et al., 2020, p. 51-53). This education should include the necessity for diligent hygiene practices before and after performing wound care (op. cit., p. 51). It's important to supply patients with the basic knowledge necessary to identify the signs of a developing wound infection, as well as provide information on how to contact their healthcare provider should concerns arise (Bullough et al., 2014, p. 75).

6.7 Mental health support

The need for mental health support was a common theme found in the data collection for mothers who have just had a cesarean section. This section will discuss the use of psychological interventions and coping strategies as methods for supporting the mental health of the postpartum mother.

6.7.1 Psychological interventions

According to a study done by Shorey et al. (2021, p. 2), psychological interventions have been found to help parents shift their negative thoughts, experiences, and emotions involving their childbirth experience, to focusing on the positive aspects and helping them to adopt a more productive rumination. Psychological interventions can refer to any psychotherapeutic method which focuses on adopting healthier metacognition and shifting a person's perceptions and/or behaviors (op. cit., p. 2). In this study it was found that psychological interventions were most effective in improving PTSD symptoms and reducing the mother's fear of childbirth. The study goes on to say that parents who self-defined their birth as being traumatic benefited more from psychological interventions than parents who were defined as "at-risk" of having a traumatic birth.

Technology-based interventions were significantly effective in improving the mental well-being of mothers after a traumatic birth (Shorey et al., 2021, p. 8-10). In this study, technology-based interventions refer to online trauma-focused cognitive behavioral therapy (CBT) modules, online counseling, and the use of the game "Tetris" which was played on the handheld Nintendo DS gaming console by the mothers involved in the study. Visuospatial cognitive tasks, CBT, and debriefing/counseling are all psychological interventions which were found to potentially improve the symptoms of anxiety and PTSD in mothers who had a traumatic birth (op. cit., p. 10). This study also showed that mindfulness-based therapies and debriefing/counseling were found to specifically help improve the mother's fear of childbirth.

It is clear from this study that different forms of psychological interventions can be potentially beneficial to the mental health of mothers who have either experienced a traumatic birth or who are at risk of having a traumatic birth. It is recommended in this study that these psychological interventions should be offered during the early weeks after a traumatic birth and should continue to be offered for at least six months postpartum (Shorey et al., 2021, p. 10). This is especially important for those who have experienced a traumatic birth, as symptoms of PTSD can develop late (op. cit., p. 10). It was also noted in this study that there was a lack of psychological support offered to the fathers. It is recommended that either fathers be included in joint postnatal psychological support

sessions, or fathers should be offered specialized individual sessions (Shorey et al., 2021, p. 11).

6.7.2 Coping strategies

Several studies have found that poor coping strategies can lead to higher levels of depression and stress following a cesarean section (Brandao et al., 2018, p. 2086; Noyman-Veksler, 2015, p. 443-444; Deninotti et al., 2020, p. 423). One common example of a poor coping strategy is expressive suppression (Deninotti et al., 2020, p. 424). This refers to the suppression of emotions and feelings in order to withhold information about one's emotional wellbeing (op. cit., p.424). This study further explains that mothers who cope with delivery by suppressing their emotions can make symptoms of PTSD and postpartum depression last longer. Deninotti et al. (2020, p. 431) recommends the use of cognitive reappraisal, which creates a positive shift in metacognition. By using this method, the mother can reevaluate her birth experience and focus on the positives rather than the negatives, for example, how she gave birth to a healthy baby, how brave she was, or how supportive her spouse was throughout the cesarean section (op. cit., p. 430-431). Brandao et al. (2018, p. 2093) suggests that a more positive perception of childbirth should be the goal of any psychological intervention offered to women following a cesarean section.

Noyman-Veksler et al. (2015, p. 443) did a study which examined the role of sense of coherence (SOC) on the postpartum psychological wellbeing in mothers who recently delivered via cesarean section. SOC refers to one's confidence in the ability to manage, predict, and understand their environment, as well as the ability to utilize internal and external resources to manage tension (op. cit., p. 443). It was found in this study that a higher sense of coherence correlated with a lower risk of developing postpartum depression and PTSD. Noyman-Veksler et al. (2015, p. 452) found that the use of mindfulness-based stress reduction was one intervention that has been shown to increase an individual's sense of coherence.

6.8 Assessment and monitoring

A study done by Sun et al. (2021, p. 598-599) recommends that healthcare professionals should closely monitor mothers who have just had a cesarean section for signs or symptoms of postpartum mental health disorders. They also recommend that mothers be provided with quick access to mental health care due to the increased risk of developing a mental health disorder in the postpartum period after cesarean section. This study explains that both careful monitoring and quick access to mental health care are especially vital for mothers who had an emergency cesarean section. Dikmen-Yildiz et al. (2018, p. 383-384) ran a study which showed the importance of early identification and intervention for women who have PTSD or who are at risk of developing PTSD. They found that by identifying and assisting these women early on, they were able to help prevent long-lasting PTSD and inhibit the development of other mental health problems. Nam et al (2017, p. 56-58) recommends that postpartum depression screening as well as breastfeeding promotion policies should take place early in the postpartum period. In this study it was found that implementing both reduced the risk of the mother developing postpartum depression during the 6-month period after cesarean section. According to Doke et al. (2021, p. 8), the assessment of postpartum depression is most commonly done using the Edinburgh Postnatal Depression Scale (EPDS). This study goes on to say that nurses and other healthcare professionals should assess the mother using the EPDS six weeks following a cesarean section. Noyman-Veksler et al. (2015, p. 452), Quinlan (2019, p. 8), and Brandao et al. (2018, p. 2093) found that identifying mothers who are at risk of developing postpartum psychopathology and catching symptoms early can reduce the risk of postpartum psychopathology from developing even further. Quinlan (2019, p. 8) further explains that identifying these women and providing immediate support can help them to shift from negative to positive coping strategies faster.

Cirpanli & Hicyilmaz (2022, p. 69-77) advise that it would be of great advantage to have a health professional, especially a nurse, monitor at least one breastfeeding session from start to finish to make sure that the mother is breastfeeding properly.

Monitoring and assessment of the surgical wound is necessary for the identification of signs of infection, wound separation, and wound dehiscence (Winter, 2018, p. 3). The wound should be assessed by healthcare professionals daily during the hospital stay

(Quinlan & Murphy, 2015, p. 178) and the patient can watch for signs of infection or other issues following discharge (Bullough et al., 2014, p. 75). Additionally, specific monitoring for the development of a fever during the postoperative period is recommended, as it can be one of the first signs of infection (Winter, 2018, p. 3).

It is recommended that post-cesarean patients be monitored for anemia prior to discharge with hemoglobin lab draws on postoperative day one or two (Ogunkua & Duryea, 2021, p. 18). This is particularly important for women who experienced significant blood volume loss (op. cit., p. 18).

6.9 Social support network

According to Dikmen-Ylidiz & Phillips (2018, p. 381-382), social support is important in protecting mothers from developing PTSD during the postpartum period after cesarean section. They go on to say that for mothers who have already been diagnosed with PTSD, social support can help with managing the symptoms. A study done by Noyman-Veksler et al. (2015, p. 444) showed that mothers who felt that they had higher levels of social support experienced fewer PTSD symptoms after having a traumatic birth via cesarean section. In this study, it was also found that informal support (i.e. receiving help with housekeeping or help with taking care of the infant) reduced the risk of postpartum depression and improved the maternal self-efficacy. It was also stated in this study that social support was found to be especially important for mothers who had a cesarean section, compared to mothers who had a vaginal delivery. Noyman-Veksler (2015, p. 451-452) noted that although social support is traditionally thought of as family members or loved ones, clinicians can also serve as a source of support for the mothers as needed. According to Martin et al. (2022, p.44), the implementation of programs which provide social and emotional support could also benefit the mother's breastfeeding during the postpartum period. According to Antonakou & Papoutsis (2021, p. 150-344), one of the main challenges women face after cesarean section is lack of knowledge and coping skills in managing depressive moods and this might make them quit breastfeeding. Therefore, there is need for health professionals to provide extra care, emotional support and encouragement to women after cesarean section. While reviewing another study on the significance of peer and partner support, Antonakou & Papoutsis (2021, p. 150-344) found

that the inclusion of peers, fathers, or partners in breastfeeding interventions increases breastfeeding initiation, duration, and exclusivity rates. They went further by suggesting that healthcare professionals include fathers and partners in parental preparation programs and in decision making regarding the child's nutrition. Chen et al. (2018, p. 2-7) found that cesarean section can shorten breastfeeding duration and therefore recommends that healthcare professionals provide skilled support for mothers to maintain lactation and enhance their confidence in exclusively breastfeeding. Ogunkua & Duryea (2021, p. 18) recommend that mothers should be given adequate breastfeeding support from healthcare professionals throughout their stay in the hospital with resources mapped out to be utilized after discharge. Martin et. al (2022, p. 7-9) recommend adequate physical, psychological and emotional support for breastfeeding mothers outside of the hospital.

6.10 Acupressure

A study done by Lu et. al (2019, p. e16456) found that Tuina therapy magnified the enlargement of breasts, implying that Tuina therapy could stimulate mammary tissue development for breastfeeding mothers. Tuina therapy was also found to heighten the serum prolactin levels when compared with the control group. They go on to say that patients in the Tuina group experienced improved postpartum uterine recovery which has been associated with lactation. The findings of the study by Sun et al. (2018, p. e13352) indicate that acupuncture is also an effective and quick treatment for flatulence acquired from postoperative ileus after cesarean section.

6.11 Natural remedies and tools at home

The methods presented under this theme consist of different natural remedies and tools used at home that can help speed up the mother's recovery. These include: Channa striatus extract supplementation, chewing gum, coffee, topical chamomile oil, peppermint drops, ginger extract, aromatherapy, lemon balm, breast pumping, bedside bassinet, hand and foot massage, and mechanical prophylaxis. Each method is discussed in detail below.

6.11.1 *Channa striatus* extract supplementation

Multiple studies have examined the effects of *Channa striatus* extract supplementation during the postpartum period following cesarean section (Abu Bakar et al., 2015, p. 1-11; Ab Wahab et al., 2015, p. 1-6; Shafii et al., 2020, p. 148-150). *Channa striatus*, also called Haruan, is a freshwater fish found in Southeast Asia where it is traditionally used as a remedy to support healing, relieve pain, and boost energy due to its high levels of amino and fatty acids and its antioxidative properties (Abu Bakar et al., 2015, p. 2; Ab Wahab et al., 2015, p. 1; Shafii et al., 2020, p. 148).

The study by Ab Wahab et al. (2015, p. 3-5) found that daily oral supplementation of 500mg *Channa striatus* extract resulted in significantly improved cosmetic appearance of the wound (assessed with a visual analog scale) as well as increased patient satisfaction scores regarding the wound's appearance. The study also demonstrated a larger decrease in pain score over time and higher wound evaluation scores regarding wound healing when the experiment group was compared to the control group, however, these effects were not statistically significant. Due to the role of antioxidants in wound healing, Shafii et al. (2020, p. 148-150) studied the total antioxidant status (TAS) of women taking a daily oral dose of 500mg *Channa striatus* extract following cesarean section. They found that the experiment group had significantly enhanced levels of TAS when comparing the baseline measurements to week 2, 4, and 6. The placebo group did not have statistically significant improvement over time, however, the differences between the experiment and placebo groups were also not statistically significant. *Channa striatus* has also been found to be effective in facilitating the recovery of the uterus following a cesarean section (Abu Bakar et al., 2015, p. 6-7). Significant differences were shown between the uterine measurements and the pulsatility index of the uterine arteries between the experiment group and the control group based on time throughout the study period (Abu Bakar et al. 2015, p. 5-6). These results indicate a more efficient involution of the uterus and faster reduction of the increased blood circulation to the uterus when a daily dose of 500mg *Channa striatus* extract was taken by the mother.

6.11.2 Chewing gum

Chewing gum has been recommended as a routine part of clinical postoperative care for post-cesarean patients due to evidence of hastening intestinal recovery (Wen et al., 2017, p. 8) and permitting earlier reintroduction of oral feeding, which in turn helps avoid delays in the mother's postoperative nutrition and milk production (Lee et al., 2016, p. 171). Lee et al. (2016, p. 167-171) examined the effects of xylitol gum and xylitol-free gum and found that although xylitol gum may present greater benefit to the recovery of bowel sounds, both types of gum were effective in hastening the overall recovery of intestinal function. The results of Wen et al.'s (2017, p. 7-8) meta-analysis indicate that chewing gum promotes the recovery of intestinal function by accelerating the time to first flatus, first defecation, first bowel sound, and first bowel movement. Shorter time to first flatus is likely to lessen the new mother's gas pains, therefore improving the early parenting experience and reducing the need for pain medications (Lee et al., 2016, p. 171). Additionally, Esfehiani et al. (2018, p. 1354) have suggested that chewing gum be used in postoperative treatment in order to ease abdominal discomfort due to their finding that chewing gum reduced the postoperative pain of the mother.

The three studies included in the dataset of this thesis which discuss chewing gum as an intervention did present some heterogenous findings. The results of the study by Esfehiani et al. (2018, p. 1352-1354) indicate that chewing gum had no significant effect on the resumption of normal bowel activity, which is not consistent with the results of Lee et al. (2016, p. 169-171) and Wen et al. (2017, p. 7-8). This difference in results could be due to the relatively small sample size of Esfehiani et al.'s (2018, p. 1348-1354) study, along with slight variations in gum chewing protocols across the different studies (Lee et al., 2016, p. 168-169; Wen et al., 2017, p. 8). It's also valuable to note that the study by Wen et al. (2017, p. 1-9) was a systematic review and meta-analysis of ten RCTs, meaning it had a much wider dataset than the single RCT by Esfehiani et al. (2018, p. 1348-1355). Another inconsistency in results was seen between the studies by Wen et al. (2017, p. 7-8) and Lee et al. (2016, p. 169-171), where Wen et al. found that chewing gum significantly reduced the time to first defecation and Lee et al. had evidence that chewing gum did not impact said timeline. Again, this inconsistency could be explained by variation in sample size and gum chewing intervention. Regardless, all three studies concluded by

recommending chewing gum be used as a safe, simple, and inexpensive method to support postpartum recovery following cesarean section (Esfehani et al., 2018, p. 1352-1354; Lee et al., 2016, p. 171; Wen et al., 2017, p. 7-8).

6.11.3 Coffee

A study done by Zamanabadi et al. (2021, p. 3-5) found that first defecation and bowel activity time were reduced among women who were given coffee after a cesarean section. Considering how important early resumption of gastrointestinal movement is in women undergoing cesarean section, coffee is recommended as a safe and inexpensive intervention. According to Bozkurt Koseoglu et. al. (2020, p. 2-5), drinking coffee early in the postoperative period after cesarean section reduced the mean time of first flatulence, defecation, and toleration of solid food. The study found that return of bowel function was shorter in the coffee drinking group. They went on to suggest that drinking coffee in the early stages after cesarean section leads to the stimulation of bowel movement and that coffee is a safe, inexpensive, and well tolerated beverage that can be used in patients to enhance the recovery of gastrointestinal function.

6.11.4 Topical chamomile oil

Khadem, et. al. (2018, p. 128-135) found that the application of topical chamomile oil on the abdominal skin after cesarean section led to significant decrease in postoperative time to first flatus, bowel sound, and defecation in the intervention group when compared to the control group. Topical chamomile oil has been found to have therapeutic effect on gastrointestinal motility and has therefore been recommended as a topical digestive relaxant effective in the treatment of postoperative ileus (Khadem, et. al., 2018, p. 128-135).

6.11.5 Peppermint drops

The research study done by Mousavi Vahed, et. al. (2022, p. 1435-1442) found that peppermint was notably successful for the rapid return of intestinal functions such as return of bowel sounds, passing of flatus, and stool excretion. These findings further led

them to suggest that a drop of mint can be effective in the fast restoration of intestinal function and consequently decrease the severity of ileus after cesarean section.

6.11.6 Ginger extract

Zeraati et al. (2016) found in their studies that ginger extract given as an oral drop was highly effective in the prevention of nausea and vomiting after cesarean section. The study further stated that there were no side effects related to the dosage of ginger extract given and therefore recommends that ginger can be effective in the control of nausea and vomiting.

6.11.7 Aromatherapy

According to Maddocks (2022, p. 13), inhaled lavender oil has been shown to significantly reduce the postoperative pain scores for women following a cesarean section. In this study, the pain-reducing effect of the inhaled lavender oil lasted for up to twelve hours. There were no negative physiological effects from the lavender oil recorded.

6.11.8 Lemon balm

Beihaghi et al. (2018, p. 1641-1642) ran a study examining how the use of lemon balm capsules would affect postpartum depression in women who recently had a cesarean section. Lemon balm (*Melissa officinalis*) is a medicinal plant that affects the nervous system and causes relaxation. In this study, it was revealed that the consumption of 1200 mg capsules of lemon balm significantly reduced the incidence rate of postpartum depression for mothers who have just had a cesarean section. There was no record of any negative side effects from the lemon balm capsules.

6.11.9 Breast pumping

Xia et. al. (2018, p. 2-10) found in their study that an increase in the breast pump suction pressure to about 150mmHg led to a positive early breastfeeding outcome. They went on to say that a higher-pressure stimulation decreases the time to onset of lactation which in

turn increases milk supply and boosts the mother's confidence. Beake et al (2017, p. 6-11) found that breast pumping increased milk production for mothers in the pumping group. Antonakou & Papoutsis (2021, p. 150-344) advises that mothers should be assisted in expressing breastmilk for their newborn in cases where direct breastfeeding becomes difficult.

6.11.10 Bedside bassinet

A study reviewed by Beake et. al. (2017, p. 6-11) found that mothers expressed their preference to bedside bassinet over a stand-alone bassinet. The reason given by these mothers was that the bedside bassinet made it easier to reach the baby thereby making frequent breastfeeding easier.

6.11.11 Hand and foot massage

Two studies (Mol et al., 2020, p. 62-65; Sharma & Kumari, 2019, p. 79-84) examined the effect of hand and foot massage on the mother's perception of pain following a cesarean section. Sharma & Kumari (2019, p. 80-83) found that providing a 20-minute massage (5 minutes for each hand and foot) to the mother, twice per day for a duration of three days, resulted in significantly lower pain scores when compared to the baseline pain score and the control group pain scores throughout the timeline. Further, Mol et al. (2020, p. 63-64) found equivalent results when assessing a slightly modified method consisting of a 30-minute hand and foot massage performed each morning for 5 consecutive days following cesarean delivery. These studies together indicate that providing the mother with hand and foot massage following cesarean section is an effective way to reduce pain perception.

6.11.12 Mechanical prophylaxis

According to Ogunkua & Duryea (2021, p. 18), Nicolaidis et al. (2013, p. 139), and Bates et al. (2012, p. e692S-e693S), women who have an increased risk of developing venous thromboembolism (VTE) are recommended to use mechanical prophylaxis after a cesarean section when anticoagulants are contraindicated. Mechanical prophylaxis in the treatment of VTE includes the use of either elastic compression stockings or the use of an

intermittent pneumatic compression (IPC) device. Nicolaides et al. (2013, p. 137) states that all women about to have a cesarean section should go through a risk assessment for VTE so that medical professionals know how to best support these women after delivery. Bates et al. (2012, p. e693S) goes on to say that for women who are considered a very high risk for VTE, it is recommended to combine the use of either elastic compression stockings or IPC with the use of prophylactic low-molecular-weight-heparin (LMWH). Nicolaides et al. (2013, p. 139) notes that compressions stockings should be worn for at least six weeks following cesarean section when anticoagulants are contraindicated.

7 LIMITATIONS OF THE STUDY

Not all literature applicable to the research question was available in “full text,” a requirement of each article in order to be included in the review data. Despite exclusion of several articles due to limited access, the final dataset of this thesis was extensive and described a multitude of methods to support a post-cesarean mother.

Our study was limited to the consideration of postpartum measures for improvement of maternal cesarean section outcomes. This was an appropriate and necessary self-imposed limitation which narrowed the scope of our study to a manageable size. In our research we encountered many methods to prevent or minimize the post-cesarean challenges we addressed that were implemented either prenatally or intra-operatively. Although these could not be included in our review, they are important methods for consideration by healthcare professionals.

Many research articles discussed methods of support for post-cesarean mothers but were extremely medical in nature. Articles that compared various pharmacological support methods for pain management and thromboprophylaxis were especially common. Very few of this type of article were included in our review, as they did not answer our research question from the perspective of a nurse or midwife and did not present methods of support that were within the nurse or midwife’s scope of practice. This limitation also highlighted the need for further research into non-pharmacological methods for treating post-cesarean pain and reducing the risk of thrombosis.

There was limited research done on some of the interventions which were applicable to our research question and included in the literature review. The limited data highlights the need for additional high-quality studies surrounding this topic to clarify issues of heterogeneity, small sample size, and results that are difficult to generalize.

8 CONCLUSION

The goal of this thesis was to improve care and recovery for the mother during the postpartum period after cesarean section. The purpose of this thesis was to provide information through a literature review about the best methods for supporting the mother's recovery after cesarean section. The information gathered herein will act as a future reference and educational resource for nurses, midwives, and other healthcare professionals who work with mothers that are planning to have a cesarean section or who have recently undergone a cesarean section. This thesis will help healthcare professionals to better support their patients during the postpartum period. According to Antonakou & Papoutsis (2021, p.344), cesarean births constitute almost one third of all births globally. It is also important to note that nurses and midwives are the primary advocates for their patients and their patient's care (Goodman, 2014). Therefore, it is crucial that they are knowledgeable about the ways women can be supported following a cesarean section.

The main methods to support mother's recovery after cesarean section found in this review were skin-to-skin contact care; physical activity; early reintroduction of a normal diet; pharmacological intervention; wound care; patient education; mental health support; assessment and monitoring; social support network; acupressure; and natural remedies and tools at home. It is clear from these results that there are many things that need to be taken into account in order to best support the mother's recovery after a cesarean section. Pregnant women should receive early educational and practical support on the potential challenges mothers go through following both vaginal and cesarean birth during antenatal care. It is advised that nurses and other healthcare professionals working with mothers that are planning to have a cesarean section or have recently undergone a cesarean section apply the findings of this review to support women following cesarean birth. Further evidence-based research is recommended to validate some of the interventions found in this review.

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