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Postpartum maternal complications: a retrospective single-center study

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Abstract

Objectives: To evaluate the incidence and underlying causes of postpartum complications, with a focus on infections, among women who delivered at a tertiary maternity hospital over a 17-year period.
Methods: This retrospective observational study was conducted at the University Medical Center Ljubljana, the largest maternity hospital in Slovenia. The study included all women who delivered vaginally or via cesarean section between 2008 and 2024 and subsequently required medical assessment or hospitalization within six weeks postpartum. We analyzed the frequency and types of complications, paying special attention to infection rates by delivery method and microbiological findings from wound swabs.
Results: Postpartum complications were observed in 7.6 % of women following vaginal birth and 10.6 % after cesarean delivery. Infections and breastfeeding-related problems were the most common causes for medical reevaluation. After vaginal delivery, breast complications such as mastitis or milk stasis represented 36.4 % of all cases, followed by minor perineal issues. Following cesarean section, surgical site complications were most frequent (42.1 %), with a wound infection rate of 7.7 %. Between 2020 and 2024, readmissions to intensive care occurred in 0.92 % of vaginal deliveries and 2.76 % of cesarean deliveries. Endometritis was the most common infection after vaginal birth, while wound infections predominated post-cesarean. Wound swab cultures often revealed polymicrobial flora.
Conclusions: Postpartum infections remain a leading complication, particularly after cesarean delivery. Strengthening preventive measures including antibiotic prophylaxis, timely postpartum follow-up, and continuous microbial surveillance is critical to reducing maternal morbidity and supporting more effective, targeted interventions.

Keywords: surgical site infection; breastfeeding complications; antibiotic prophylaxis; postpartum period; postpartum infections; cesarean section

Introduction

The postpartum period, defined as the first six weeks following childbirth, is characterized by profound physiological and anatomical changes as the body recovers from pregnancy and delivery. During this time, the uterus undergoes involution, wounds (such as perineal tears or surgical incisions) begin to heal, lactation is initiated, and cardiovascular and metabolic parameters gradually return to their pre-pregnancy states [1]. Despite this being a natural recovery phase, it is also a period marked by an increased risk of complications. According to national data from Slovenia, approximately 10 % of women seek medical attention within the first six weeks postpartum [2].

Common postpartum concerns include breastfeeding difficulties, abnormal uterine bleeding, perineal or wound pain, gastrointestinal and urinary issues, headaches, and hypertensive disorders. Among these, infections are a leading cause of postpartum morbidity and a frequent reason for emergency consultations [1]. Postpartum infections remain a significant cause of maternal morbidity and, in some regions, to maternal mortality, despite advances in obstetric care and widespread availability of antibiotic therapy. While the burden is greater in low-resource settings, postpartum infections continue to pose challenges in high-income countries as well. If not promptly recognized and treated, infections can escalate to sepsis or septic shock [3]. A maternal fever exceeding 38 °C in the postpartum period warrants a thorough clinical evaluation to determine the source of infection and initiate timely antibiotic treatment [1]. The most common postpartum infections include endometritis (infection of the uterine lining), mastitis (breast infection), and wound infections involving either cesarean section incisions or perineal tears/episiotomy sites [4].

Endometritis is the most prevalent postpartum infection, occurring in approximately 2 % of women following vaginal delivery and in 10–15 % after cesarean section. It is typically a

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polymicrobial infection involving bacteria from the normal vaginal flora, such as Group B streptococci, aerobic Gram-negative bacteria (*Escherichia coli [E. coli], Klebsiella pneumoniae, Proteus species [Proteus spp.]*), and anaerobic species. Clinical presentation includes fever, foul-smelling lochia, lower abdominal pain, and uterine tenderness. Treatment consists of broad-spectrum antibiotics and antipyretics [1].

Mastitis, an infection of the breast tissue in lactating women, is often precipitated by trauma to the areola, incomplete breast emptying, or the use of breast pumps. It presents with the sudden onset of fever, chills, and a painful, erythematous, and firm breast. The most common pathogens are skin flora, particularly *Staphylococcus* species. First-line treatment includes antistaphylococcal penicillins and continued breastfeeding is encouraged. If left untreated, mastitis may progress to a breast abscess, affecting approximately 0.1 % of lactating women, which typically requires incision and drainage in addition to antibiotics [2].

Surgical site infections (SSIs) following childbirth include cesarean wound infections and, less commonly, deep pelvic infections. These infections usually originate from skin or genital tract bacteria and present with local signs such as redness, pain, swelling, purulent discharge, or systemic symptoms like fever [1]. Though rare, severe postpartum infections such as necrotizing fasciitis, septic pelvic thrombophlebitis, or intra-abdominal abscesses can occur and carry high morbidity and mortality [1].

Cesarean section and other invasive procedures during vaginal delivery (e.g. manual removal of retained placenta or placental tissue) significantly increase the risk of surgical site infections by facilitating the introduction of bacteria into sterile tissues [5, 6]. Cesarean section, the most common major obstetric surgery worldwide, is associated with a markedly higher infection risk than vaginal birth [7]. Without prophylactic antibiotics, up to 20–25 % of women develop postpartum infections after cesarean delivery, with endometritis rates reaching 30–35 % [8, 9]. Even with prophylaxis, the risk of postpartum infection remains approximately five times higher following cesarean delivery compared to vaginal birth.

Recognizing this elevated risk, the World Health Organization (WHO) issued guidelines in 2021 recommending routine prophylactic antibiotics for all cesarean births. A single pre-incision dose of a first-generation cephalosporin (or clindamycin for penicillin-allergic women) is standard to reduce surgical-site infections [9]. Furthermore, a multicenter study by Tita et al. (2016) demonstrated that adding a 500 mg intravenous dose of azithromycin significantly reduced the risk of surgical site infection [10].

The aim of this study is to investigate the incidence, types, and distribution of postpartum complications at the University Medical Center Ljubljana over a 17-year period, and to compare the findings with international data in order to identify potential areas for improvement in postpartum care.

Materials and methods

Study design and setting

We conducted a retrospective observational study of postpartum complications at the Department of Perinatology, UMC Ljubljana – the largest maternity and tertiary referral center in Slovenia. Maternity Hospital Ljubljana oversees approximately 6,000 births annually and manages both low-risk and high-risk pregnancies from across the country. Hospital records spanning from January 1, 2008, to December 31, 2024, were reviewed.

Study population

The study included all women who delivered at UMC Ljubljana, either vaginally or via cesarean section, during the study period and subsequently returned for medical evaluation or were readmitted due to complications within 6 weeks postpartum.

Data collection

We extracted data from electronic medical records and institutional maternity databases. For each calendar year, we recorded the total number of deliveries and identified cases of postpartum follow-up or hospital readmissions related to complications. For each case, we documented:

- Mode of delivery
- Time of presentation (in days postpartum)
- Primary diagnosis.

Diagnoses were categorized as follows:

- Breast complications (e.g., mastitis, abscess)
- Wound complications (perineal or surgical/incisional)
- Uterine infections (e.g. endometritis)
- Other infections (e.g., urinary tract infections)
- Hemorrhagic complications
- Miscellaneous causes (e.g., hypertension, deep vein thrombosis, syncope/collapse).

For ICU admissions during the 2020–2024 period, additional data were collected on diagnoses (e.g., sepsis, severe

hemorrhage, COVID-19 infection) and outcomes. Special attention was given to cesarean wound infections. In these cases, we recorded:

- Type of surgery (elective vs. emergency)
- Timing of antibiotic prophylaxis
- Patient risk factors (e.g., elevated BMI, diabetes)

Operative reports were reviewed when available.

Microbiological analysis

In cases of suspected wound infection, microbiological swabs were obtained at readmission. We analyzed the isolated pathogens, frequency of polymicrobial infections, and the prevalence of common bacteria such as *Staphylococcus aureus*, *E. coli*, and anaerobic organisms.

Outcomes

Primary outcome measures included:

(1) The percentage of deliveries followed by postpartum complications requiring medical evaluation, stratified by mode of delivery
(2) The distribution of complication types after vaginal vs. cesarean delivery
(3) The proportion of women requiring hospital readmission (including ICU admissions) for severe postpartum complications, by delivery mode
(4) Among infection-related complications, the relative frequency of endometritis, mastitis, wound infections, and others
(5) The microbiological profile of wound infections

Additionally, we analyzed year-to-year trends in the incidence of postpartum complications, with particular focus on potential shifts during the COVID-19 pandemic years (2020–2021) compared to previous years.

Our findings will be compared with international data on postpartum infection rates, cesarean-related risks, hospital readmission comparisons, and the impact of the COVID-19 pandemic on postpartum complications.

Data analysis

Descriptive statistics were used to summarize the data. Analyses were performed using Microsoft Excel. No inferential statistical methods were applied, as the study aimed to describe trends rather than test hypotheses.

Ethical considerations

Ethical Committee approval was not required for this retrospective study, as it was based solely on anonymized hospital data and did not include any identifiable patient information.

Results

Postpartum complication rates

Between 2008 and 2024, UMC Ljubljana recorded a total of 110,726 births - 88,720 vaginal deliveries and 22,006 cesarean sections – resulting in an overall cesarean rate of 19,8 %. During this period, an average of 7.6 % of women who delivered vaginally were evaluated for at least one postpartum complication (Figure 1), compared to 10.6 % of women following cesarean delivery (Figure 2). These rates remained relatively stable throughout the study period, with cesarean deliveries consistently associated with a higher rate of postnatal complication. Some women had multiple postpartum evaluations. The elevated complication rate after cesarean section aligns with the well documented increased risks associated with surgical deliveries.

Types of complications after vaginal delivery

Among women who experienced postpartum complications following vaginal birth, the most frequent issues were related to breastfeeding (36.4 %) and infections. The predominant breastfeeding complication was mastitis, typically presenting with localized breast pain, redness, fever, and malaise. Several cases progressed to breast abscesses, requiring surgical drainage. The second most common category (20.8 %) included various “other” complications such as urinary tract infections (UTIs), headaches, hypertension, thromboembolic events, collapse, or generalized malaise or fatigue. Perineal wound issues (15.4 %) – including infections, dehiscence or hematoma were also common. Less frequent complications included endometritis and postpartum hemorrhage.

More than half of the postpartum complications in this group were related to breastfeeding or perineal wounds and were generally managed on an outpatient basis with supportive measures (e.g. lactation support, analgesia) or oral antibiotics when needed. The distribution of causes of vaginal delivery complications is illustrated in Figure 3.

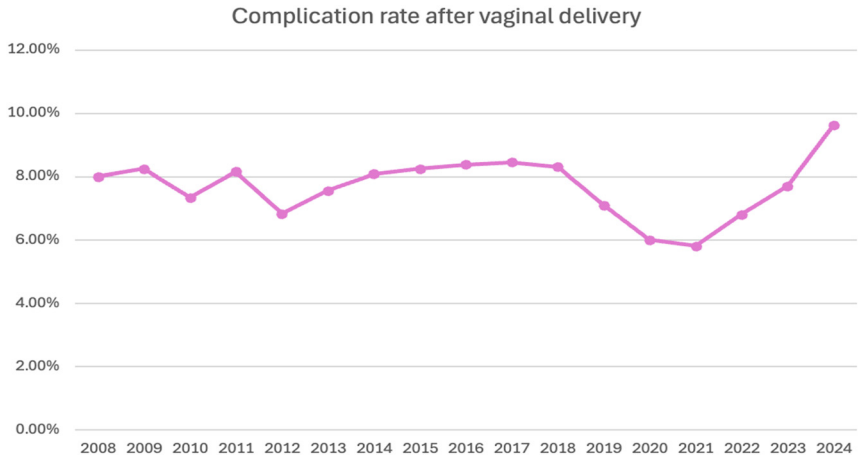

Figure 1: Postpartum complication rates among women with vaginal deliveries at the University Medical Center Ljubljana, 2008–2024. The figure presents the annual percentage of women who underwent medical evaluation for at least one postpartum complication within six weeks following a vaginal birth. Data are based on retrospective analysis of anonymized hospital records. Complications include both physical and psychological conditions documented during follow-up visits or hospital readmissions.

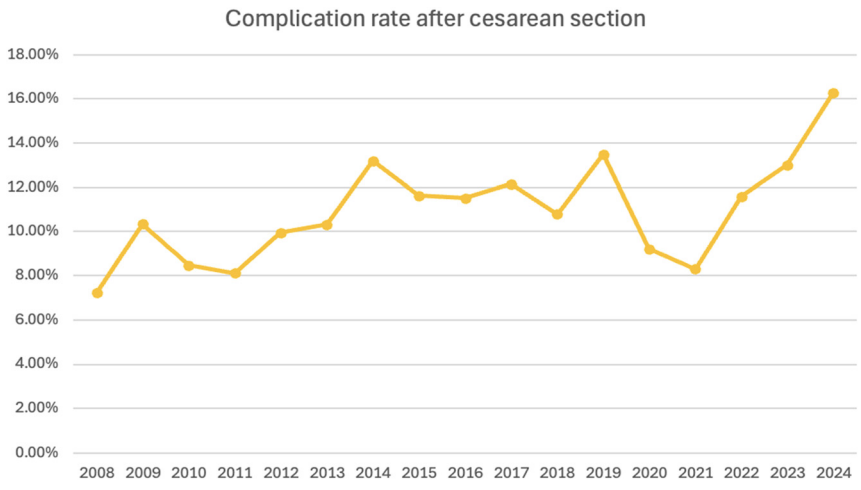

Figure 2: Postpartum complication rates among women with cesarean deliveries at the University Medical Center Ljubljana, 2008–2024. The figure displays the annual percentage of women who underwent medical evaluation for at least one postpartum complication within six weeks following a cesarean birth. Data are based on retrospective analysis of anonymized hospital records. Complications include both physical and psychological conditions documented during follow-up visits or hospital readmissions.

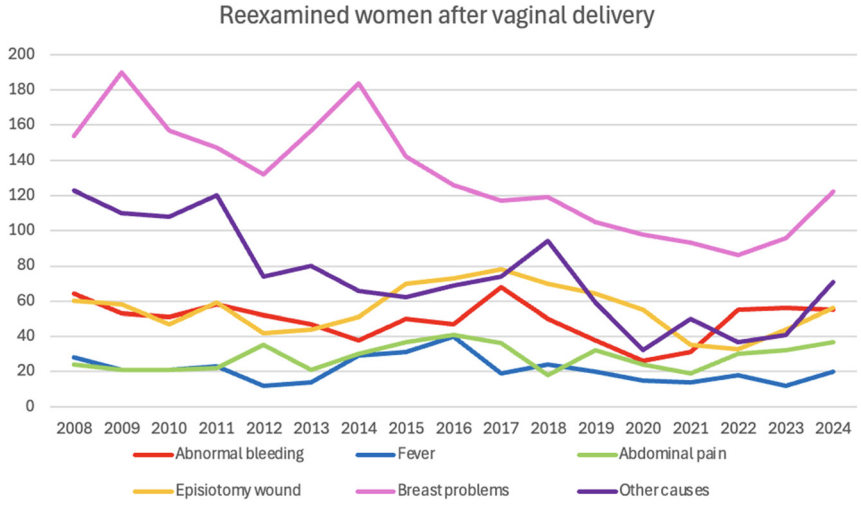

Figure 3: Distribution of postpartum complication types following vaginal birth at the University Medical Center Ljubljana, 2008–2024. The figure illustrates the distribution of identified causes of postpartum complications in women who delivered vaginally. Complication categories include abnormal bleeding (postpartum hemorrhage), fever, abdominal pain (endometritis), episiotomy wound complications, breast problems (mastitis and other breast-related problems), other causes (urinary tract infections, severe headaches, hypertension, thromboembolism, circulatory collapse, fatigue, and general malaise).

Types of complications after cesarean delivery

In contrast, women who delivered via cesarean section had a different pattern of complications. Surgical site issues dominated, with 42.1 % of post-cesarean complication visits involving the laparotomy wound (Figure 4). Most wound-related problems were hematomas, often identified during routine wound check or reported by patients due to swelling or discharge.

Wound infections were documented in 7.7 % of post-cesarean complications. These typically presented with incisional pain, erythema, purulent discharge, and, in some cases, fever. Some progressed to partial wound dehiscence. Management ranged from local wound care to surgical re-suturing, depending on severity.

The second most common complication category was breastfeeding-related (around 16 %), predominantly mastitis. Endometritis was also notable in this group, though many cases were managed on an outpatient basis. Other complications (UTIs, thromboembolic events, etc.) occurred less frequently than wound and breast complications.

While many postpartum complications were managed without admission, a portion of women required hospitalization for more severe issues. Between 2020 and 2024, 33 women who had delivered vaginally were readmitted due to postpartum complications – representing 0.92 % of all vaginal deliveries in that period. In contrast, 26 women were readmitted following cesarean birth, equating to 2.76 % of all cesarean deliveries – making hospital readmission nearly three times more likely after cesarean birth. For vaginal births, the most common reason for readmission was endometritis. Among cesarean deliveries, wound infections were the predominant cause – often involving cellulitis or abscess formation requiring intravenous antibiotics or surgical treatment.

Hospital readmissions and intensive care

While many postpartum complications were managed without admission, a portion of women required hospitalization for more serious issues. Between 2020 through 2024, 33 women who had delivered vaginally were readmitted to the Department of Intensive Perinatal Medicine due to postpartum complications – representing 0.92 % of all vaginal deliveries in that period. In contrast 26 women were readmitted following cesarean birth, equating to 2.76 % of all cesarean deliveries, making hospital readmission nearly three times more likely after cesarean birth than after a vaginal birth. For vaginal births, the most common reason for readmission was endometritis. Among cesarean deliveries, wound infections were the predominant cause – often involving cellulitis or abscess formation requiring intravenous antibiotics or surgical treatment.

Figures 5 and 6 show the distribution of causes for postpartum hospital admissions following vaginal and cesarean births, respectively.

During the COVID-19 pandemic (2020–2021), several readmissions were related to worsening SARS-CoV-2 infection. These included women who had delivered both vaginally and via cesarean section and subsequently developed respiratory deterioration requiring inpatient management. There was one maternal death in the study period; all other women with severe sepsis or COVID-19 eventually recovered and were discharged.

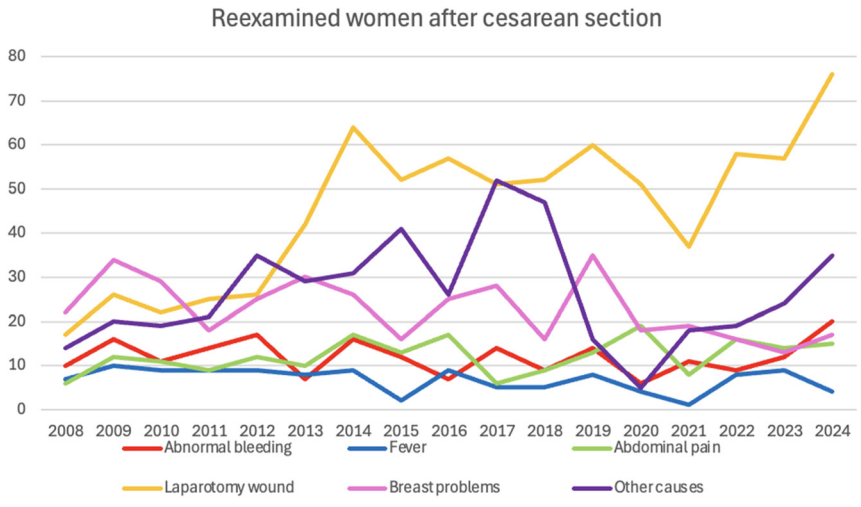

Figure 4: Distribution of postpartum complication types following cesarean birth at the University Medical Center Ljubljana, 2008–2024. The figure illustrates the distribution of identified causes of postpartum complication categories among women who delivered by cesarean section. Complication categories include abnormal bleeding (postpartum hemorrhage), fever, abdominal pain (endometritis), laparotomy wound (surgical wound complications (e.g., laparotomy site infections or dehiscence)), breast problems (mastitis and other breast-related problems), other causes (urinary tract infections, severe headaches, hypertension, thromboembolism, circulatory collapse, fatigue, and general malaise).

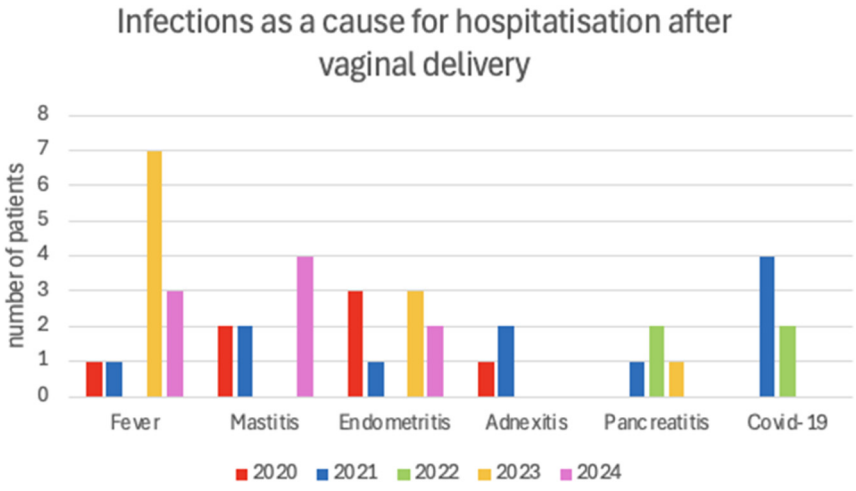

Figure 5: Causes of postpartum hospital readmission among women with vaginal deliveries at the University Medical Center Ljubljana, 2008–2024. The figure shows the distribution of primary causes for hospital readmission within six weeks postpartum following vaginal birth. The most frequent causes included fever, mastitis, endometritis, Covid-19.

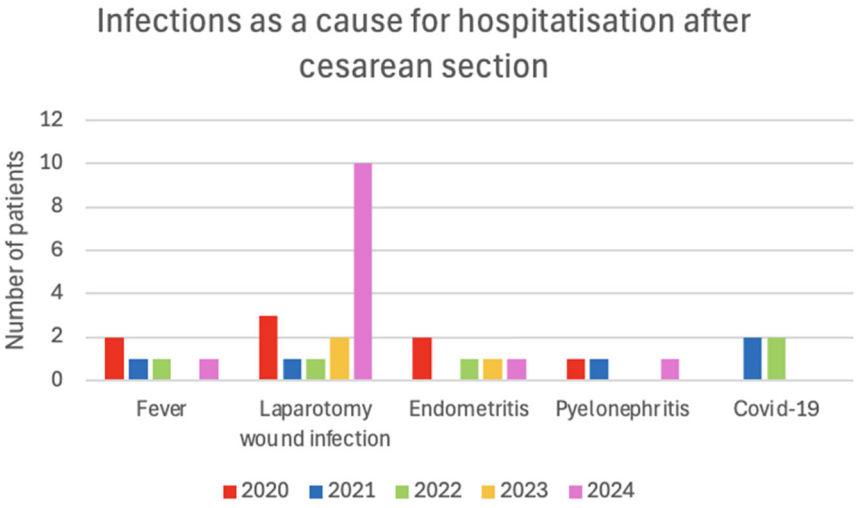

Figure 6: Causes of postpartum hospital readmission among women with cesarean deliveries at the University Medical Center Ljubljana, 2008–2024. The figure shows the distribution of primary causes for hospital readmission within six weeks postpartum among women who underwent cesarean section. The most frequent causes included surgical wound infections, fever, endometritis, Covid-19.

Cesarean wound infections – risk factors and characteristics

A detailed review of cesarean wound infections from 2020 to 2024 revealed that 76 % occurred following emergency cesarean sections, while 24 % followed elective procedures. Although 88 % of affected women had received prophylactic intraoperative antibiotics (typically a first-generation cephalosporin), most infections occurred despite prophylaxis – often due to delayed antibiotic administration during emergency procedures.

Obesity (BMI>30) was present in 56 % of affected women, and 29 % had diabetes (including gestational and pregestational). The average maternal age in this group was 35 years.

Minor superficial wound separations were typically managed on an outpatient basis with local wound care and oral antibiotics. More severe or deep infections required hospitalization for intravenous antibiotics and, in some cases, surgical debridement (Figure 7).

Microbiological findings

Microbiological swabs were obtained in nearly all cases of suspected wound infection, with pathogens identified in all but two instances. Approximately half of the infections were polymicrobial, involving both anaerobes (e.g., *Prevotella*, *Peptoniphilus*, *Fusobacterium*) and aerobes (e.g., *Providencia rettgeri [P. rettgeri]*, *Enterococcus faecalis [E. faecalis]*, *E. coli*).

One-third of cultures revealed dual organisms, such as *Staphylococcus aureus (S. aureus)* with *Serratia marcescens*, or *Pseudomonas aeruginosa* with *E. coli*. Single-pathogen infections (≈20 %) most commonly involved *S. aureus*, *Staphylococcus epidermidis*, *Streptococcus intermedius*, *E. faecalis*, or *Bacteroides fragilis*. These findings are consistent with polymicrobial flora originating from skin, genital tract, and gastrointestinal sources (Figure 8).

In recent years, there has been a marked increase in culture acquisition for suspected wound infections. While only 38–40 % of clinical wound infections were cultured in

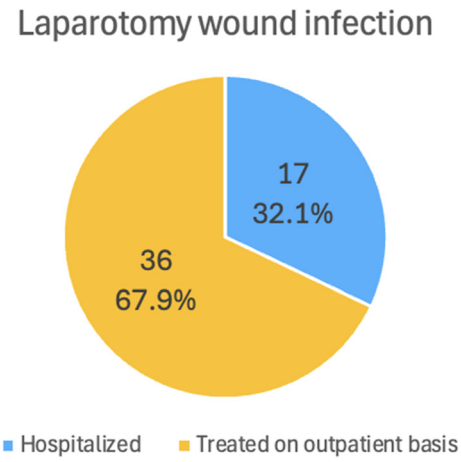

Figure 7: Management setting of laparotomy wound infections following cesarean delivery at the University Medical Center Ljubljana, 2020–2024. The figure compares the proportion of women with laparotomy wound infections who were managed in an outpatient setting (e.g. local wound care, oral antibiotics) vs. those who required hospital admission for inpatient treatment, including intravenous antibiotics or surgical intervention. Data reflect clinical management practices over a five-year period.

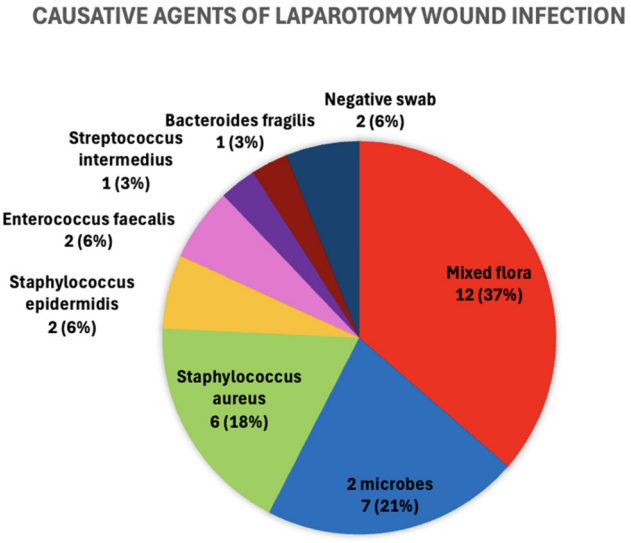

Figure 8: Microbiological profile of laparotomy wound infections following cesarean delivery at the University Medical Center Ljubljana, 2020–2024. The figure presents the distribution of microbiological isolates identified in laparotomy wound infections after cesarean delivery. Pathogens are categorized as polymicrobial flora (mixed flora: *Providencia rettgeri, Enterococcus faecalis, Prevotella denticola, Peptoniphilus species, Prevotella nigrescens, Fusobacterium periodonticum*), dual infections (2 microbes: *Staphylococcus aureus and Serratia marcescens; Pseudomonas aeruginosa and Escherichia coli; Streptococcus agalactiae and Enterococcus faecalis*), or single-pathogen isolates (*Staphylococcus aureus, Staphylococcus epidermidis, Enterococcus faecalis, Streptococcus intermedius, Bacteroides fragilis*).

2022–2023, this rose to 83 % in 2024. This trend likely reflects increased awareness of antimicrobial resistance and the need for pathogen-specific treatment. It may also partly explain the apparent rise in documented infections.

Rising trend in cesarean wound infections

An unexpected observation was the rise in cesarean wound infections in 2024, with 24 documented cases – more than in any previous year – despite no significant increase in total cesarean procedures. The cases were distributed across different obstetric teams and surgical indications, suggesting no single operator or technique was responsible. Most of these infections occurred after emergency cesarean sections, where antibiotic prophylaxis may have been administered intraoperatively rather than pre-incision. A quality improvement initiative is currently underway at our institution to investigate contributing factors and optimize prophylactic protocols.

Discussion

Infection rates between two largest hospitals in Slovenia

We compared our findings with recent data from the Maribor Perinatology Department, the second-largest maternity hospital in Slovenia. Mikluš et al. [11] reported a 2.3 % rate of surgical wound infections following cesarean section between June 2023 and June 2024, among 434 women who all received preoperative antibiotic prophylaxis. This is notably lower than our observed rate of 7.7 % at UMC Ljubljana in the same period. Several factors may explain this discrepancy, including differences in patient demographics, surgical technique, antibiotic timing, or documentation rigor. Importantly, both institutions reported similar causative pathogens – such as *S. aureus*, *Staphylococcus haemolyticus*, and *Peptoniphilus* – indicating a shared microbial profile of post-cesarean infections in Slovenia. The proportion of infections that underwent microbiological swabbing was also higher in our center (83 % in 2024 vs. 60 % in Maribor), which may have contributed to the difference in confirmed infection rates. Both hospitals found that most infections occurred in women with emergency cesarean sections and elevated BMI, reinforcing the association between obesity, emergency surgery, and infection risk [11].

Infection rates in Europe and globally

Our data show that 8–11 % of women experienced postpartum complications requiring medical care, with infections playing a major role. This aligns with global data, where postpartum infections like endometritis and wound infections occur in ~1–2 % of deliveries. However, prevalence varies widely based on healthcare infrastructure. In low-income countries, infections are a leading cause of maternal mortality, responsible for up to 10 % of maternal deaths in Africa and Asia [12]. In contrast, infection-related maternal deaths in Europe are rare, largely due to the widespread use of antibiotics and modern hygiene practices. For instance, Ireland reports a maternal sepsis incidence of 1.81 per 1,000 pregnancies, with nearly half occurring postpartum – about 0.9/1,000 [13]. Our findings confirm that while life-threatening cases are rare in well-resourced settings, postpartum infections remain clinically significant.

Postpartum hospital readmissions – international comparison

Hospital readmission rates in our cohort were ~0.9% after vaginal delivery and 2.8 % after cesarean section, consistent with global benchmarks. International data show vaginal birth readmission rates of 1–2 % and cesarean rates of 3–4 %. A U.S. study of over two million births reported a 30-day readmission rate of ~1 %, with significant inter-hospital variability [14]. In the UK, readmission rates rose from 2.5 % in 2008 to 3.4 % in 2016 [15]. Infections – especially endometritis, wound infections, and mastitis – were the leading causes in our data, as seen globally, accounting for up to 60 % of postpartum readmissions in some studies. These findings suggest our outcomes are within international norms, but cesarean birth remains a key risk factor.

Cesarean section – risks and outcomes

Cesarean delivery is consistently associated with higher complication and infection risks. Literature shows up to a 5-fold higher infection rate compared to vaginal birth [16], primarily due to the surgical incision and risk factors such as prolonged labor or membrane rupture. In our cohort, 7.7 % of cesarean births resulted in wound infection, comparable to other centers that report infection rates between 3 and 15 %, depending on patient risk and prophylaxis. A Danish cohort reported infection rates of 7.6 % within 30 days of cesarean vs. 1.6 % after vaginal birth [16]. Consistent with international data, most infections in our series followed emergency cesareans, echoing findings that unplanned cesareans carry greater morbidity [10]. Obesity and diabetes were frequent in our infected cohort, both known to impair healing and immune response [16]. Despite routine prophylactic antibiotics significantly reducing infection rates over the decades – from 20–30 % in the 1970s to <10 % today – our findings show that emergency cases, where prophylaxis is often delayed, remain high-risk. This highlights the need for ongoing quality assurance and adherence to best practices [17].

Microbiology of postpartum infections – comparison with other centers

Our microbiological findings are consistent with other centers. Postpartum wound infections and endometritis are typically polymicrobial, involving skin, genital, and intestinal flora [17]. *S. aureus* was isolated in 18 % of our wound infections, matching global data showing it in 15–20 % of cases. *E. coli*, *E. faecalis*, *Serratia*, and *Peptoniphilus* were also common. Notably, we isolated *P. rettgeri*, a rare Gram-negative organism in obstetric infections, suggesting possible nosocomial colonization. Understanding common pathogens supports the use of broad-spectrum antibiotics pending culture results and helps tailor empirical therapy.

COVID-19 and postpartum infection

The COVID-19 pandemic introduced additional complexities to postpartum care. In our study, several postpartum women were readmitted for COVID-related pneumonia, a complication previously unrecorded. Studies show that SARS-CoV-2 during or shortly after pregnancy increases the risk of severe maternal morbidity, including serious complications, sepsis and organ failure [18]. While we did not observe a spike in classical puerperal infections, pandemic-related disruptions, such as delayed follow-up or staffing shortages, may have contributed to complications. A rise in wound infections in 2024 may, in part, reflect these lingering effects.

Strengths and limitations

Strengths

This study included a large, representative cohort from Slovenia's largest maternity hospital, the main tertiary

referral center for both low- and high-risk pregnancies. The extended 17-year observation period enabled a meaningful evaluation of temporary and long-term trends, including those observed during the COVID-19 pandemic. The incorporation of microbiological data provided detailed insight into the pathogens responsible for postpartum infections, thereby enhancing the clinical relevance of the findings. Taken together, the scale, duration, and depth of available data make this one of the most comprehensive assessments of postpartum complications in the region. Nevertheless, the study is strengthened by its large and representative sample, encompassing almost all births at the country's largest maternity hospital, and by the long observation period, which allowed us to evaluate patterns and outcomes across nearly two decades.

Limitations

As a retrospective study, our findings are limited by the quality and completeness of hospital records. Minor complications managed at home, by general practitioners, or at smaller regional facilities may not have been captured, which could lead to underestimation of less severe postpartum problems. We also lacked detailed data on outpatient treatments. Over the 17-year period, changes in clinical practice – such as new prophylactic protocols or adaptations during the COVID-19 pandemic – may have influenced the trends we observed.

Due to the limited nature of the dataset, we were only able to perform descriptive statistical analysis. No inferential statistics (e.g., hypothesis testing or multivariable modeling) were applied, as key confounding variables were not available. While we stratified postpartum complications by mode of delivery, we were unable to conduct a formal statistical comparison between vaginal and cesarean births. The dataset did not include key maternal and obstetric variables (such as maternal age, gestational age at delivery, onset of labor, or the indication for cesarean section) necessary for valid statistical comparisons between vaginal and cesarean deliveries, limiting the ability to assess group differences beyond descriptive stratification. As a result, any direct comparison between the two groups could lead to biased or misleading conclusions. The lack of detailed clinical and demographic information in our dataset limited the possibility of performing multivariable analyses to identify independent risk factors for postpartum complications. As a result, we were unable to construct a reliable multivariate model to assess which factors significantly contribute to the occurrence of complications. Future studies using more comprehensive clinical datasets are warranted to explore differences in postpartum complications between delivery modes in greater depth.

Conclusions

Postpartum infections continue to represent the most common complications following childbirth, with a particularly high incidence after cesarean delivery. Among the most frequently observed conditions are mastitis, endometritis, and surgical site infections. While many of these can be effectively managed in outpatient settings, a significant proportion still requires hospital readmission, and in severe cases, intensive care. The risk of infection is notably elevated in emergency cesarean sections and in women with additional risk factors such as obesity, diabetes, or pre-existing medical conditions.

Preventive measures, including timely administration of prophylactic antibiotics, play a critical role in reducing the incidence and severity of these complications. However, prevention alone is not sufficient. Structured postpartum follow-up, patient education on warning signs, and early clinical recognition are essential components of comprehensive postpartum care. Greater reliance on microbiological testing, when clinically appropriate, supports more targeted antimicrobial therapy and helps mitigate the growing concern of antibiotic resistance.

Although postpartum infections cannot be entirely eradicated, their overall burden on both maternal health and healthcare systems can be significantly reduced. This requires adherence to standardized, evidence-based clinical protocols, as well as a sustained commitment to quality improvement and clinical vigilance. Optimizing postpartum care pathways – particularly for high-risk groups – should remain a key focus in improving maternal outcomes in both hospital and community settings.

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Data availability: The datasets generated during and analyzed during the current study are available from the

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