REVIEW ARTICLE

REVISTA ENFERMAGEM ATUAL IN DERME

RISK DETERMINANTS AND PREVENTION STRATEGIES FOR PUERPERAL INFECTION: AN INTEGRATIVE LITERATURE REVIEW

DETERMINANTES DE RIESGO Y ESTRATEGIAS DE PREVENCIÓN DE LA INFECCIÓN PUERPERAL: UNA REVISIÓN INTEGRATIVA DE LA LITERATURA

DETERMINANTES DE RISCO E ESTRATÉGIAS DE PREVENÇÃO DA INFECÇÃO PUERPERAL: UMA REVISÃO INTEGRATIVA DE LITERATURA

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ABSTRACT
Introduction: The puerperal or postpartum period is understood as an involutive action for the reestablishment of the woman's body. Approximately 92% of pregnant women die from simple complications related to pregnancy and childbirth. In this context, puerperal infection is a major public health problem and contributes to high levels of morbidity and mortality. **Objective**: To analyze and describe the risk factors and prevention of Puerperal Infection through the scientific literature. **Method**: This is an integrative literature review. The literature search was carried out in the following databases: Medical Literature Analysis and Retrieval System Online, Latin American and Caribbean Literature in Nursing Sciences, Cumulative Index to Nursing and Allied Health Literature, SCOPUS and Web of Science. **Results**: From the searches carried out in the databases, 143 articles were found. The eligibility stage resulted in 35 articles, after which 12 articles were included in the study. **Conclusion**: Studies indicate that puerperal infection is a significant cause of mortality among postpartum women worldwide. Effective prevention of puerperal sepsis and its consequences depends on knowledge of prophylactic measures. It is imperative that nurses and other health professionals involved in the care of pregnant women provide educational information, especially regarding hygiene habits, considering the social, economic and cultural aspects of women.
Keywords: Pregnant Women. Postpartum Period. Puerperal Infection.

RESUMEN
Introducción: El puerperio o posparto se entiende como una acción involutiva para el restablecimiento del cuerpo de la mujer. Alrededor del 92% de las mujeres embarazadas mueren por complicaciones simples relacionadas con el embarazo y el parto. En este contexto, la infección puerperal es un importante problema de salud pública y contribuye a altos niveles de morbilidad y letalidad. **Objetivo**: Analizar y describir, a través de la literatura científica, los factores de riesgo y prevención de la Infección Puerperal. **Método**: Se trata de una investigación bibliográfica del tipo revisión integrativa de la literatura. La búsqueda de literatura se realizó en las siguientes bases de datos: Medical Literature Analysis and Retrieval System Online, Latin American and Caribbean Literature in Sciences, Cumulative Index to Nursing and Allied Health Literature, SCOPUS y Web of Science. **Resultados**: De las búsquedas realizadas en las bases de datos se encontraron 143 artículos. La etapa de elegibilidad resultó en 35 artículos, después de los cuales se incluyeron 12 artículos en el estudio. **Conclusión**: Los estudios indican que la infección puerperal es una causa importante de mortalidad entre las mujeres posparto a nivel mundial. La prevención eficaz de la sepsis puerperal y sus consecuencias depende del conocimiento de las medidas profilácticas. Es imperativo que las enfermeras y otros profesionales de la salud involucrados en el cuidado de la mujer embarazada brinden información educativa, especialmente sobre hábitos de higiene, considerando los aspectos sociales, económicos y culturales de la mujer.
Palabras clave: Mujeres Embarazadas. Período Posparto. Infección Puerperal.

RESUMO
Introdução: O período puerperal ou pós-parto é compreendido como uma ação involutiva para o restabelecimento do corpo da mulher. Cerca de 92% das mulheres grávidas morrem por complicações simples relacionadas a gravidez e ao parto. Nesse contexto, a infecção puerperal é um grande problema de saúde pública e contribui com altos níveis de morbidade e letalidade. **Objetivo**: Analisar e descrever por meio da literatura científica os fatores de risco e prevenção da Infecção Puerperal. **Método**: Trata-se de uma pesquisa bibliográfica do tipo revisão integrativa da literatura. A busca na literatura foi realizada nas seguintes bases de dados: *Medical Literature Analysis and Retrieval System Online*, na Literatura Latino-Americana e do Caribe em Ciências da, na *Cumulative Index to Nursing and Allied Health Literature*, *SCOPUS e Web of Science*. **Resultados**: A partir das buscas realizadas nas bases de dados, 143 artigos foram encontrados. A etapa de elegibilidade resultou em 35 artigos, após isto, incluíram-se 12 artigos no estudo. **Conclusão**: Os estudos indicam que a infecção puerperal constitui uma causa significativa de mortalidade entre puérperas em âmbito global. A prevenção eficaz da sepse puerperal e suas consequências depende do conhecimento das medidas profiláticas. É imperativo que enfermeiros e demais profissionais de saúde envolvidos no atendimento às gestantes forneçam informações educativas, especialmente no que tange aos hábitos de higiene, considerando os aspectos sociais, econômicos e culturais das mulheres.
Palavras-chave: Gestantes. Período Pós-Parto. Infecção Puerperal.

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INTRODUCTION

The puerperal or postpartum period is understood as an involutive action for the reestablishment of the woman's body, which occurs after the placenta is expelled, thus returning the involution of the organs as before pregnancy [1]. The puerperium begins after childbirth and is classified according to its duration: immediate (from the 1st to the 10th day postpartum), late (from the 11th to the 45th day postpartum) and remote (from the 45th day, with an unexpected end) [2].

Approximately 92% of pregnant women die from simple complications related to pregnancy and childbirth. Most of these are preventable and should be resolved by professional health care.[3] Furthermore, puerperal infection is a major public health problem and contributes to high levels of morbidity and mortality [4].

Puerperal infection can be defined as an infectious process immediately after birth, due to genital or extragenital causes. Worldwide, puerperal sepsis is one of the five leading causes of maternal death, accounting for 10 to 15% of deaths in the postpartum period. In Brazil, it is defined as the 3rd leading cause of maternal mortality, with the highest number of puerperal infections occurring after the woman is discharged from hospital. Infections are also the most common cause of death after spontaneous or induced abortions. The medical burden of these infections is aggravated by the alarmingly rapid increase in bacterial resistance to commonly used antibiotics [5-6].

The infection is diagnosed when the puerperal woman has a temperature equal to or greater than 38°C, lasting more than 48 hours during the first ten days after birth, excluding the first 24 hours. It is worth noting that this condition does not apply to patients with surgical wounds such as episiotomy and cesarean section, since in such cases, fever is usually present [7].

In this regard, it is observed that, in contrast to normal birth, a natural and physiological process, surgical birth is an invasive procedure and is indicated when there are risks that threaten the life of the mother and/or baby. The World Health Organization (WHO) emphasizes that cesarean sections are being frequently performed in several countries. Brazil has the second highest rate of cesarean sections in the world, second only to the Dominican Republic. This is a worrying fact, since this type of delivery often contributes to the increase in the rate of infections in postpartum women in the country, due to the greater risks when compared to natural births [7-8].

Some characteristics contribute to the development of puerperal infection, namely: socioeconomic profile, extremes of age, economic deficit and difficulty in accessing health services. Among the clinical, obstetric and care factors, many are controllable, such as obesity, which in itself represents a risk factor for other comorbidities, such as diabetes,

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hypertension and eclampsia. In addition to the correct management of the type of delivery and procedures during and after delivery, it is important to provide quality care, which includes the development of interventions aimed at the real needs of postpartum women, qualifying the care provided with an effective contribution to the prevention and reduction of puerperal infection rates. Thus, the nursing team plays the important role of identifying infection situations.[9]

Therefore, considering the high rates of puerperal infection worldwide, this study aims to analyze and describe, through scientific literature, the determinants of risk and prevention strategies for Puerperal Infection.

METHODS

This is an integrative literature review, which consists of a research method that aims to synthesize previously published knowledge and include the applicability of studies based on practice[10].

The study has a qualitative approach, based on secondary studies and encompasses a non-measurable, predictable, or informative methodology, analyzing descriptive data from the researcher, emphasizing the process rather than the producer, with the purpose of exposing the perspective of the study participants[11].

To conduct this research, the following steps were followed: formulation of the research question, search in the primary research literature, extraction of data from the original research, evaluation of the primary research included in the literature, analysis and synthesis of the validation results, and presentation of the comprehensive evaluation[12].

The PICo strategy (P: Population; I: Interest; Co: Context) was used to develop the research question (Table 01). Shown in Table 01. Generally used to create non-clinical studies. The acronym is used to address issues, raise appropriate and meaningful definitions referring to the purpose of the research and avoid unnecessary searches [13].

Table 01: Description of the PICo Strategy, Teresina-PI, 2024.

P: Population	Pregnant women/puerperal women
I: Interest	Risk factors and prevention
Co: Context	Puerperal infection

Source: The authors, 2024.

Which resulted in the following guiding question: “What are the risk determinants and prevention strategies for Puerperal Infection”?

The literature search was conducted in the following databases: Medical Literature Analysis and Retrieval System Online (MEDLINE) through the US National Library of

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Medicine National Institutes of Health (PubMed) search engine, in Latin American and Caribbean Literature in Health Sciences (LILACS) through the Virtual Health Library (VHL), in the Cumulative Index to Nursing and Allied Health Literature (CINAHL), SCOPUS and Web of Science.

It is important to note that the identified studies were exported to the EndNote®Web software to identify and remove duplicates. In this way, the studies were transferred to the Rayyan web application. It is also worth noting that two reviewers assessed the eligibility of the studies, while a third reviewer intervened in cases of disagreement.

A form containing information relevant to the study was used to collect data. This took place in May 2024, when a new survey of scientific productions on the proposed topic was carried out, as well as the descriptors established by the Health Sciences Descriptors (DeCS) of the Regional Library of Medicine (Bireme) and their equivalents in English in the Medical Subject Headings (MeSH), with the help of the Boolean operators “AND” and “OR”, as shown in (Table 02).

Table 02 - Search strategy in the MEDLINE, BDENF, SCIELO and LILACS databases.

Database	Data search strategy used
MEDLINE via PUBMED	("*Postpartum period*" *AND* "*Puerperal Infection*")
CINAHL	*(MH "Postnatal Period") OR (MH "Puerperium") OR "postpartum period" OR (MH "Postpartum (Omaha)") OR (MH "Perinatal Period")*
SCOPUS	*("Postpartum period" (All Fields) AND "Puerperal Infection" (All Fields))*
WEB OF SCIENCE	*("Postpartum period" AND "Puerperal Infection")*
BDENF	((Gestantes) *OR* (Gestante) *OR* ("Mulheres Grávidas") *OR* (Parturiente) *OR* (Parturientes)) *AND* (("Período Pós-Parto") *OR* (Puérperas) *OR* (Puerpério)) *AND* (("Infecção Puerperal"))
LILACS	((Gestantes) *OR* (Gestante) *OR* ("Mulheres Grávidas") *OR* (Parturiente) *OR* (Parturientes)) *AND* (("Período Pós-Parto") *OR* (Puérperas) *OR* (Puerpério)) *AND* (("Infecção Puerperal"))
SCIELO	((Gestantes) *OR* (Gestante) *OR* ("Mulheres Grávidas") *OR* (Parturiente) *OR* (Parturientes)) *AND* (("Período Pós-Parto") *OR* (Puérperas) *OR* (Puerpério)) *AND* (("Infecção Puerperal"))

Source: The authors, 2024.

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The inclusion criteria used were original articles published between 01/2019 and 06/2024, aiming to achieve a recent search, based on the last 5 years and that were related to the proposed theme and objectives. Review articles, theses, dissertations, newspapers, editorials, case reports and those that deviated from the proposed theme were excluded.

The organization of the data for analysis followed the steps of: selection of research questions, definition of inclusion and exclusion criteria for literature search, selection of the study and sample and critical analysis of the findings. Initially, analytical readings were carried out with the objective of structuring and synthesizing the data contained in the research sources to obtain an answer to the guiding question [14]. The results of the data obtained were presented through a table (Table 03), where the discussion was descriptive, based on the articles of this study.

From the searches carried out in the databases, 143 articles were found. Of the total, 79 were found in SCOPUS, 29 publications were identified in MEDLINE via the PUBMED portal, 28 articles were found in CINAHL, 4 in WEB OF SCIENCE, 2 in LILACS and 1 in BDENF. Of these, 5 duplicate articles were excluded, and the others were selected for reading the title and abstract, and were excluded after the screening stage, as they did not meet the study criteria. The eligibility stage resulted in 35 articles, after which 14 articles were included in the study, as shown in the Flowchart in Figure 1. It is worth noting that the recommendations of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses - PRISMA[15] were followed for selection of publications, as shown in Figure 1 below.

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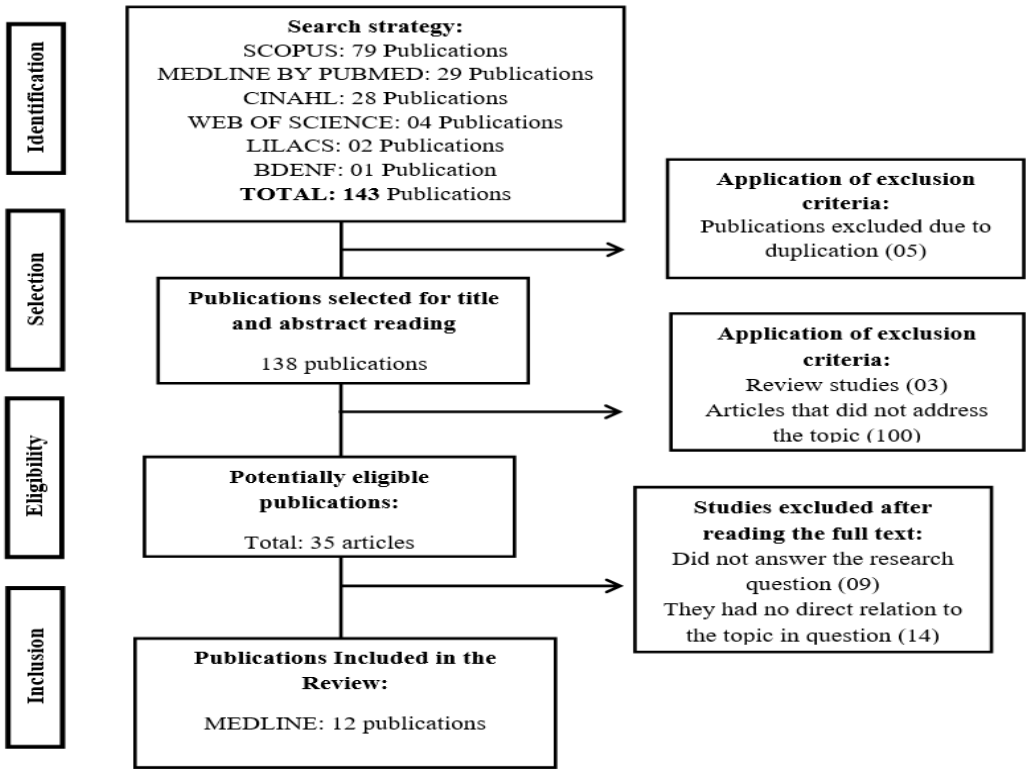
Figure 1 – Flowchart for selection of primary studies, prepared based on the PRISMA* recommendation. Teresina, PI, Brazil, 2024.



Source: Database: SCOPUS, MEDLINE via PUBMED, CINAHL, WEB OF SCIENCE, LILACS, BDENF, 2024.

Thus, 12 articles were selected in the study, of which, in relation to authorship, two studies were written by two authors and the other eleven were carried out by four or more authors. The articles were published in the years 01/2019 to 06/2024, with emphasis on the years 2023 and 2020, with four publications (Table 03).

Table 03 - Summary of studies included in the review, according to authors, year of publication, title, type of study, level of evidence and main results. Teresina, PI, Brazil, 2024.

N	Author(s)/ Year	Study title	Type of study	Main results
16	Kalbarczyk *et al.*, 2022	Exploring terminology for puerperal sepsis and its symptoms in urban Karachi, Pakistan to improve communication, care-seeking, and illness	Formative research	The lack of a specific term for postpartum sepsis makes it difficult to seek care and obtain a correct diagnosis, especially in local communities.

		recognition		
17	Liu *et al*., 2023	Risk Factors, Trends, and Outcomes Associated With Postpartum Sepsis Readmissions.	Retrospecti ve cohort study	A diagnosis of sepsis was present in 7.9% of all postpartum readmissions. Characteristics associated with readmission for postpartum sepsis included younger age at delivery, obesity, pregestational diabetes, and chronic hypertension. Readmissions for postpartum sepsis were associated with infection during the delivery hospitalization, including intra-amniotic infection or endometritis, wound infection, and labor sepsis.
18	Petrucio *et al*., 2021	Surgical site infection after cesarean section in a maternity hospital in Manaus, Brazil: the importance of rational use of antibiotic therapy	Prospective cohort	The surgical site infection rate was high during the study period. There is a need for an effective protocol for bacterial identification and monitoring of postpartum women. Knowledge of the epidemiological and microbiological characteristics can help in planning the care provided by health institutions to minimize cases of surgical site infection and its consequences.
19	Mauricio, Huamán; Espinoza, 2023	Factores asociados a complicaciones post parto según la encuesta demográfica y de salud familiar en Perú 2019-2020.	Cross-sectional and analytical study	Age 20–35 years increased the prevalence of postpartum complications by 1.12 times compared to women aged 36 years and older. Having complications during childbirth increases the prevalence of postpartum complications by 2.75 times. Having primary and secondary education decreases the prevalence of postpartum complications compared to higher education; being single decreases the prevalence of having postpartum complications, compared to the cohabiting group.
20	Oyato *et al*, 2024.	Determinants of puerperal sepsis among postpartum women: a case-control study in East Shoa Zone public hospitals, Central Ethiopia	Unmatched case-control	Gestational diabetes mellitus, anemia, malnutrition, placenta previa, obstructed labor, postpartum hemorrhage, and five or more pervaginal examinations during labor were the determinants of puerperal sepsis.
21	Bakhtawar*et al.*, 2020	Risk factors for postpartum sepsis: a nested case-control study	Nested case-control/	1-4 prenatal visits, 3 or more vaginal examinations, home birth, preterm birth, diabetes in pregnancy, lower abdominal pain, vaginal discharge, and blood glucose were significantly associated with sepsis. Risk factors and the model based on clinical signs and symptoms have adequate power to

				discriminate women with and without sepsis.
22	Belgundkar; Heikham; 2020	A Study to Assess the Effectiveness of Nurse Intervention Programme on Knowledge Regarding Prevention of Puerperal Infection among Post Natal Mothers in KLE Prabhakar Kore Hospital at Belagavi Karnatak	Pre-validated structured questionnaire	Postpartum mothers gained a notable level of knowledge when compared to their previous knowledge before the administration of the nursing intervention program. At pretest, 87.5% of postnatal mothers had inadequate knowledge, 12% had moderate knowledge, and 0% had adequate knowledge. At posttest, 0% of mothers had inadequate knowledge, 26.66% had moderate knowledge, and 73.33% had adequate knowledge.
23	CH *et al*., 2019	Study to Assess the Knowledge of Postnatal Mothers Regarding Prevention of Puerperal Complications in Selected Hospital at Chinakakani, Guntur (Dt), Andhra Pradesh	Descriptive	Most women had low level of knowledge about puerperal complications, maximum number of women are uncertain about puerperal infection. Health education programs on prevention of puerperal complications can improve postpartum knowledge and help the same by decreasing the incidence of puerperal complications.
24	Nchimbi; Joho, 2022	Puerperal sepsis-related knowledge and reported self-care practices among postpartum women in Dar es salaam, Tanzania. Women's Health.	Analytical cross-sectional	A significant gap in reported self-care practices to prevent puerperal sepsis was evidenced. Secondary and tertiary education were significant predictors of knowledge and reported self-care practices. Special attention should be given to women with low educational level.
25	Sarkar, Ahalawat, Kumari, 2019.	A Descriptive Study to Assess the Knowledge and Practices Regarding Prevention of Puerperal Infection among Postnatal Mothers in Civil Hospital, Panipat, Haryana	Non-experimental descriptive research	Most of the postpartum mothers were not aware about the prevention of puerperal infection. Almost more than half of the postpartum mothers had an average knowledge of 63.33% about the prevention of puerperal infection and 52.5% had unsatisfactory practices about the prevention of puerperal infection.
26	Kopeć-Godlewska *et al*, 2020	Infection-associated hospitalizations of women in labour	Population-based retrospective analysis	Patients who delivered in low-referral hospitals had a higher chance of developing puerperal infection. Local and general infections were the most frequently observed in the study population (probably deep SSSIs, since superficial ones are more often cured in outpatient and other settings). The serious reason for hospitalizations in the

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				study population was non-infectious, especially retained placenta and/or fetal membranes.
27	Felisian *et al*, 2023	Sociocultural practices and beliefs during pregnancy, childbirth, and postpartum among indigenous pastoralist women of reproductive age in Manyara, Tanzania: a descriptive qualitative study	Qualitative descriptive	Sociocultural beliefs and practices during pregnancy in indigenous communities have hindered access to the adoption of interventions that directly impact the improvement of morbidity and mortality in the mother-baby binomial, slowing progress. Such beliefs encourage harmful behaviors and are applied in the peripartum period.

Source: The authors, 2024.

As observed in the identified studies, puerperal infection is a condition defined by the presence of bacterial infections in the genital tract after childbirth. Worldwide, it is considered an important cause of maternal morbidity and mortality, being responsible for a significant percentage of postpartum readmissions, as well as for adverse outcomes, since sepsis diagnoses are frequently associated with maternal deaths in the puerperium [16-17].

A study conducted in Brazil highlights that cesarean delivery is one of the main risk factors for puerperal infection and the predominant profile of patients with surgical site infection after cesarean section is composed of women with low education, single and performing activities requiring lower qualifications. This profile is partially consistent with a Peruvian study, which indicates that age is a factor that favors postpartum complications [18-19].

In addition, some factors contribute to the occurrence of infection, such as surgical time longer than 56 minutes, emergency cesarean section or one decided after the onset of labor, accidental injury to the genital organ, lack of antibiotic prophylaxis, and insufficient number of prenatal consultations. These risks can be classified into three types: host-related, pregnancy-related, intrapartum-related, and procedure-related [19-18].

Data obtained from a maternity hospital in Manaus reveal that, among the host-related risk factors for puerperal infection, are obesity (70.4% of participants were obese), age (19.75% were in the maternal age range above or younger than the ideal), and diabetes mellitus (13.6% had a diagnosis of pregestational diabetes). Regarding the risk factors related to pregnancy and intrapartum, 6.2% had pregnancy-induced hypertension. Regarding the factors involved in the procedure, 29.6% of women with bacterial infection did not use prophylactic antibiotics and 45.6% of patients underwent emergency cesarean section. Furthermore, the average number of prenatal consultations was

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approximately 4, while national protocols have recommended, since 2016, that at least eight consultations be carried out during prenatal care [18].

Conditions such as anemia, obstructed labor, malnutrition, placenta previa and performing five or more pervaginal exams during labor are also determinants of puerperal infection. Anemic and malnourished patients are susceptible due to a weakened immune system, and women with obstructed labor are 2.76 times more likely to develop puerperal complications. Furthermore, multiparous women are more likely to develop postpartum complications compared to primiparous mothers, as they are less inclined to seek medical care for infectious symptoms, as they have had previous births and assume that the symptoms are normal [20].

Few prenatal consultations, premature birth, lower abdominal pain and vaginal discharge contribute to the occurrence of postpartum infection. Therefore, it is essential that health professionals have knowledge about pathogens, risk factors, clinical signs and symptoms, with the aim of discriminating between women with and without sepsis and, consequently, have sufficient basis to develop prevention policies, in order to reduce threats and enhance the treatment of the infection[21].

One of the most effective methods in dealing with puerperal infection is education about prevention. In a study, it was noted that postpartum mothers had greater success in knowledge after the application of nursing intervention, when compared to prior knowledge. It is important to reduce maternal mortality and morbidity through the efforts of the mothers themselves, who can make more efforts when they have sufficient knowledge[22].

The lack of understanding of women about puerperal complications was noted in a survey conducted in Guntur, India. The article reveals that 36% of women had a low level of knowledge on the subject, 51% were uncertain, and only 13% claimed to have moderate knowledge about puerperal infections. Therefore, the ongoing need for health education programs is highlighted, with professionals helping to understand postnatal care to reduce the incidence of the complications mentioned[23].

In contrast, another study found that 62.1% of participants had adequate knowledge on the subject, a higher percentage than that found by other authors, who obtained less than 40% of coherent responses. Their findings indicate that educational level has a significant impact on the level of knowledge of postpartum women regarding the prevention of puerperal sepsis. A low level of education may be associated with a delay in seeking health services, which consequently increases the chances of maternal mortality[24].

Most postpartum women do not know about care to prevent infections. To this end, it is vital that nurses provide guidance and counseling services to patients. However, to transmit knowledge, it is essential that there is a continuing education plan for clinical nurses,

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containing information from recent research on knowledge and practices for the prevention of puerperal infection[25].

Updating the knowledge of medical and obstetric care teams, as well as accessibility to obstetric care for patients, are essential issues. A survey conducted with women in Poland who were hospitalized in the postpartum period showed that those treated in low-referral hospitals were three times more likely to be affected by puerperal infection than those who gave birth in teaching hospitals. This is due to the lack of surveillance, control and prevention of infections by the team, which was unwilling to transmit knowledge to patients. This is unlike the teams trained in teaching hospitals, which are generally characterized by frequent interactions with users. Women in labor need to learn the basic principles of hygiene to prevent infections, and it is the responsibility of the health professionals involved to teach and encourage them to adjust their habits to appropriate standards of hygiene and behavior[26].

Public health interventions must consider all the contexts in which women are inserted. For example, there are sociocultural beliefs and practices during pregnancy in indigenous communities that influence the occurrence of puerperal infection, such as the application of objects in the vaginal canal during childbirth. Thus, it is important to recognize the cultural context in which mothers find themselves, in order to promote health by providing quality guidance that corrects harmful practices[27].

It is worth noting that preventive measures regarding Puerperal Infection are limited, with a need and emphasis on new studies that address the topic, aiming at reducing and worsening the health of pregnant, parturient and postpartum women.

CONCLUSION

Studies indicate that puerperal infection is a significant cause of mortality among postpartum women worldwide. The main determinants of risk identified include cesarean section, insufficient prenatal consultations and lack of knowledge of pregnant women about the infection.

A clear deficit in preventive measures for puerperal infection was observed among the target audience. Most of the patients studied had unsatisfactory knowledge about the problem, which made it difficult to prevent and identify the signs and symptoms of the infection, increasing the risk of complications.

Effective prevention of puerperal infection and its consequences depends on knowledge of prophylactic measures. It is imperative that nurses and other health professionals involved in caring for pregnant women provide educational information, especially regarding hygiene habits, considering the social, economic and cultural aspects of women. Strengthening health education for pregnant women is a crucial strategy to reduce the incidence of maternal mortality due to postpartum infection.

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Declaration of Conflict of Interest:

Nothing to declare.

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