# RISK FACTORS FOR INFECTION IN THE SURGICAL PUERPERIUM

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**ABSTRACT:** This study aimed to identify the risk factors for infection in the surgical puerperium through applying Carraro's model of care. It is descriptive research with a qualitative approach, undertaken in the first semester of 2013. A total of nine puerperas participated, who had given birth by cesarean section. In order to identify the risk factors for puerperal infection, to which the women were exposed, an instrument was used which was proposed by the author of the above-mentioned model of care. The risk factors identified were: obesity, altered psychological state, lesion of the skin and/or mucosa, deficient immunity, impairment in one or more organs, and use of prostheses. It is considered that this systematized instrument is an important tool for professionals working in the health area, as it makes it possible to identify risk factors for puerperal infection and to undertake the intervention, and is reflected in the minimization of rates of morbidity and mortality resulting from this health issue.
**DESCRIPTORS:** Post-partum period; Infection; Cesarean; Nursing.

## FATORES DE RISCOS PARA INFECÇÃO NO PUERPÉRIO CIRÚRGICO

**RESUMO:** O objetivo deste estudo foi identificar os fatores de risco de infecção no puerpério cirúrgico pela aplicação do modelo de Cuidado de Carraro. Trata-se de uma pesquisa descritiva com abordagem qualitativa, conduzida no primeiro semestre de 2013. Participaram nove puérperas cuja via de parto foi à cesariana. Para identificação dos fatores de risco de infeção puerperal, aos quais as mulheres estavam expostas, utilizou-se de um instrumento proposto pela autora do referido modelo de Cuidado. Os fatores de riscos identificados foram: obesidade, estado psicológico alterado, lesão da pele e/ou mucosas, imunidade deficiente, insuficiência em um ou mais órgãos e o uso de próteses. Considera-se que este instrumento sistematizado se constitui em uma ferramenta importante para profissionais atuantes na área de saúde, por possibilitar a identificação de fatores de risco de infecção puerperal, realizar a intervenção, refletindo-se na minimização das taxas de morbidade e mortalidade por esse agravo.
**DESCRITORES:** Período pós-parto; Infecção; Cesárea; Enfermagem.

## FACTORES DE RIESGOS PARA INFECCIÓN EN EL PUERPERIO QUIRÚRGICO

**RESUMEN:** El objetivo de este estudio fue identificar los factores de riesgo de infección en el puerperio quirúrgico por la aplicación del modelo de Cuidado de Carraro. Es una investigación descriptiva con abordaje cualitativo, conducida en el primer semestre de 2013. Participaron nueve puérperas cuya vía de parto fue la cesárea. Para identificación de los factores de riesgo de infección puerperal a los que las mujeres estaban expuestas, fue utilizado un instrumento propuesto por la autora del referido modelo de cuidado. Los factores de riesgos identificados fueron: obesidad, estado psicológico alterado, lesión de la piel y/o mucosas, inmunidad deficiente, insuficiencia en uno o más órganos y el uso de prótesis. Se considera que este instrumento sistematizado se constituye en una herramienta importante para profesionales actuantes en el área de salud, por posibilitar la identificación de factores de riesgo de infección puerperal, realizar la intervención, resultando en la minimización de los índices de morbidad y mortalidad por ese agravio.
**DESCRIPTORES:** Periodo posparto; Infección; Cesárea; Enfermería.

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## INTRODUCTION

The consolidation of the process of maternity occurs after the birth, in what is termed the puerperium. This unique and special moment of life is full of meanings, different for each woman, as well as for their families.

Regardless of its meaning, however, the puerperal period is considered a critical and transitional period. Its complexity may be conferred by the intertwining of various aspects, such as biological, psychological, emotional, behavioral, relational, sociocultural and economic aspects: and also by issues of gender[1].

Due to this, in this period, the woman is susceptible to certain complications, such as hemorrhages and health issues related to lactation, depression and puerperal infections, among others[2].

Puerperal infection is described in the literature, in general terms, as referring to infectious processes following birth, whether due to genital causes, such as infections of the uterus, ovaries and Fallopian tubes, and surgical wound, or those known as extragenital, when linked to breast engorgement, mastitis, thrombophlebitis, respiratory complications and urinary infections[3].

Infections following birth are not rare and place the mother's life and health at risk, significantly raising the rate of maternal mortality in Brazil and worldwide. Internationally, puerperal infections present rates which fluctuate between 3% and 20%. In Brazil, studies indicate that these parameters are between 1% and 7.2%[4].

In spite of the Brazilian rate being low in comparison with the international rate, one must consider the financial harm to the health institutions, and the psychological, social and spiritual harm which they cause to the health service users – in this case, the puerperas and their families[5].

In the state of Paraná, in 2012, puerperal infections were the second most common direct cause of obstetric death in the state, responsible for 15% of the deaths. In that year, this health issue was behind only preeclampsia/eclampsia (26%), and was equal to postpartum hemorrhage (15%)[6].

The puerperal infections occur independently of the type of birth which the woman had. The cesarean, however, is the principal risk factor for the development and rise of this health issue[3].

The cesarean is defined as the birth of the fetus through an incision in the abdominal walls. This technique has been part of both Eastern and Western cultures since ancient times, and has become one of the most known and undertaken surgical procedures of the present day, due to the progressive increase in its rates, which vary among countries, regions and subpopulations[7].

In one large case-control study on risk factors for sites of surgical infection, it was observed that 5% of 1605 incisions from cesareans undertaken became infected[8]. Another study also reports that in the absence of antibiotic prophylaxis, the rates of endometritis, a common type of puerperal infection, are of approximately 30% following an emergency cesarean, and 7% after an elective cesarean[4].

As a result, the cesarean, due to being a major invasive surgical procedure, among its risks, contributes to the increase of the rates of puerperal infection[9].

Thus, it is understood that the puerperium is also a time of risks, when one should be alert, especially in the first days, which are critical(10). In particular, following a surgical birth, one must be alert to the risks of puerperal infection, as this mode of childbirth is an important factor which contributes to the rise in this health issue.

It is necessary for nursing professionals who care for women in the puerperal stage in the pregnancy cycle to include knowledge about the risks of puerperal infections in their specialist area, remaining alert for prevention and occurrence, which justifies the relevance of, and interest in this issue. It has to be considered that puerperal infections cause negative repercussions for the woman and for society, as they create costs and compromise the recovery of the puerperal women in this period, extending the period of hospitalization and delaying the bond between mother, baby and family.

In this way, it was taken as an objective for this study to identify the risk factors for infection in the surgical puerperium, through applying Carraro's Model of Care (1994)[11], used as a theoretical and methodological framework for the present study.

## METHOD

This is qualitative, descriptive field research. The data were collected through applying

Carraro's Model of Care in the provision of nursing care to the puerpera in the hospital environment.

The above-mentioned model was proposed in 1994 by Telma Elisa Carraro, and was validated in 2008. The model was initially a methodology of care, whose original formulation was developed and applied within the hospital context, with human beings who experienced a wide variety of surgical situations[12]. Due to having been elaborated with this configuration, it is very close to practice, reducing the distance between the level of abstraction of the nursing theories and nursing's daily practice.

Carraro's Model of Care has, as its structural components, nine assumptions and the definition of four metaparadigmatic concepts of the discipline of nursing: the Human Being, the Environment, the Health-Illness, and Nursing, which address conceptual definitions of vital power, family, and hospital infection[12]. Its assumptions were based in a humanist philosophical view, and encompass presuppositions regarding nursing, human behavior, life, health and illness. It consists of five stages, which articulate with each other, which complement each other, and which can occur simultaneously: Knowing us, Recognizing the Situation, Designing the Trajectory and Selecting the Strategies, Following and Acting, and Accompanying the Trajectory[11].

The application of this model makes it possible to provide systematized care, without leaving to one side the comprehensive and humanistic perspective which nursing needs to have for the being who is cared for, as well as for her family[13].

In order to undertake the study, the following was used as the guiding question: What are the risk factors in the surgical puerperium according to the application of Carraro's Model of Care?

Nine puerperas, who had had cesarean births, took part in the study. The sample was established by the researchers in accordance with the study's objective and methodology, understanding that rigid criteria were not established for the sample selection; this was because in this type of research, the principle of generalization is not valued. Rather, value is placed on the representativity referent to the depth and variety of information. With this, the number of participants was defined in order to ensure a sample adequate for gaining the information[14].

The researchers remained in the maternity unit, the focus of this study, in the months of March, April and May 2013, from 7:00 to 13:00 or from 13:00 to 19:00, so as to undertake care practice. This being the case, the dynamic of this care practice occurred in the following way: the first contact between researchers and the participants was when the obstetric surgical center made contact, requesting the puerpera to be brought in by the maternity team. From that moment onward, the puerpera was cared for by the researchers, her care being permeated by the model of care.

Each puerpera was informed about the study, and, on being invited, all showed interest in participating and signed the terms of consent, at which time they were informed that their participation was voluntary and that being attended within the institution was not in any way dependent on their participation in the research. So as to preserve the participants' confidentiality and anonymity, their names were substituted with pseudonyms which they chose themselves.

The second stage of the model of care had, as one of the phases, Recognizing the Situation, and Recognizing Risks of Hospital-acquired Infection. In this phase, we used the instrument titled "Hospital-acquired Infection Risk Factors in the Surgical Situation", with 18 risk factors which can influence the development of hospital-acquired infections. These factors cover: classification of the surgery's potential for contamination; duration of the surgery (above 2 hours or from cut point, which corresponds to the value in hours of the surgical time); ASA 3, 4 or 5 (physical status of the patient to be anesthetized); prolonged hospital inpatient treatment (pre- and/or post-operative); extremes of life; obesity; malnutrition; uncontrolled diabetes mellitus; polytrauma; impairment in one or more organs, lupus erythematosus; rheumatoid arthritis; terminal cancer or cancer in the phase of chemotherapy and/or radiotherapy; psychological status; lesion of the skin and/or mucosa; deficient immunity; use of prostheses and the hospital school (residents, doctoral students and interns)[11].

The research was approved by the Ethics Committee, under Opinion N. 120.892. The data were analyzed in accordance with the framework proposed by Creswell, followed by the steps: organize and prepare the data for the analysis; read all the data; analyze with a codification

method; use the process of codification for describing the scenario or the people and the categories or themes for analysis; state how the themes will be represented, and the description in the qualitative narrative; and interpret or extract a meaning from the data[15].

## RESULTS

The instrument elaborated by Carraro titled "Hospital-acquired Infection Risk Factors in the Surgical Situation", as described in the methodology, describes 18 risk factors which can influence the development of hospital-acquired infections. This being the case, in applying the care model with the participants of this study, it was possible to investigate to which risks for infection the puerperas were exposed.

All nine participants in the study had cesarean births, considered a high complexity operation, hence all were exposed to various of the infection risks. The first risk identified was prolonged hospitalization. This risk factor was found in three puerperas who participated in the study. One of them, as she had heart disease, needed to be hospitalized two weeks prior to the cesarean, for substitution of anticoagulants. The other two needed to remain in the hospital even following discharge, due to the fact that their respective newborns needed care in the neonatal intensive care unit.

Another risk factor was obesity, which occurred with one of the participants. Following this, altered psychological status was identified, which was manifested in all the puerperas, as it is understood that the puerperium is a period of adaptation and of changes, especially when the puerpera is primiparous, or, in the case of one participant, as she already had a history of postpartum depression.

Furthermore, the need for care in intensive care units for the babies, a situation experienced by two of the participants, as well as the manifestation of anxiety and fear prior to the surgery, as occurred with all of the puerperas cared for, contributed to strengthening the exposure to the risk factor of altered psychological status.

Lesion of the skin and/or mucosa was presented as a risk of infection for all the puerperas who participated in the study, as – obviously – they had the surgical wound and venous access for the infusion of medications and other solutions.

The risk factor of deficient immunity was identified in three puerperas who participated. This risk factor is normally related to the metabolic demands of the pregnancy or to those with a diagnosis of anemia during the gestational period, besides the blood losses during the operation.

Impairment in one or more organs, and the use of prostheses, was manifested in one of the women studied. This woman had cardiac insufficiency, and two years prior to the present study had undergone surgery for the implantation of a prosthesis, which substituted one of her coronary valves.

Other factors emphasized by Carraro (1994), such as contaminated operations, the surgical procedure lasting more than two hours, ASA 3,4 and 5, extremes of life, poor nutrition, uncontrolled diabetes mellitus, polytrauma, lupus erythematosus, rheumatoid arthritis and terminal cancer, or cancer in the phase of chemotherapy/radiotherapy, were not identified in this research.

However, other risk factors for hospital and/or puerperal infection, which the author did not mention in her instrument, were found. These other factors were related directly to the presence of infection in the surgical speciality which was the object of this study, as described below.

The dynamic of the service, and the physical structure of the place where the study was undertaken, were considered an important risk factor to which all the puerperas were exposed, as in this service, cesareans take place in a conventional surgical center, in which operations with high potential for contamination took place. The physical structure of the surgical center also afforded the development of infections, as the flow of contaminated material to the central sterile services department was inappropriate, as it passed through the patients' reception area.

Besides these risks, rupture of membranes of greater than 12 hours, the presence of meconium, and prolonged labor, were also considered as situations experienced by some of the puerperas.

## DISCUSSION

The findings described above support what the literature indicates as risk factors for the development of infections in the puerperium.

These risk factors include cesarean birth, surgical trauma, excessive vaginal manipulation, amniorrhexis and/or prolonged labor, malnutrition or obesity, poor aseptic conditions, immunological weakness and retention of egg remnants[9].

The factors associated with puerperal infection can be divided in categories: those which precede the birth, the intrapartum, and postpartum[16]. In the antepartum, the risk factors associated with puerperal infections are the absence of prenatal care, and low socioeconomic level, deficient conditions of personal hygiene, malnutrition, infections of the lower genital tract, maternal anemia, obesity and diabetes mellitus[1], as well as venous thrombosis, mastitis, previous pneumonia, alcoholism, abuse of drugs, and immunosuppression[16].

Among the factors in the intrapartum and postpartum, associated with puerperal infections, emphasis is placed on cesareans, the rupture of the chorion and amnios over twelve hours prior to birth, chorioamnionitis, prolonged labor, excessive use of vaginal touch, lesions in the birth canal, retention of placental fragments, meconial amniotic fluid, accentuated blood loss in the postpartum[3], indwelling catheterization, internal monitoring of the fetal/uterine pressure, epidural anesthesia, hematomas, episiotomies and/or lacerations[16].

It stands out that cesarean birth causes from five to thirty times greater risk of infection than a normal birth[3]. It is believed that this event occurs due to the surgical incision, to the greater time taken by the operation, and to the greater blood loss[9].

Regarding the low socioeconomic level, it is believed that factors related to the nutritional condition may influence the puerpera's immunity, as also may compromised hygiene conditions[17].

Obesity, as a risk factor for one participant in this study, stands out as an important factor predisposing to the development of puerperal infections, being associated with inefficacious tissue circulation, in which there may be greater accumulation of seromas and hematomas. Subcutaneous tissue with a thickness greater than two cm is associated with a higher probability of opening of the surgical wound[17]. Furthermore, women with a body mass index (BMI) greater than 30 are more likely to develop infection of the surgical wound than women with a normal BMI[4].

Also related to the risk factor of cesarean birth, this surgical procedure increases the recovery time and presents the risks from the surgical act itself, such as anesthesia, the incision, and all the complexities surrounding an operation, which situations contribute to the increase in rates of maternal mortality[18].

Differently from a normal birth, the cesarean has a large number of complications associated with the postoperative period, of which mention may be made of the greater risk of hemorrhage and of acquiring infections, such as those of the abdominal wall, endomyometritis and thrombophlebitis[19], which after the birth are classified as puerperal infections. In another aspect, the cesarean allows the penetration of skin flora through the surgical site, given that this destroys the protective cutaneous barrier. Equally, the quality of the care provided to the woman in the pre-, intra-and post-operative period, such as the preparation of the parturient woman, the quality of the professionals' surgical technique and asepsis, retention of placental remnants, and hemorrhage after birth, contribute to the triggering of puerperal infections[20].

In addition to the factors above, prolonged labor, rupture of amniotic membranes over 12 hours prior to birth[4], use of anesthesia, inability on the part of the surgeon, blood loss of greater than 800 ml, postoperative anemia, surgical time greater than 60 minutes and a positive culture for the amniotic fluid contribute to the puerpera's susceptibility to infections[18].

## FINAL CONSIDERATIONS

This study aimed to identify the risk factors for infection in the surgical puerperium, through the use of Carraro's Model of Care. Thus, in accompanying women who experience the surgical puerperium, using the above-mentioned model as the theoretical and methodological framework, it was possible to identify various risks for puerperal infections to which the participants were exposed.

Identifying the risk factors for puerperal infections, through the systematized instrument, was essential for guiding the process of care for them and for their families. Furthermore, the study made it possible to review the instrument

proposed by Carraro in 1994, as it was used specifically for identifying the risks of puerperal infections, particularly in the surgical puerperium, that is, that following the cesarean.

As a result, besides the risk factors for hospital infection, presented by the author who proposed this model of care, others were present – and were extremely important in constructing this study. Thus, the systematized and revised instrument constitutes an important tool for the nurse and other professionals who work in the mother-child health area, with the aim of their remaining alert in relation to preventive and surveillance measures regarding the occurrence of puerperal infections, affording a reduction in the maternal morbidity and mortality resulting from this health issue.

Moreover, studies in the Brazilian literature on puerperal infections, particularly focusing on their risk factors, remain uncommon. As a result, further investigations on this issue are relevant, considering a larger sample of participants.

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