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Original

Characterization of Post-Cesarean Surgical Site Infections

Caracterização das Infecções de Sítio Cirúrgico Pós-Cesárea

Caracterización de las Infecciones del Sitio Quirúrgico Post-Cesárea

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ABSTRACT

Objective: to characterize post-cesarean surgical site infections. **Method**: descriptive documentary study, performed at a hospital in southern Brazil, with forms of active search and post-cesarean stitch removal from outpatient care performed between January 2015 and December 2017. Data were cited regarding the indication of cesarean section, risk factors, drug use, culture collection and infection rate, analyzed by descriptive statistics. **Results**: a total of 1,479 post-cesarean outpatient care records (2015=456; 2016=487; 2017=536) were investigated, with lack of dilation as the main indication. The incidence of surgical site infection increased in the last year (2015=2.6%, 2016=2.3%, 2017=3.5%) in which the nurse was included in the outpatient clinic. **Conclusion**: the indication for cesarean section due to lack of dilation is not foreseen in protocols, and the increase of infection rate in 2017 might be justified by the increased vigilance.

Descriptors: Surgical Wound Infection; Cesarean Section; Patient Safety; Health Surveillance; Nursing Care.

RESUMO

Objetivo: caracterizar as infecções de sítio cirúrgico pós-cesárea. **Método**: estudo documental descritivo, realizado em um hospital do sul do Brasil, com formulários de busca ativa e retirada de pontos pós-cesárea dos atendimentos ambulatoriais realizados entre janeiro de 2015 a dezembro de 2017. Elencaram-se dados referentes a indicação da cesárea, fatores de risco, uso de medicamentos, coleta de cultura e taxa de infecção, analisados por estatística descritiva. **Resultados**: investigaram-se 1.479 fichas de atendimento ambulatorial pós-cesárea (2015=456; 2016=487; 2017=536), tendo a falta de dilatação como principal indicação. A incidência de infeção de sítio cirúrgico aumentou no último ano (2015=2,6%, 2016=2,3%, 2017=3,5%) em que se incluiu o enfermeiro no ambulatório. **Conclusão**: a indicação de cesárea por falta de dilatação não está prevista em protocolos, e o aumento da taxa de infecção em 2017 talvez possa ser justificada pelo aumento da vigilância.

Descritores: Infecção da Ferida Cirúrgica; Cesárea; Segurança do Paciente; Vigilância Sanitária; Cuidados de Enfermagem.

RESUMÉN

Objetivo: caracterizar las infecciones del sitio quirúrgico después de una cesárea. **Método**: Estudio documental descriptivo, realizado en un hospital del sur de Brasil, con formas de búsqueda activa y extracción de puntos post-cesárea de la atención ambulatoria realizada entre enero de 2015 y diciembre de 2017. Se citaron datos sobre la indicación de cesárea, factores de riesgo, consumo de drogas, cultivo y tasa de infección, analizados por estadística descriptiva. **Resultados**: Se investigaron un total de 1,479 registros de atención ambulatoria post-cesárea (2015=456; 2016=487; 2017=536), con la falta de dilatación como la indicación principal. La incidencia de infección del sitio quirúrgico aumentó en el último año (2015=2,6%, 2016=2,3%, 2017=3,5%) en el que la enfermera fue incluida en la clínica ambulatoria. **Conclusión**: la indicación de cesárea debido a la falta de dilatación no está prevista en los protocolos y el aumento de la tasa de infección en 2017 puede estar justificado por el aumento de la vigilancia.

Descriptores: Infección de la Herida Quirúrgica; Cesárea; Seguridad del Paciente; Vigilancia Sanitaria; Atención de Enfermería.

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INTRODUCTION

Surgical Site Infections (SSI) can be characterized as adverse events that happen in postoperative period of around 3 to 20% of performed procedures and contribute to patients' morbidity and mortality.[1] In the United States of America, for example, it was evaluated that about 150,000 of SSI are responsible for more than 8,000 annual deaths and, according to statistics presented by Society for Healthcare Epidemiology of America (SHEA) and Infectious Diseases Society of America (IDSA), in 2014 SSI occurred from 160,000 to 300,000 among all the cases in the country.[2] In Brazil, they are considered some of the most important Healthcare-associated Infections (HAI) occupying the third place, with a rate of 14 to 16% of hospitalized patients.[1]

SSI diagnosis is performed through the analysis of a set of factors, considering the occurrence of infection within 30 days after the surgical procedure, 90 days in case of implants and prostheses and, if it was by mycobacterium, up to 24 months after the procedure.[1] Among the factors, the patient, infectious agent and own surgical procedure risks are conceptualized.

Respecting the patient, factors related to coexisting infection, smoking, obesity, malnutrition, age and corticotherapy are considered. About the infectious agent, the infective load and virulence; and, from surgical procedure, the degree of contamination, surgical time and technique, trichotomy and skin antisepsis are analyzed.[1]

It is worth noting that SSI may result in physical, social and psychological damages, which pose a threat to patient's integrity. Also, they can extend the permanence of individual in hospital environment and even elevate the chances of additional surgeries, which generate financial damages to institutions.[1]

Among the surgical procedures, the cesarean section is considered the most performed in Brazil and presents high risk of infection for being an invasive, complex procedure and that exposures the woman to own risks as obesity, altered psychological state, skin and mucosal lesions; and environment risks in question, associated with surgical procedure.[3-4]

For being a period of more attention to newborn than to woman, the infection indicators may pass unnoticed and often, delay the diagnosis of aggravation.[5] Among the risks presented by cesarean section, it is worth mentioning the hemorrhages, abdominal wall infections, endometritis and thrombophlebitis.[4]

Since cesarean delivery has a risk of five to thirty times greater than normal birth, it is worth noting the need of redoubled attention in pre, intra and postoperative care, in quality and in surgical technique and in professionals and environment asepsis.[4] Thus, knowing the post-cesarean SSI incidence rates can subsidize decision making for prevention practices. In this perspective, this study has as objective to analyze post-cesarean SSI.

METHOD

Documentary, descriptive, retrospective and quantitative approach study. The data collection was carried out from January to March 2018, through consulting puerperal outpatient care records and statistical data records of Hospital

Infection Control Committees (HICC) from a philanthropic hospital located in southern Brazil.

This institution has an outpatient clinic that provides care for stitch removal and post-discharge surveillance for women who underwent cesarean section. At that time, the nursing staff carried out the investigation-form filling with information such as the reason for cesarean section, if it was performed by own choice or unawareness of indication of surgical procedure, risk factors, appearance of surgical wound, culture collection, microorganism profile and antibiogram.

Outpatient care for post-cesarean stitch removal and form filling analyzed in current investigation are carried out by nursing technician and passed to be supervised by HICC nurses since the year of 2016. In this way, in the identification of phlogistic signals, the nurse from referred Committee performed the notification and monitoring of the evolution of cases.

The data collection was carried out through weekly visits by researchers to HICC sector, and the integrality analysis of records performed between January 2015 to December 2017. The investigation records of infection were analyzed, moreover, patients' medical records were consulted in case of inconsistences or incomplete records. The information was compared to the post-cesarean Surgical Site Infections (SSI) rates notified by the service. For collection, the form of own elaboration was utilized guided by outpatient and medical records, containing variables related to identifying the cesarean section reason, risk factors, physical examination of surgical wound, drug use in puerperal period, material collection for culture and surgical infection rate.

The data were tabulated in spreadsheets and analyzed through descriptive statistics, which consists in an analysis utilized to describe and synthesize data, as well as the calculus of infection rates. The indicators of post-cesarean SSI surveillance outcomes were calculated as proportions, expressed under the percentage form: total number of notified cases in relation to the total number of cesarean deliveries performed in the period.

All the ethical precepts were respected, and the proposal of this study is recorded under CAAE 87395018.1.0000.0104.

RESULTS

In analysis to obstetric background of puerperal women in outpatient care, the progressive increase of the average of number of cesarean sections over the triennium (2015=1.39; 2016=1.53; 2017=1.65) was observed, and as consequence, the decrease of the average number of normal births (2015=0.44; 2016=0.39; 2017=0.27).

Table 1 presents the reasons and risk factors that led to cesarean section performance.

Table 1: Reasons and risk factors that indicate the performance of cesarean section. Philanthropic hospital from southern Brazil, 2018.

General variables	2015 n (456)		2016 n (487)		2017 n (536)	
	n	%	n	%	n	%
Reasons*						
Fetal suffering	2	0,4	12	2,4	11	2,2
Lack of dilation	163	35,7	299	61,3	270	50,3
Fluid loss	12	2,6	25	5,1	22	4,1
Does not know / own choice	29	6,4	7	1,4	14	2,6
Tubal ligation	85	18,6	71	14,5	39	7,2
Cephalopelvic disproportion	39	8,6	21	4,31	25	4,6
Previous cesarean sections	14	3,1	3	0,6	9	1,8
Early presentation	10	2,2	12	2,4	8	1,6
Others**	21	4,6	16	3,2	2	0,4
Risk Factors*						
Rupture of membranes	24	5,3	56	11,4	12	2,4
Systemic arterial hypertension	85	18,6	67	13,1	103	19,2
Diabetes Mellitus	28	6,1	45	9,2	48	8,9
Smoking	24	5,3	16	3,2	20	4
Obesity	16	3,5	4	0,8	15	3
Eclampsia	12	2,6	4	0,8	4	0,8
Urinary tract infection	157	34,4	140	28,7	105	20,8
Anemia	24	5,3	20	4,1	4	0,8
Bleeding	13	2,9	12	2,46	10	2
Use of antibiotics	13	2,9	1	0,2	1	0,2
Others**	7	1,5	9	1,8	1	0,2

*Reasons and risk factors can be cumulative, that is, woman can present more than one reason that led to cesarean section indication, as well as more than one risk factor.
**"Others" comprise the following reasons: placenta previa and multiple birth, in addition to risk factors which are cardiopathy, bariatric, preeclampsia, HIV, hypo/hyperglycemia, alcoholism and malnutrition (Results <10).

Among suggestive manifestations of infection, the presence of fever and the surgical scar appearance were observed, as presented in Table 2.

Table 2: Suggestive manifestations of post-cesarean infection at a philanthropic hospital from southern Brazil, 2018.

Suggestive manifestations of infection	2015 n (456)		2016 n (487)		2017 n (536)	
	n	%	n	%	n	%
Fever	39	8,5	27	5,5	18	3,4
Surgical scar – absence of discharge	410	90,0	438	90,0	482	90,0
Surgical scar – bloody discharge	15	3,2	6	1,2	9	1,8
Surgical scar – purulent discharge	7	1,5	10	2,0	10	1,8

Among the total of 1,479 investigated records, 42 were the Surgical Site Infections (SSI) cases (2015: 12, 2.6%; 2016: 11, 2.3%; 2017: 19, 3.5%) which is equal to 2.8% of care. Table 3 brings the SSI characterization, presenting the material collection and its respective cultures.

The germs found in positive cultures were *Acinetobacter baumannii*, *Proteus mirabilis*, *Staphylococcus aureus*, *Klebsiella pneumoniae*.

Table 3: Characterization of Surgical Site Infections that presented material collection in the period of January 2015 to December 2017. Philanthropic hospital from southern Brazil, 2018.

Culture	2015 n (7)		2016 n (4)		2017 n (11)	
	n	%	n	%	n	%
Positive	3	42,9	1	25	5	45,5
Negative	4	57,1	3	75	6	54,5

DISCUSSION

The cesarean section increase identified in the obstetric background of attended puerperal women corroborates with the study performed at a unit of Obstetric Admission of Hospital of Clinics from Porto Alegre that obtained cesarean section prevalence rate of 31%.[5] Another cohort study carried out in Ireland from 2005 to 2016, found that among the 802,182 investigated births, 219,859 were cesarean deliveries, corresponding to 27.4% of the total,[6] which may allow the interpretation of that the inherent difficulty to rate reduction of the procedure may be considered a challenge not only for the Brazilian context.

It is important to highlight that the World Health Organization recommends indexes of 15% in the total number of births. In 2015, there was a decrease in cesarean section percentage in Brazil, reaching 55% of births performed, which is still considered high compared to that recommended by WHO.[7] In this context, an even more rigorous intervention about the cesarean section performance becomes necessary both in cultural context, which permeate the women's decision, and in elaboration of public policies of incentive for normal birth. A study carried out through a systematic literature review pointed that women believe that the better the technology is, the better she will be assisted, and thus they consider cesarean delivery as the better option.[8]

Over the years, women created an apprehension related to normal birth and even tokophobia, which consists in exaggerated aversion or anxiety related to vaginal delivery. It occurs due to cultural reasons as the ease of woman sterilization through tubal ligation or by medical availability in cesarean section performance, once various surgeries can be carried out in a single day. Moreover, the question of fear, pain and labor time and the search for maintaining body aesthetics are taken into consideration in choosing cesarean section.[9]

Table 1 demonstrates that lack of dilation stands out as the main reason for cesarean section performance at the investigated institution, in disagreement with study carried out at Pakistan military base Hospital which obtained as main indication for surgery the previous cesarean section (44.4%) followed by failure to progress in delivery (27.1%).[10] In Brazil, it is noteworthy that the proposed recommendations by guidelines stimulate the cesarean section performance in cases of pelvic presentation, multiple birth, placenta previa, placenta accreta, human

immunodeficiency virus (HIV) and herpes simplex virus (HSV) infection,[11] none of the reasons presented in this investigation.

A study that searched for factors associated to cesarean section performance at a hospital from Porto Alegre identified that 50.6% of admitted pregnant women had dilation equal to or less than three centimeters and were undergone cesarean section. According to this study, the early hospitalization before the active phase of labor may lead to surgical performance, with the health professional in charge of evaluating the situation of pregnant woman, searching for the best alternative.[5]

Another determining factor to perform cesarean section is the concomitant tubal ligation, which consists in a definitive sterilization procedure for woman. It is worth mentioning that the legislation prohibits the surgical sterilization in woman during the birth and abortion periods, except in cases of confirmed need, by previous successive cesarean sections.[12-14]

Analyzing the evident intervention in natural course of birth, questions about the medicalization of childbirth and the indiscriminate use of prophylaxis postpartum are currently discussed. In this perspective, it was observed that, even though a variable is questioned in just some evaluations performed in outpatient clinic, about a quarter of puerperal women left the institution with analgesic, anti-inflammatory drugs and/or antibiotics prescription in the first two years. Thus, the postpartum medicalization might be related to as an impeding factor for diagnosis of possible Surgical Site Infections (SSI).

A study carried out in São Paulo pointed as fundamental the nursing performance in pre, intra and postpartum, once signs and symptoms of alterations can be identified, and possible complications can be prevented.[15] It is nurse's responsibility to make precise notes and perform the physical examination as well as to have the clear knowledge respecting SSI so there are the correct approach and interference, if necessary.[14]

Another study, performed at a general hospital, of observational quality, talked at length about the SSI as a multifactorial pathology, which includes patient, surgical staff factors to procedure and to surgical site contamination by microorganisms during surgery, with this being the last determining factor. However, prevention measures are proposed by literature such as performance of proper antibiotic prophylaxis, non-performance of trichotomy and active search for infection.[15-16]

There are indications for the SSI prevention (pre and infra-operative). They are: elective surgery with pre-operative hospital stay less than or equal to 24 hours; trichotomy with interval less than or equal to 2 hours; antibiotic prophylaxis performed up to 1 hour before the incision; antibiotic prophylaxis duration less than or equal to 24 hours, antisepsis of the operating field, surgical box inspection, among others.[1]

From the data survey of the present study, Table 2 shows that there is an increase in SSI incidence when comparing the year of 2015 and 2017, which can be explained by changing the way infections are searched and reported, especially by the presence of nurse and decrease in drug prescriptions in the postpartum period. In this

perspective, the relevance of constant vigilance and the central role of the nurse are reinforced.

About the infection rates, although lower than the recommended by Brazilian Ministry of Health, in comparison with retrospective cohort study performed in Ireland in the period between 2005 and 2016 that obtained infection rate of 0.6%, it is observed that the current investigation presents higher rates.[6]

With relation to germs found after the collections, study that sought to identify the microbiota presents in operative wounds demonstrated that among gram-positive bacteria, *Staphylococcus aureus* were in 39.2% of cases and may cause complete surgical dehiscence without evisceration, abscess, delayed healing process and death by septic shock and/or pneumonia. Meanwhile, gram-negative bacteria *Acinetobacter baumannii, Proteus mirabilis* and *Klebsiella pneumoniae* obtained respectively 1.78%, 7.14% and 5.35%.[17-18]

Concerning this scenario, it is worth noting the need to maintain the constant vigilance to cesarean sections, aiming for the non-performance of unnecessary surgeries by non-foreseen reasons in the current recommendations guidelines. As study limitation, the performance of just one reality is cited. Follow-up studies that join the hospital information with the primary care one may contribute to investigate possible underreporting of postoperative infections and to subsidize new health practices.

CONCLUSION

It is concluded that the Surgical Site Infection was identified in 42 cases, and in 22 of them culture collection occurred, being 9 of them positive. The 2017 year was the one that presented greater number of cases. The increase of infection rate might be related to the increase of vigilance and of nurse inclusion in outpatient care.

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There are no conflicts of interest to declare.

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