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Perioperative safety indicators: surgery cancellation and immediate postoperative complications

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ABSTRACT. The perioperative period comprises the moments before, during and after surgery. Based on the concern about the care for and safety of patients in this process, this study sought to assess the quality of surgical procedures in a hospital environment. It is an epidemiological, descriptive and retrospective research conducted at Santa Terezinha University Hospital [Hospital Universitário Santa Terezinha], in the municipality of Joaçaba, Santa Catarina (SC). The investigation aimed to identify the reasons for surgical cancellation, as well as immediate postoperative complications that occur in the postanesthesia care unit. A total of 456 records from surgery cancellation daily maps and 361 medical records of patients in postoperative care were analyzed. Results show that the main cause for cancellation of surgeries was transfer or unscheduled procedure (23.1%), but 27% of the unscheduled surgeries did not have the reason for cancellation reported. Adult (over 80%) and female individuals were the majority for both cancelled surgeries and postoperative complications. The most frequent postoperative complication was hypotension. Among performed surgeries, thoracic ones (41.8%) were most prevalent, while abdominal/pelvic (49%) surgeries were the most cancelled. It is concluded that a big portion of the cancelled surgical procedures could have been prevented, since only 6.8% of them were related to clinical conditions.

Keywords: recovery room; nursing records; patient safety; surgical procedures.

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Introduction

The hospital environment is characterized as a hostile, stressing and very dynamic one. Nonetheless, nursing professionals seek to lighten the atmosphere by applying the Nursing Care Systematization (NCS) in order to humanize hospital care (Ribeiro, Ferraz, & Duran, 2017a). Within this context, one can regard the perioperative period as the stage at which a humanized care (Perioperative Nursing Care Systematization - PNCS) is of utmost importance to qualify the assistance provided to clients and their family members (Oliveira & Mendonça, 2014), as well as to promote a safe process during this period (Ribeiro, Peniche, & Silva, 2017b) when patients find themselves exposed to various forms of risks and complications.

Bearing in mind the concern about quality of care and patient safety, the World Health Organization (WHO) created the World Alliance on Patient Safety. Said alliance, of international scope, sets forth guidelines aimed to ensure the individual's wellbeing, lowering, to an acceptable level, the risk of unnecessary damages associated with health care (WHO, 2004; Rede Brasileira de Enfermagem e Segurança do Paciente [REBRAENSP], 2013).

When it comes to the perioperative period, a good preoperative preparation and the definition of the intraoperative conduct are performed on the basis of promoting a quality and effective preoperative evaluation. This way, it is possible to learn about the patient's clinical conditions and facilitate the planning of pre, intra and postoperative care that suits each case (Bisinotto, Pedrini Júnior, Alves, & Andrade, 2007). In this sense, a "cascade effect" takes place, bringing about a quick recovery, as well as decreasing procedure-derived complications, length of stay and hospital expenses.

Initially, the patient who will undergo surgery and their family members need to go through a preparation before receiving the news of the surgical procedure. Such a conduct is essential because many surgeries can change the life of these individuals by affecting their routine and emotional, psychological and even financial conditions so that they can adjust to the new reality (Barbeiro, 2010). However, when it

comes to procedure cancellation the frustration is even greater, as losses affect all parties involved and triggers a loss of trust from the patient towards the institution, waste of time for several professionals, reduced assistance quality, expenses with materials, underutilization of surgery rooms, and a consequent missed opportunity to include another user. Moreover, it favors an increase in the rate of stay, a decrease in bed availability and a higher risk of hospital infections, among other complications. However, if cancellation is done before the patient withdraws themselves from their activities (routine, work, family) and before their hospital admission, the consequences can be mitigated (Ávila, Gonçalves, Martins, & Moyses, 2012).

One of the mottos of health professionals is to guarantee the wellbeing and/or maintain the health of their patients. Based on that, as previously mentioned, the WHO created in 2004 the World Alliance on Patient Safety, a global reference whose objective is to raise the quality of health services and patient care (*Conselho Regional de Enfermagem do Estado de São Paulo* [COREN], 2010). Its goal is to design programs aimed at guiding and encouraging healthcare professionals and the population to provide and help in the search of viable solutions to problems related to patient safety.

Safety is vital for the act of caring, as it allows the patient to feel safe about the procedure to which they will be subjected and about the professional in charge, improving the quality of care (WHO, 2002). It is worth noting the essential nature of safety in the perioperative period.

Due to the large number of records related to surgical errors, the WHO launched in 2008 the "Safe Surgery Saves Lives" campaign to increase patient safety before, during and after surgical procedures (Rebraensp, 2013). The campaign published and encouraged the use of checklists prepared according to the procedure and its complexity, highlighting that the method must be used at three moments (Rebraensp, 2013). Before anesthesia induction (Sign in), before skin incision (Time out) and before the patient leaves the surgery room (Sign out) (WHO, 2008).

The perioperative period corresponds to the moments before, during after the surgery and are classified as preoperative, while the patient is being prepared, intra or transoperative, which is the moment of surgery itself, and postoperative. The latter is subdivided into mediate, which occurs right after the patient leaves the surgical room, and immediate, which comprehends the total healing and recovery process of the patient (Noma, Malta, & Nishide, 2008). Just as all of them, the postoperative period requires great caution because the patient is more susceptible to develop infections, and one must be attentive to the operation of equipment (drains, tubes and catheters), besides checking hydration, water balance, ventilation and oxygenation conditions, which must be constantly monitored along with signs that might indicate possible complications.

The concept of surgical complication based on the reflection by Sokol and Wilson (2008) is defined as any undesirable, unintentional and unexpected outcome that affects the patient directly due to the procedure and would not have happened if the operation had been well executed.

Postoperative complications can be classified as general complications and special complications. The former refers to any individual who, subjected to a surgical procedure, is susceptible to develop anything from an hemorrhage to thromboembolic disorders, whereas special complications occur only in patients with a certain clinical illness. Malnourished, anemic and immunosuppressed patients are more likely to develop postoperative complications (Stracieri, 2008).

Respiratory complications are the most frequent ones, especially in the postoperative period and in patients with Chronic Obstructive Pulmonary Disease (COPD), who are more prone to have increased bronchial secretion, decreased tracheobronchial ciliary activity and accumulated secretions (Stracieri, 2008). The signs that indicate these complications include rise in body temperature, agitation, dyspnea, adventitious sounds, as well as viscous and thick sputum (Noma et al., 2008).

Complications related to the cardiovascular system occur too, with the most common one being hypotension, which can cause vital organ hypoperfusion and ischemic damages resulting from lack of ventilation, anesthesia effects, abrupt change of decubitus, pain, blood or liquid loss, and sequestration of blood from the peripheral circulation. Hypotension, when associated with higher or lower heart rate, can signal hemorrhage, circulatory failure or liquid diversion. Now, weak and threadlike pulse, cold, moist, pale or cyanotic skin, great agitation and unease associated with hypotension indicate shock (Noma et al., 2008).

In surgical procedures, there is also the possibility of patients developing deep vein thrombosis (DVT), moderate or serious inflammation of the veins, associated with blood coagulation or thrombophlebitis, a mild inflammation of the peripheral veins, forming clots that can turn into emboli and reach the lungs,

heart or brain (Noma et al., 2008). Thus, it is possible to observe that several problems are represented by an isolated symptomatology that identifies or signals the onset of a postoperative clinical syndrome (Stracieri, 2008).

A surgical procedure is not something that one is subjected to everyday, and when there is need for it, the patient's whole routine is affected, because a previous preparation is necessary. Before surgery, most of the times, the patient needs to stay in the hospital until the day the procedure will be performed, which thus impairs their activities and family relationship. Moreover, this makes room for fears, insecurity about the patient's life, the unknown and the consequences to be faced (Barbeiro, 2010).

Cancellation of surgery, despite explanations, have a devastating effect on patients (Aquino, Moura, & Pinto, 2012). In this situation, the institution is negatively affected as well, by expenses with materials, by the team losing their time (Risso & Braga, 2010), by increases in hospital costs and by the time scheduled for the surgery room being missed. The most frequent reasons for cancellation of surgery include: the patient not showing up, unfavorable clinical conditions, lack of beds, no medical team available, or scheduling errors. It is worth noting that, in general, many of these reasons can be reassessed and changed in order to prevent new cancellations (Ávila et al., 2012).

In this context, the present study aimed to identify surgery cancellation reasons in a university hospital in the midwestern region of Santa Catarina, Brazil, as well as the occurrence of immediate postoperative complications.

Material and methods

Research developed at Santa Terezinha University Hospital [Hospital Universitário Santa Terezinha] (HUST), in the municipality of Joaçaba (SC), between July and December 2017. It is a retrospective, cross-sectional study, of quantitative approach, conducted at said hospital, which contains 154 beds, 53 of which are meant for surgical patients, and 10 for patients in the intensive care unit (ICU). The HUST is a reference within the region of the Association of Santa Catarina's Midwestern Municipalities [*Associação dos Municípios do Meio Oeste Catarinense*] (AMMOC), which is composed of the following cities: Água Doce, Capinzal, Catanduvas, Erval Velho, Herval d`Oeste, Ibicaré, Joaçaba, Lacerdópolis, Luzerna, Ouro, Treze Tílias and Vargem Bonita. In total, 119,574 inhabitants make up the AMMOC, according to the latest census by the Brazilian Institute of Geography and Statistics (*Instituto Brasileiro de Geografia e Estatística* [IBGE], 2010).

Data were extracted from the medical records of surgical patients admitted to the HUST and who stayed in the postanesthesia recovery room, for the "Immediate postoperative complications" indicator, referring to surgeries performed in 2016, to be collected. Daily surgical maps and surgery cancellation records were researched as well for the "Cancellation of surgery" indicator, between April and December 2017. The analyses comprised 456 records from the surgical cancellation daily maps, and 361 medical records of patients in postoperative care, so that complications that occurred in the postoperative recovery room could be identified.

For data collection, a form specifically prepared for recording data was used. These data were collected from the daily surgical map and the surgical cancellation record so that the surgical cancellation indicators could be identified. Another resource employed was a spreadsheet for collection of data on immediate postoperative complications in the Postoperative recovery room in the medical records of surgical patients.

The data were arranged on an Excel spreadsheet and later imported into the Statistical Package for the Social Sciences (SPSS), then analyzed by means of descriptive statistics, with the variables being expressed as percentage absolute numbers, as displayed. To compare the variables, the Chi-square test and Fisher's exact test were applied.

The project was approved by the Ethics Research Committee of Santa Catarina State University [*Universidade do Estado de Santa Catarina*] - UDESC, with CAAE: 67068617.0.1001.0118 and Legal Opinion No 2.134.916.

Results and discussion

In the HUST, between April and December 2017, 5,599 surgical procedures were performed, and 8.1% (455) were cancelled. Table 1 describes the absolute quantification and the percentages corresponding to each reason for cancelling the surgical procedures. Out of the 455 cancelled surgeries, the highest cancellation rate, 27% (123), was due to unreported reasons, followed by 23% (105) due to transferred

surgeries, while the lowest cancellation rate, 1.85% (8), was caused by typing errors or scheduling mistakes. In addition, the reasons for cancellation of surgery were classified as clinical, with 6.8% (31), non-clinical, 66.2% (301), and unreported reasons, 27% (123).

Table 1. Absolute and relative numbers of cancelled surgical procedures in the HUST by reason, from April to December 2017.

Reason for cancelling surgeries	N	%
Transfer/unscheduled procedure	105	23.1
Typing error/scheduling mistake	8	1.8
Change in the surgical center/cancellation determined by the executive board	45	9.9
Another patient in urgency	31	6.8
Patient without clinical conditions/no-show	66	14.5
No authorization for admission/No bed for admission	48	10.5
Problems with material	29	6.4
Other reasons/not informed	123	27
Total	455	100

Source: Authors, 2018.

As for seasonality, April and July were the months that presented the smallest number of cancelled surgeries, with 4.8% (22), while the peak happened in August/September, with a total of 30.1% (137), followed by May, with 18.5% (84) of all cancellations (Figure 1).

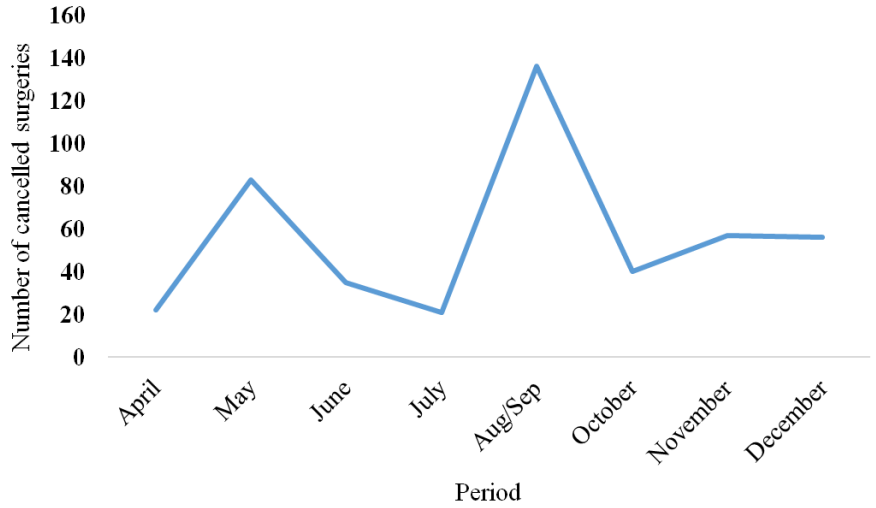

Figure 1. Seasonality of surgeries cancelled in the HUST from April to December 2017. Joaçaba, Brazil, 2018 (Source: Authors).

Table 2 displays the number of surgery cancellations by the topography of the procedure that would be performed. It is possible to notice a prevalence of abdominal/pelvic surgeries, with 49% (223) of all cancelled surgeries, followed by head and neck surgeries, with 20.4% (93). The lowest cancellation rates were found for skin surgeries, with 2.6% (12), followed by vascular, with 2.9% (13).

Table 2. Absolute and relative distributions of cancelled surgeries, by the topography of the procedure recorded in the surgical map, to be performed in the HUST, from April to December 2017.

Topography of cancelled procedures	N	%
Abdominal/pelvic surgery	223	49
Head and neck	93	20.4
Thoracic surgery	51	11.2
Vascular surgery	13	2.9
Orthopedics and traumatology	59	13
Skin surgery	12	2.6
No information	4	0.9
Total	455	100

Source: Authors.

Table 3 displays the number and proportions referring to surgery cancellations, based on the patients' sociodemographic characteristics (sex, age). There was a predominance of females, with 63.5% (289) of the total, and most of the surgeries, 53.6% (244), should be performed on patients aged between 20 and 59 years

old, with those aged 60 or over representing 26.6% (121) of all cancelled procedures. The age group from 1 to 19 years old presented the lowest rate of cancelled surgeries, 5.3% (24).

Table 3. Characterization of HUST patients with cancelled surgeries by sex and age, from April to December 2017. Joaçaba, Brazil, 2018.

Sociodemographic characteristics	N	%
Sex		
Female	289	63.5
Male	166	36.5
Age group		
1 to 19 years old	24	5.3
20 to 59 years old	244	53.6
60 years old or over	121	26.6
Not informed	66	14.5

Source: Authors.

Complications presented in the postoperative period, in patients that underwent surgeries in 2016, were also analyzed. Out of the 6,201 performed procedures, 361 cases were analyzed, accounting for 5.6% of the total. In said analyses, hypotension was the most prevalent one, with 8.6% (31), followed by presence of pain, with 6.4% (23), and hypertension, with 3.9% (14). Vomit, dyspnea, tachypnea and bleeding were also observed. It is worth stressing that, for the highest rate, 39.6% (143) of the performed procedures, no mentions of presence or absence of complications were found in the patients' medical records, and 36% had no postoperative complications.

Table 4. Absolute and relative distributions of complications presented by patients in the postoperative period following surgeries performed in the HUST during 2016.

Postoperative complication	N	%
Pain	23	6.4
Dyspnea, Tachypnea	7	1.9
Vomit	8	2.2
Hypertension	14	3.9
Hypotension	31	8.6
Bleeding	5	1.4
No complication	130	36
No information	143	39.6
Total	361	100

Source: Authors.

Regarding the topography of performed surgeries, a higher prevalence was found for thoracic surgeries, with 41.8% (151), followed by pelvic/abdominal surgeries, with 23.5% (85), and head and neck surgeries, 17.5% (63). The lowest rates were found for orthopedics/traumatology surgeries, with 2.5% (9), vascular surgeries, with 6.6% (4), and skin surgeries, with 8% (29).

With respect to performed and analyzed surgeries, females were slightly predominant, making up 50.4% (182) of all HUST patients subjected to surgeries in 2016, while men accounted for 49.6% (179). As for age group, 19 to 59 years old was the most prevalent one, with 55.4% (200), followed by 60 years old or over, with 34.9% (126). The least prevalent age groups comprised children and adolescents, between 3 and 12 years old, with 4.4% (16), and 13 to 18 years old, with 5.3% (19), respectively.

A total of 455 surgeries were cancelled throughout the period from April to December 2017, accounting for 8.1% of all procedures. The causes for cancelled surgeries of greatest prevalence were unreported reasons (27%), transfer/unscheduled procedure (23.1%), and patients without clinical conditions or no-show (14.5%). These data differ from those reported in a study conducted by Souza, Maurício, Marques, Mello, & Leite (2010), also in a university hospital in the city of Rio de Janeiro. In said investigation, out of the 973 postponed surgeries, the first three reasons referred to patients without clinical conditions (24.5%), lack of material (10.3%), and blank or unreported reasons (12.4%).

Among all cancelled surgeries, only 14.5% were exclusively related to the patients' clinical conditions or no-show. This data reveals the institution's ineffective management and organization, suggesting the need for inclusion of educative programs or an efficient management in order to help reduce the number of surgical cancellations in the studied hospital.

It is important to highlight that, during the present research, in 2017, the HUST went through renovation and expansion, especially the surgical center, which may justify the large number of transferred or unscheduled surgeries. The percentage of surgeries cancelled by patients in inadequate clinical conditions may be resulting from the hospital being a reference in cancer treatments, and many surgeries schedules for these patients need to be cancelled when the surgical act may pose risks to the individual.

Furthermore, a piece of data that is in line with the study by Souza et al. (2010) is that, out of the 973 cancelled surgical procedures, most occurred in September, with 15.5% (151), similar to what happened in this study, which found the highest cancellation rate in August/September.

The most prevalent age group of the patients whose surgical procedures were cancelled, in the present investigation, was the one between 19 and 59 years old (55%), considering adults. Cancellations were also most predominant among females.

These findings are similar to results reported in a study conducted in a Public Hospital in the state of São Paulo, and in which the adult age group (19-59) was predominant, with 33.4% of all cancelled procedures (Santos & Bocchi, 2017). Additionally, in a research carried out in a military hospital in Saudi Arabia, out of the 440 patients who had their surgeries cancelled, 51.6% were women, and 93.9% were aged 18 years old or over (Da'ar & Al-Mutairi, 2018).

Many are the complications which a patient in the postoperative period may present. General complications includes respiratory, cardiovascular, such as hypotension, which 3% of patients in postoperative care present, hypovolemia, systemic and asymptomatic arterial hypertension, hypothermia (Benavides et al., 2015). Besides, hypotension, hemorrhage, thromboembolic disorders, kidney failure are worth highlighting, along with various problems such as headache, heartburn, hiccups, cough and lower urine output (Caro et al., 2015).

In this research, the most frequent postoperative complication was hypotension, with 8.6% (31), followed by pain, with 6.4% (23), twice the percentage reported by Caro et al. (2015) in their study.

Respiratory complications were reported in 7 (1.9%) of the cases and stand within the expected parameters, since these complications can occur in 5-10% of the patients subjected to non-thoracic surgery, and in 22% of high-risk patients (Kelkar, 2015). As for complications such as hypothermia, hypovolemia, fever or kidney failure, they were observed by other authors but are not among the ones reported in this research. However, the "pain" variable, despite being the second most frequent complication, was not prevalent compared to the findings of other authors, whose study results presented 75% of patients reporting pain in the postoperative period (Caro et al., 2015). It is important to point out that, for the highest rate of performed procedures, 39.6% (143), no mentions of presence or absence of complications were found in the patients' medical records, which suggests a need for greater caution and attention from health professionals as to adding this information to said documents.

Conclusion

The most frequent cause for cancellation of surgery in the HUST, in 2016, was transfer or unscheduled procedure. A large number of records for unscheduled surgeries did contain information on the reasons, hindering the analysis and provision of suggestions for correcting preventable causes.

The female sex prevailed for cancelled surgeries and for complications in the postoperative period.

In adults, cancelled surgeries and patients presenting complications were most predominant, with postoperative hypotension being the most frequent complication.

For a big portion of performed procedures (39.6%), no mentions of presence or absence of complications were found in the patients' medical records, and 36% of the individuals showed no postoperative complications.

Among performed procedures, thoracic surgeries were the most prevalent, while for cancelled procedures abdominal/pelvic surgeries were most predominant.

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