

INSTITUTIONAL CAUSES FOR ELECTIVE SURGERY CANCELLATION

Causas institucionais para cancelamento de cirurgias eletivas

Causas institucionales para la cancelación de cirugías electivas

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ABSTRACT: Objective: To analyze scientific productions about elective surgery cancellation due to institutional causes. **Method:** Integrative literature review, systematized by the acronym Problem, Interest, and Context (PICo), according to PICo strategy and procedures defined by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). Bibliographic search was carried out in September 2018 and updated in May 2020 in the following databases: Medical Literature Analysis and Retrieval System Online (MEDLINE)/PubMed, Latin American and Caribbean Health Sciences Literature (Lilacs), Nursing Database (BDEnf) of the Virtual Health Library (VHL), Scopus (Elsevier) of the Periodical Portal of the Coordination for the Improvement of Higher Education Personnel (*Coordenação de Aperfeiçoamento de Pessoal de Nível Superior* – CAPES), and Scientific Electronic Library Online (SciELO). Publications from 2008 to 2020 in Portuguese, English, and Spanish were retrieved. **Results:** We found 920 studies in the bibliographic search, 263 of them were duplicates, and 657 remained for selection. In the end, 15 studies were included in the review. **Conclusion:** The institutional causes identified were delay in the previous surgery, leading to unavailability of operating rooms, structural problems, lack of or defects in equipment, and insufficient human resources.

Keywords: Surgery department, hospital. Surgicenters. Elective surgical procedures. Hospital administration.

RESUMO: Objetivo: Analisar as produções científicas sobre cancelamento de cirurgias eletivas pelas causas institucionais. **Método:** Revisão integrativa da literatura, sistematizada pelo acrônimo Participante, Interesse e Contexto (PICo), de acordo com a estratégia PICo e procedimentos definidos pelo Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). A busca bibliográfica foi realizada em setembro de 2018 e atualizada em maio de 2020, nas bases de dados Sistema Online de Busca e Análise de Literatura Médica (MEDLINE)/PubMed, Literatura Latino-Americana e do Caribe em Ciências da Saúde (Lilacs) e Base de Dados em Enfermagem (BDEnf) da Biblioteca Virtual em Saúde (BVS), Scopus (Elsevier) do Portal de Periódicos da Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) e Biblioteca Eletrônica Científica Online (SciELO). Foram consideradas publicações de 2008 até 2020, nos idiomas português, inglês e espanhol. **Resultados:** Foram identificados, na busca bibliográfica, 920 estudos, sendo 263 duplicados, restando 657 para seleção. Ao final, foram incluídos 15 estudos na síntese. **Conclusão:** As causas institucionais identificadas foram o avanço de horário da cirurgia anterior, gerando a indisponibilidade de salas cirúrgicas, problemas estruturais, falta ou defeitos em equipamentos e recursos humanos insuficientes.

Palavras-chave: Centro cirúrgico hospitalar. Centros cirúrgicos. Procedimentos cirúrgicos eletivos. Administração hospitalar.

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RESUMEN: Objetivo: Analizar producciones científicas sobre la cancelación de cirugías electivas por causas institucionales. **Método:** Revisión bibliográfica integral, sistematizada por el acrónimo Participante, Interés y Contexto (PICO), de acuerdo con la estrategia y los procedimientos PICO definidos por el Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). La búsqueda bibliográfica se realizó en septiembre de 2018 y se actualizó en mayo de 2020, en las bases de datos MEDLINE/Pubmed, LILACS y BDeInf de la Biblioteca Virtual en Salud, SCOPUS (Elsevier) del Portal de revistas Capes y SciELO. Consideró publicaciones de 2008 a 2020, en portugués, inglés y español. **Resultados:** En la búsqueda bibliográfica, se identificaron 920 estudios, 263 de los cuales se duplicaron, dejando 657 para la selección. Al final, se incluyeron 15 estudios en la síntesis. **Conclusión:** Las causas institucionales identificadas fueron el tiempo de avance de la cirugía previa, generando la falta de disponibilidad de quirófanos, problemas estructurales, falta o defectos en los equipos y recursos humanos insuficientes.

Palabras clave: Servicio de cirugía en hospital. Centros quirúrgicos. Procedimientos quirúrgicos electivos. Administración hospitalaria.

INTRODUCTION

Currently, surgeries are diagnostic and therapeutic modalities that benefit thousands of people because they solve countless health problems, improve quality of life, reduce discomforts, such as pain, restore mobility and human senses (partially or totally), besides other advantages.

Surgery scheduling and preparation involves numerous actions and professionals. It is a complex process that, if not effectively planned, may result in suspension or cancellation.

Surgery cancellation is often seen by professionals as a natural phenomenon, as part of the institutional routine. However, health professionals should understand that these occurrences need to be minimized¹. The volume of surgical procedures and the number of cancellations are indicators of hospital quality and productivity².

Surgery cancellation represents losses to the institution, such as: delays in the surgical schedule, losses to other patients waiting their turn to be operated, increase in operational and financial costs, prolonged hospitalization, and higher risk of hospital-acquired infection².

Surgery cancellation is still a challenge for hospitals. Studies also cite the following reasons for suspension of scheduled procedures: process failures such as medical team absence or delay, which slows the operating room (OR) occupancy flow; communication failures between medical team, surgical center (SC), and hospitalization units; lack of materials or supplies; surgical preparation failures, among others. In these cases, surgery cancellation results in losses to the institution, delays in the surgical schedule, and losses to other patients, who also wait their turn to be operated³. In this context, the research question is: what are the institutional causes for elective surgery cancellation and/or suspension?

OBJECTIVE

To analyze information about elective surgery cancellation available in specialized literature, identifying institutional causes.

METHOD

This is an integrative literature review that enables synthesis and analysis of the scientific knowledge produced on the subject investigated. An integrative review can have different purposes; in other words, it can be directed to concept definition, theory review, or methodological analysis of studies included about a particular topic⁴.

Based on the question presented, the main subjects were identified and systematized according to the Problem, Interest, and Context elements, known as PICO strategy, which is a mnemonic adapted by the Joanna Briggs Institute⁵:

- P: Surgery cancellation and/or suspension;
- I: Surgery cancellation and/or suspension indicators for the elaboration of an instrument for verification or prior check aimed at calling patients;
- Management instruments and/or tools for calling patients to the SC;
- Co: surgical center.

Standardized terms and their synonyms were identified in the Health Sciences Descriptors (*Descritores em Ciências da Saúde* – DeCS) and Medical Subject Headings (MeSH) controlled vocabularies.

The search strategy involved using quotation marks (“) to restrict compound terms and establish their order. Boolean and/or search operators AND – term intersection; OR – compound terms and/or synonym cluster; and NOT – exclusion

operator, were used in the Scopus database of the Periodical Portal of the Coordination for the Improvement of Higher Education Personnel (*Coordenação de Aperfeiçoamento de Pessoal de Nível Superior – CAPES*).

The following portals and databases were accessed: Medical Literature Analysis and Retrieval System Online (MEDLINE), consulted via PubMed; Scopus (Elsevier) through the CAPES Periodical Portal; Nursing Database (BDenf) among others of the Virtual Health Library (VHL) regional portal. The Scientific Electronic Library Online (SciELO) was also searched. Documents written in Portuguese, Spanish, and English from 2008 to 2020 were retrieved.

Bibliographic search was carried out in September 2018 and updated in May 2020. Table 1 presents VHL and MEDLINE/PubMed examples.

Retrieved documents were stored in the Endnote Web reference manager and, after removing the duplicates, they were exported to and organized in an Excel spreadsheet with the following data: article number, author, title, year, volume/number/page, database, abstract, and keywords.

Articles that indicated the institutional causes for surgery cancellation were included.

On the other hand, articles addressing instruments for cancellation management, operating room planning, statistical analysis of cancellations without indication of causes, and articles on outpatient or emergency surgery or providing only a reflective approach were excluded.

After data analysis and interpretation, the publications were summarized, describing common findings.

The study followed the preparation steps recommended by Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)⁶, as shown in Figure 1.

RESULTS

Chart 1 describes the studies, presenting their title, period, year, country, type, and summary of results. A total of 920 documents were identified, with 263 duplicates, and 657 remaining for analysis and selection.

Among them, 604 documents were excluded by the assessment of title, abstract, and type of document (book and integrative review). Out of the 53 documents that had their full text analyzed, 31 were excluded because they did not address causes/motives of surgery cancellation and did not have their full text available; 22 papers were qualitatively evaluated, and 7 were excluded due to eligibility.

In summary, this review comprised 15 articles published predominantly in international journals (n=10), followed by Latin American (n=4) and Brazilian journals (n=1). They were published in 2011 (n=1), 2012 (n=1), 2016 (n=2), 2017 (n=1), 2018 (n=5), 2019 (n=3), and 2020 (n=2). China and Brazil predominate in the distribution by countries, with two studies each. As to study type, most papers had a retrospective design (n=8), followed by prospective (n=4), cross-sectional (n=2), and descriptive (n=1). There was no predominance of authors.

Delays in the previous surgery, OR unavailability, and hospital management problems stood out as reasons for cancellation. Other issues mentioned include lack of surgeons,

Table 1. Search strategies carried out in 2018 and updated in 2020.

Databases	Strategies	N
VHL	tw:(cancelamento OR suspensão OR cancelada) AND (cirurgia OR cirurgia OR operações OR cirurgicos OR cirurgicas OR operação) AND (instance:"regional") AND (db:(LILACS OR BDENF OR IBECS OR BBO OR colecionaSUS OR SES-SP OR tese OR BINACIS) AND la:(pt OR es OR en) AND year_cluster:(2012 OR 2010 OR 2016 OR 2008 OR 2017 OR 2011 OR 2013 OR 2014 OR 2015 OR 2018))	144
VHL	tw:(cancelamento OR suspensão OR cancelada) AND (cirurgia OR cirurgia OR operações OR cirurgicos OR cirurgicas OR operação) AND (instance:"regional") AND (db:(LILACS OR BDENF OR IBECS OR BBO OR colecionaSUS OR SES-SP OR tese OR BINACIS) AND la:(pt OR es OR en) AND year_cluster:(2012 OR 2010 OR 2016 OR 2008 OR 2017 OR 2011 OR 2013 OR 2014 OR 2015 OR 2018)) AND (year_cluster:{2018 TO 2020})	10
PubMed	("Operating Rooms"[MeSH Terms] OR ("Operating Rooms"[Title/Abstract] OR "Operating Room"[Title/Abstract])) AND (Cancellations[Title/Abstract] OR suspension[Title/Abstract]) AND (("2010/01/01"[PDAT] : "3000/12/31"[PDAT]) AND (English[lang] OR Portuguese[lang] OR Spanish[lang]))	85
PubMed	("Operating Rooms"[MeSH Terms] OR ("Operating Rooms"[Title/Abstract] OR "Operating Room"[Title/Abstract])) AND (Cancellations[Title/Abstract] OR suspension[Title/Abstract]) AND (("2018/01/01"[PDAT] : "2020/12/31"[PDAT]) AND (Portuguese[lang] OR Spanish[lang] OR English[lang]))	23

VHL: Virtual Health Library.

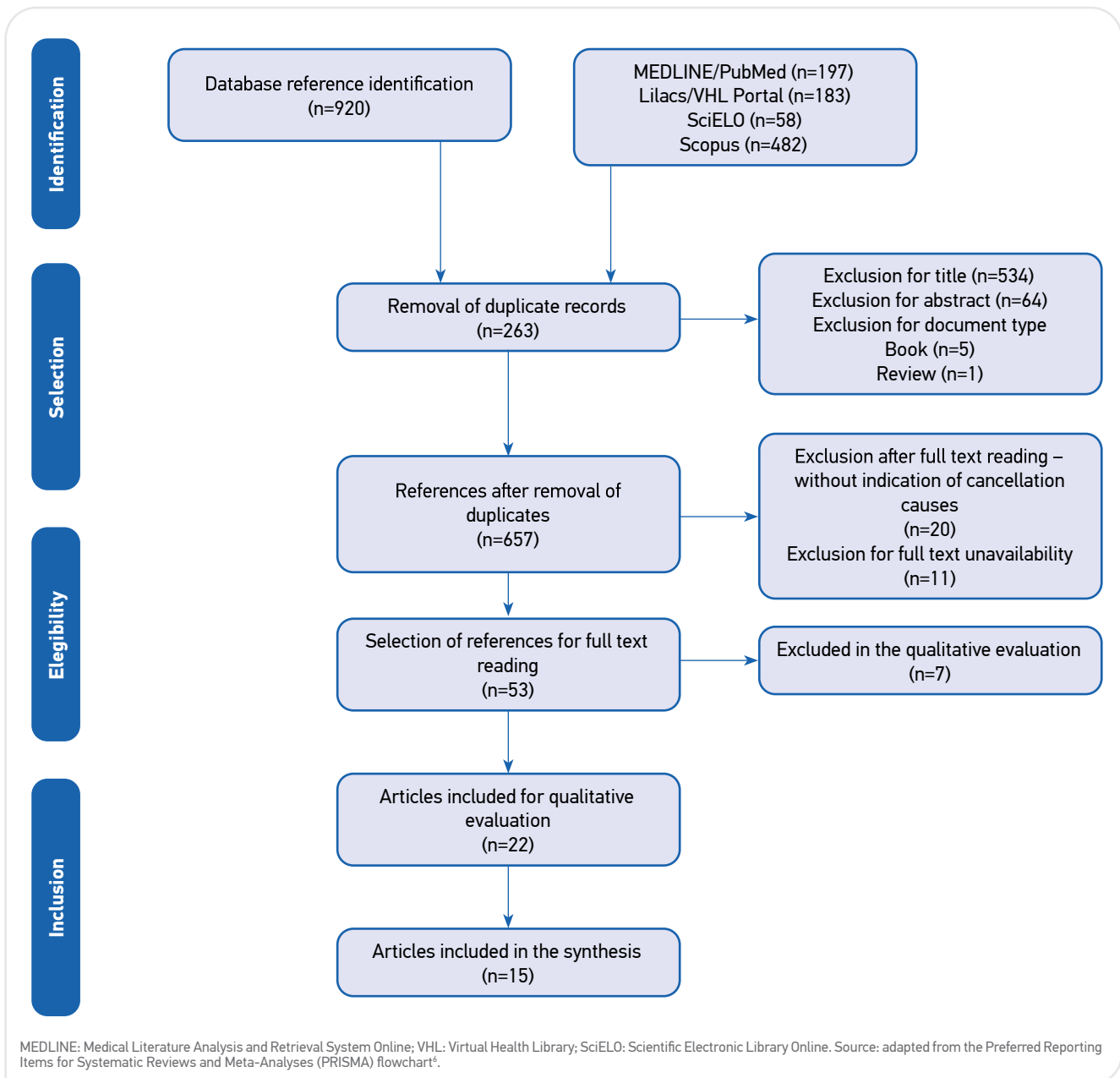


Figure 1. Primary study selection process flowchart.

facility and space failures, lack of staff, emergency surgery demand, lack of equipment, lack of intensive care beds in the postoperative period, procedure no longer necessary, scheduling failures, and lack of oxygen and blood.

DISCUSSION

The studies involved countries with different Human Development Index (HDI), such as England, United States,

China, Spain, Saudi Arabia, Mexico, India, Colombia, Argentina, Brazil, Tanzania, Pakistan, and Ethiopia⁷⁻²¹.

Surgery cancellation rates were higher in developing countries compared to developed ones^{13,19,21}. In developing countries, whose resources are limited, elective surgery suspension is a common phenomenon in most hospitals^{7,12,15,17}.

Reasons for surgery suspension were classified and divided into institutional, patient, and staff causes in all studies. This review addressed institutional issues responsible for surgery suspension. Analyses focused on elective surgeries and

Chart 1. Study characterization based on title, journal, publication year, country of origin, study type, and results.

Title	Journal/year Country/study type	Results
"Incidence, causes and pattern of cancellation of elective surgical operations in a university teaching hospital in the Lake Zone, Tanzania" ⁷	<i>African Health Sciences</i> 2011 Tanzania Prospective study	The most common causes for surgery cancellation were operating room unavailability and inadequate facilities in 53.0% and 28.4% of cases, respectively. Most of these cancellations were attributed to hospital management (82%), and 93% of them were avoidable.
"Cancellation of elective operations on the day of intended surgery in a Hong Kong hospital: point prevalence and reasons" ⁸	<i>Hong Kong Medical Journal</i> 2012 China Retrospective cross-sectional study	Operating room unavailability due to delay in the previous surgery was the most frequent cancellation cause (n=310).
"Tasas y causas de suspensión de cirugías en un hospital público durante el año 2014" ⁹	<i>Enfermería Universitaria</i> 2016 Argentina Descriptive cross-sectional study	Causes related to logistics or management were responsible for 44.2% of surgery suspensions, while clinical causes (non-surgical) represented 40.8%. Anesthesia-related causes accounted for 5.4% of the total surgery suspensions.
"Elective surgery cancelation on day of surgery: An endless dilemma" ¹⁰	<i>Saudi Journal of Anesthesia</i> 2016 Saudi Arabia Statistical analysis retrospective study	Four reasons explained about 80% of cancellations. The most frequent cause (27.0%) was patient non-attendance, followed by clinical conditions (24.3%) and lack of operating rooms (19.5%). Unavailability of employees / equipment / implants represented 0.7% of cancellations.
"Contributing factors of elective surgical case cancellation: a retrospective cross-sectional study at a single-site hospital" ¹¹	<i>BioMed Central Surgery</i> 2017 China Retrospective study	Work-related causes were the main reasons for surgery cancellation and represented 25.8% of them, followed by unspecified reasons (25.8%), coordination causes (15.1%), patient-related causes (13.0%), support system problems (11.8%), and physicians (8.5%).
"Incidence and causes of cancellations of elective operation on the intended day of surgery at a tertiary referral academic medical center in Ethiopia" ¹²	<i>Patient Safety in Surgery</i> 2018 Ethiopia Cross-sectional study	The most common reasons for cancellation were factors related to the surgeon (35.8%), the patient (28.7%), administrative problems (21.2%), and anesthesia (14.4%). Cancellation occurred mainly due to inadequate scheduling (20.5%), unavailability of surgeons (8.9%), of oxygen and blood (8%), and of equipment (5.5%).
"Cancelled operations: a 7-day cohort study of planned adult inpatient surgery in 245 UK National Health Service hospitals" ¹³	<i>British Journal of Anaesthesia</i> 2018 England Prospective observational cohort study	Cancellation causes: lack of available beds (31%), unavailability of operating rooms (12.7%), lack of equipment (2.3%).
"El análisis factorial para aumentar el rendimiento del quirófano y disminuir la cancelación de cirugía electiva" ¹⁴	<i>Cirujano General</i> 2018 Mexico Prospective study	Operating room unavailability (48.5%), emergency surgery (17.1%), and patient's clinical condition (10.5%) were the main causes for cancellation.
"Determinants factors for suspension of elective surgeries in a hospital of the Federal District, Brazil" ¹⁵	<i>Revista SOBECC</i> 2018 Brazil Descriptive retrospective quantitative study	From January to October 2015, 6,926 surgeries were scheduled, with 4,587 performed and 2,339 suspended, totaling a surgery suspension rate of 33.8%. Unjustified causes were the main reason for suspension (30.1%).

Continua...

Chart 1. Continuation.

Title	Journal/year Country/study type	Results
"A prospective study on operation theater utilization time and most common causes of delays and cancellations of scheduled surgeries in a 1,000-bedded tertiary care rural hospital with a view to optimize the utilization of operation theater" ¹⁶	<i>Anesthesia, Essays and Researches</i> 2018 India Prospective study	Operating room unavailability (62.22%) and patient's clinical conditions (14.44%) were the most frequent reasons for cancellation. The highest cancellation rate occurred in cancer surgeries (27.27%).
"Canceled elective general surgical operations in Khyber teaching hospital, Peshawar, Pakistan" ¹⁷	<i>Rawal Medical Journal</i> 2019 Pakistan Cross-sectional study	Operating room unavailability was the most common reason for surgery cancellation (240/23.46%); 238 (23.2%) surgeries were canceled due to clinical conditions, with uncontrolled blood pressure being the most frequent (102/49.76%).
"Causas de cancelación de cirugía programada en una clínica de alta complejidad de Popayán, Colombia" ¹⁸	<i>Revista Facultad de Medicina</i> 2019 Colombia Descriptive retrospective cross-sectional study	Cancellation rate was 2.7%; 56.7% of the causes were attributed to patients, 40.5% to providers, and 2.7% to insurance companies. Institutional causes included equipment unavailability or damage, lack of supplies, and health product processing problems.
"Retrospective analysis of suspended surgeries and influencing factors during an 8-year period" ¹⁹	<i>Cirugía Española</i> 2019 Spain Retrospective observational study	Cancellation causes: patient's clinical conditions (17.6%); operating room unavailability (26.8%), patient non-attendance (6.3%). Avoidable causes accounted for 64.8%, and unavoidable causes represented 35.2%.
"Incidence and causes of surgery cancellation in a university hospital in Barranquilla, Colombia, in 2016" ²⁰	<i>Enfermería Global</i> 2020 Colombia Retrospective observational study	Among cancellation causes, 99 (40.6%) were attributed to patients, 93 (38.1%) to the institution, and 52 (21.3%) to medical orders. In total, 41% of cancellations could have been avoided. Cancellation rate was 7.6%.
"Same-Day Cancellation in Vascular Surgery: 10-Year Review at a Large Tertiary Care Center" ²¹	<i>Annals of Vascular Surgery</i> United States 2020 Retrospective study	75% of surgery cancellations were considered unpredictable, 12.5% predictable, and 12.5% undetermined. Patient's clinical conditions (55%), cancellation by the patient (12%), no longer necessary procedures (10%), and management or scheduling conflicts (10%) were the most common reasons for cancellation.

their suspension causes. Emergency and urgent surgeries were disregarded since their suspension would be unjustifiable.

Surgery cancellation affects patients, the surgical team, and the hospital, reducing patient satisfaction and professional morale^{11,13}.

Surgery suspension is one of the most important criteria for hospital accreditation. A high-quality facility has rates close to zero. Nurses play an important role in reducing surgery suspension by understanding patients' needs, doing careful screening, and communicating with the entire surgical team^{13,14}.

Surgery cancellation postpones patient treatment, causes team rework, idleness, and possible complications due to prolonged hospitalization^{13,18,21}.

Analysis of studies included in this review identified failures in the time of use of ORs^{7,8,13,14,16}. Reduction in surgical procedure time, if not well managed, may result in idleness. Controlling the procedure progress is fundamental to speed up room turnover^{8,10,15,17,19}. These failures in time of use management result in OR unavailability, as indicated in different studies^{7,8,13,14,16}.

Surgery cancellation causes a burden on society. Studies have revealed that each surgery cancellation costs between US\$ 1,430 and US\$ 1,700, on average, to United States hospitals^{10,15}.

Frequently, the hospital has an increase in financial and operational costs due to the waste of sterile materials and supplies, as well as the OR occupancy. In most cases, surgeries are suspended with the patient already in the OR. In this

case, open materials are considered contaminated and then discarded. Professionals scheduled to assist in the procedure remain idle while awaiting a medical decision. In addition, surgery cancellation has a negative impact on hospital quality¹⁵.

Regarding failures in the elective procedure schedule, surgery cancellation is one of the main causes of surgical adverse events. In addition, work overload, distractions by other patients and work colleagues, occurrences in the unit, inattention during the change-of-shift report, and lack of communication among team members are important factors^{13,15}.

Proposals to reduce surgery suspension include: decreasing OR turnover, starting the first elective surgery of the day strictly on time, and adjusting equipment and supplies necessary for each procedure, as well as increase in OR efficiency^{16,17}.

Planned surgical scheduling was also suggested, involving information about patients, arrangements for equipment, and checking the necessary tests, such as cross-matching¹⁵.

Statistical analysis was recommended to elaborate an accurate institutional profile, which changes according to each facility, allowing the identification of specific gaps. Surgeons with high rates of suspension in their procedures should have their surgery scheduling carefully observed. Also, studying the causes of these suspensions, as well as searching for solutions, was advised. Monday was considered the day requiring the most attention regarding surgery scheduling, given the high number of suspensions⁸.

A limitation of this study is its restriction to temporal samples from different hospitals around the world.

CONCLUSION

Surgery suspension is a global, complex, and multifactorial problem. This study focused on the analysis of institutional problems. Causes for cancellation and/or suspension of elective surgeries were obtained from the articles evaluated.

Management of OR time of use was cited in many studies in two different situations: prolonged procedures and procedures lasting less than expected.

Other SC management problems were identified, including lack of oxygen, blood, water, and intensive care beds for the immediate postoperative period. Some studies provided justifications for these issues, such as repairs in the structures of an SC. Lack of human resources, including surgeons and anesthesiologists, was also mentioned.

OR efficiency requires a thorough numerical analysis in order to present the reality of each facility. Elective surgery suspension has many repercussions and involves patients and their families, the quality of hospital services, costs, and health professionals, even from a moral point of view.

Particular attention should be given to surgery scheduling rules, improvement and financial investment in infrastructure, technologies, and human resources, interpersonal communication, patient information planning and monitoring, equipment and supplies, and analysis of cancellation causes.

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