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Unplanned readmissions after surgery in a hospital in northern Brazil: prospective cohort

Reinternações não planejadas após cirurgias em um hospital do norte do Brasil: coorte prospectiva

Reingresos no planificados después de la cirugía en un hospital del norte de Brasil: cohorte prospectiva

ABSTRACT

Objective: to analyze unplanned readmissions after surgical procedures and their risk factors in a large hospital in Northern Brazil. **Method:** prospective cohort with data collected from medical records and at the bedside. Descriptive, bivariate and multiple analyses were performed using Poisson regression in Stata® v.16.0. **Results:** of 486 patients, 1.47% were readmitted. The incidence of readmission was 68 per 1,000 procedures (95% CI: 47.10; 93.85). In the adjusted analysis, risk factors were non-white race/skin color (RR: 2.06; 95% CI: 1.13; 3.75), use of implants (RR: 2.00; 95% CI: 1.05; 3.81) and surgeries in urology/renal (RR: 3.17; 95% CI: 1.59-6.31) and gynecology (RR: 2.18; 95% CI: 1.06-4.49) specialties. **Conclusion:** the incidence of readmissions in this region is higher than in other regions. Demographic characteristics and type of surgical procedure were risk factors for the outcome.

Descriptors: Operative Surgical Procedures; Patient Readmission; Hospital Infection; Longitudinal Studies.

RESUMO

Objetivo: analisar as reinternações não planejadas após procedimentos cirúrgicos e seus fatores de risco em um hospital de grande porte no Norte do Brasil. **Método:** coorte prospectiva, com dados coletados de prontuários e à cabeceira do leito. Foram realizadas análises descritivas, análise bivariada e múltipla por meio da regressão de Poisson no Stata® v.16.0. **Resultados:** do total de 486 pacientes, 1,47% reinternaram. A incidência de reinternação foi 68 a cada 1.000 procedimentos (IC95%: 47,10; 93,85). Na análise ajustada apresentaram-se como fatores de risco não ser branco (RR: 2,06; IC95% 1,13; 3,75), usar implante na cirurgia (RR: 2,00; IC95%: 1,05; 3,81) e procedimentos das especialidades urologia/renal (RR: 3,17; IC95%:1,59-6,31) e ginecologia (RR: 2,18; IC95%:1,06-4,49). **Conclusão:** a incidência de reinternação nesta região é maior do que outras regiões. Características demográficas e tipo de procedimento cirúrgico foram fatores de risco para o desfecho.

Descritores: Procedimentos Cirúrgicos Operatórios; Readmissão do Paciente; Infecção Hospitalar; Estudos Longitudinais.

RESUMEN

Objetivo: analizar los reingresos no planificados después de procedimientos quirúrgicos y sus factores de riesgo en un gran hospital del norte de Brasil. **Método:** cohorte prospectiva, con datos recolectados de historias clínicas y al lado de la cama. Se realizaron análisis descriptivos, bivariados y múltiples mediante regresión de Poisson en Stata® v.16.0. **Resultados:** del total de 486 pacientes, el 1,47% reingresó. La incidencia de reingresos fue de 68 por 1.000 procedimientos (IC del 95%: 47,10; 93,85). En el análisis ajustado, los factores de riesgo fueron no ser blanco (RR: 2,06; IC 95% 1,13; 3,75), uso de implantes en cirugía (RR: 2,00; IC 95%: 1,05; 3,81) y procedimientos de la urología/especialidades renales (RR: 3,17; IC 95%: 1,59-6,31) y ginecología (RR: 2,18; IC 95%: 1,06-4,49). **Conclusión**: la incidencia de reingresos en esta región es mayor que en otras regiones. Las características demográficas y el tipo de procedimiento quirúrgico fueron factores de riesgo para el resultado.

Descriptores: Procedimientos Quirúrgicos Operativos; Readmisión del Paciente; Infección Hospitalaria; Estudios Longitudinales.

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INTRODUCTION

Unplanned hospital readmission after a surgical procedure is related to sociodemographic profile, underlying pathology, health care-related adverse events, and home self-care [1-3].

Data from the National Surgical Quality Improvement Program in the United States of America indicated that readmissions up to 30 days after surgical procedures were associated with the occurrence of renal failure, venous thromboembolism, urinary tract infection, pneumonia, sepsis and septic shock[4]. Other common causes of readmission were identified in a study developed at the California State Hospital in 2015 which showed an association between the outcome and surgical site infection (16.9%), gastrointestinal complications (11.3%), and pulmonary complications (3.6%)[5].

A study involving five Latin American countries in 2010 found an 11.9% prevalence of adverse events in surgical clinics and 8.9% in medical-surgical clinics and showed that approximately 60% of patients who experienced adverse events had an increase in hospitalization time and 25.8% had readmissions[6,7].

Readmissions imply the overload of health services, increased health care costs, worsening of the patient's clinical condition, and low monitoring and follow-up in Primary Health Care (PHC) for users who undergo procedures of high complexity, among others[8].

The incidence of hospital readmissions can be used as an indicator of the quality of care provided to users, with the objective of analyzing, monitoring and exposing the reality in the form of statistical data and parameters in order to discuss health situations and propose changes[9].

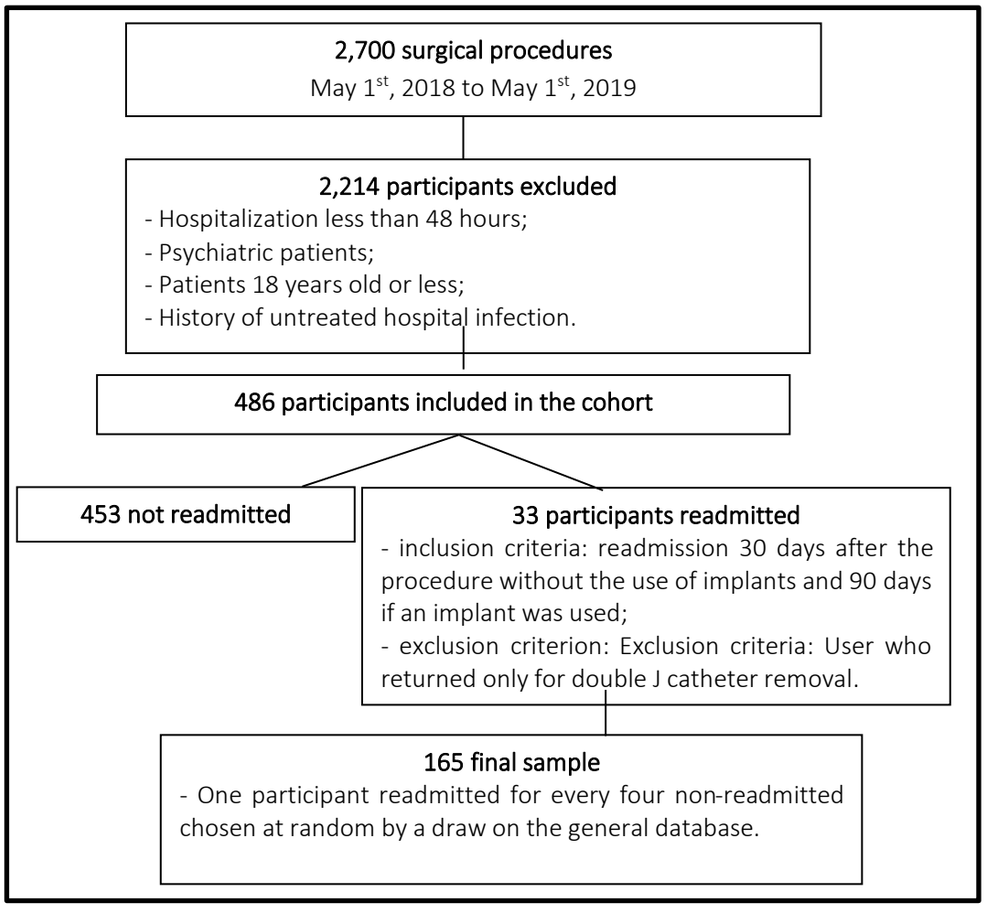
The monitoring of readmissions, despite being recognized as an important indicator, is seldom used. In the literature review carried out prior to this study, few studies were found that investigated the causes of readmission. In Brazil, only three studies were found on readmissions in different surgical scenarios, namely, heart surgeries, general surgeries, and knee arthroplasty surgeries[10-12]. Among the possible causes for the absence of further studies is the difficulty to carry out long-term monitoring of users, which requires human and material resources. However, finding the factors for readmission is important for planning preventive actions and reviewing care practices aimed at improving work processes. Thus, the objective of the study is to analyze unplanned readmissions after surgical procedures and their associated factors in a large hospital in Northern Brazil.

METHOD

A prospective cohort study was conducted. The outcome was the readmissions of surgical patients to a large hospital in the city of Porto Velho, state of Rondônia, from May 2018 to May 2019. This hospital is the largest public hospital in the state and the unit provides tertiary care, with around 590 beds designed for medium and high complexity levels of care. Specialty procedures were included: cardiac, plastic, gynecology, urology/renal, gastroenterology, neurology, head/neck or general.

The sample and sampling of the participants took place according to Figure 1.

Figure 1 - Composition of the study sample, Porto Velho, Rondônia



Source: The authors

Data collection took place through the Hospital Management System (Hospub) of the Ministry of Health, physical records, and at the bedside directly with the patient. Data collection was performed using a standard form developed by the researchers and tested through a pilot study. The researchers responsible for data collection were previously trained. The collections were performed daily through the electronic medical record and every two days *in loco* for collection in the physical records and directly at the bedside.

The dependent variable was hospital readmission, and the participants were followed up for 30 days post-discharge in surgeries without implants and 90 days in surgeries with implants, according to post-discharge follow-up criteria defined by the National Health Surveillance Agency (ANVISA) for the identification of surgical site infection[13].

For the analysis of risk for readmission, the independent variables were collected during hospitalization for the surgical procedure and organized into three groups that refer to demographic characteristics, information about the hospitalization, and the treatment performed.

- Demographic characteristics and health conditions: age (less than or over 60 years), sex (male or female), marital status (with or without a partner), education (less than or over 9 years), race/color (white or other races/skin color), Body Mass Index (eutrophic or non-eutrophic) according to the World Health Organization classification[14], chronic diseases (Diabetes, Arterial Hypertension or Chronic Obstructive Pulmonary Disease – yes or no).

- Information on admission: specialty (gynecology, urology/renal or others - cardiac, plastic, gastroenterology, neurology, head/neck and general), implant use (yes or no); patient went to the intensive care unit after the procedure (yes or no); total days of hospitalization (less than or more than seven days); patient had Health Care-Related Infection (yes or no), presence of devices (central or peripheral catheter, nasoenteral or nasogastric tube, indwelling urinary catheter [IUC], drains – yes or no), and total days of use for each device.

The analysis was presented in two parts: 1) description of the characteristics of readmitted patients; 2) analysis of risk factors for readmission, considering information from the first hospitalization where the surgical procedure was performed. Descriptive analysis was performed using absolute and relative frequency analysis and central tendency analysis. To assess the associations of variables with the outcome – readmission, bivariate analysis was performed using Pearson's Chi-square (X^2) or Fisher's Exact Test. All variables with a significance test lower than 0.20 ($p<0.20$) were submitted to multiple analysis using Poisson regression using the stepwise forward selection strategy. The covariates were tested for the possible presence of multicollinearity - represented by correlations greater than 0.80, and these variables were not considered in the final model.

In the multiple analysis, a measure of association was obtained in relation to the dependent variable (readmission) to know its respective relative risks (RR) with 95% confidence intervals. The Hosmer Lemeshow test was used to verify the quality of the adjustments of the final model. Statistical analysis was performed using the statistical software STATA® version 15.0 (College Station, Texas, USA).

The project was approved under number 2,866,650 by the Research Ethics Committee of the Federal University of Rondônia. All participants signed the Informed Consent Form and the ethical principles for research involving human beings were respected in accordance with the norms established by Resolution 466/2012 of the National Health Council[17].

RESULTS

Of the 486 patients included in the research database, 1.47% (n=33) were readmitted, leading to an incidence of 68 readmissions per 1,000 procedures, and 15% of patients were admitted to the hospital twice during the cohort follow-up period. The mean time of return to the hospital for readmission was 33 days after hospital discharge (standard deviation 25.7; minimum 1; maximum 79).

In the crude analysis, only the gender variable showed statistical significance for the outcome, the female gender was presented as a risk for readmission (RR:1.76; 95%CI:1.05-2.94; Table 1).

Table 1 - Sociodemographic characteristics and previous history of surgical patients, Porto Velho/RO, 2019 (n=165)

Variable	Not readmitted n (%)	Readmitted n (%)	Crude relative risk	p value*
Age				0.27
< 60 years	89 (78.07)	25 (21.93)	1	
≥ 60 years	43 (84.31)	8 (15.65)	0.71 (0.39- 1.30)	
Sex				0.03
Male	75 (85.23)	13 (14.77)	1	
Female	57 (74.03)	20 (25.97)	1.76 (1.05 – 2.94)	
Marital status				0.92
With partner	84 (79.25)	22 (20.75)	1	
No partner	39 (79.59)	10 (20.41)	0.98 (0.57 – 1.70)	
Schooling **				0.18
< 9 years	75 (83.33)	15 (16.67)	1	
≥ 9 years	48 (76.19)	15 (23.81)	0.70 (0.41 – 1.18)	
Race/skin color**				0.11
White	13 (65.00)	7 (35.00)	1	
Black, brown or yellow	112 (81.75)	25 (18.25)	0.51 (0.22-1.18)	

(continue)

Variable	Not readmitted n (%)	Readmitted n (%)	Crude relative risk	p value*
BMI**				0.84
Eutrophic	42 (77.78)	12 (22.22)	1	
Non-eutrophic ***	62 (76.54)	19 (23.46)	1.05 (0.63 – 1.78)	
Chronic disease**				0.11
No	82 (82.83)	17 (17.17)	1	
Yes	46 (74.19)	16 (25.81)	1.50 (0.91 – 2.46)	

* Significant p value < 0.05
** Contains missing data
***Non-eutrophic - BMI < 18.25 or > 25.0

Source: The authors, 2019

Having undergone procedures in the area of urology/renal (RR: 3.35; 95% CI 1.63-6.86) or gynecology (RR:3.04; 95% CI: 1.71-5.43) and implant use (RR: 2.54, 95% CI: 1.57-4.11) were considered risks for readmission. The use of devices in the first hospitalization did not present a statistically significant association with readmission (Table 2).

Table 2 - Information on the hospitalization of surgical patients, Porto Velho/RO, 2019 (n=165)

Variable	Not readmitted n (%)	Readmitted n (%)	Crude relative risk	p value *
Specialties				
Others	85 (78.70)	23 (21.30)	1	
Gynecology	11 (64.71)	6 (35.29)	3.35 (1.63 - 6.86)	<0.01
Urology/renal	36 (67.92)	17 (32.08)	3.04 (1.71 - 5.43)	<0.01
Patient used implant				<0.01
No	109 (85.16)	19 (14.84)	1	
Yes	23 (62.16)	14 (37.84)	2.54 (1.57- 4.11)	
ICU after procedure				0.26
No	116 (78.91)	31 (21.09)	1	
Yes	16 (88.89)	2 (11.11)	0.52 (1.73-1.60)	
Total days of hospitalization				0.92
Up to seven	37 (80.43)	9 (19.57)	1	
More than seven	95 (79.83)	24 (20.17)	1.03 (0.58-1.81)	
IRAS				0.99
No	128 (80.00)	32 (20.00)	1	
Yes	4 (80.00)	1 (20.00)	1.01 (0.23-4.35)	
Central venous access *				0.08
No	121 (80.67)	29 (19.33)	1	
Yes	7 (63.64)	4 (36.36)	1.88 (0.93-3.81)	
Total days with central access				0.30
< 7 days	3 (50.00)	3 (50.00)	1	
≥ 7 days	4 (80.00)	1 (20.00)	0.40 (0.06-2.59)	
Peripheral venous access				0.65
No	6 (85.71)	1 (14.29)	1	
Yes	126 (79.75)	32 (20.25)	1.42(0.31-6.43)	
Total days with peripheral access **				0.76
< 7 days	51 (77.27)	15 (22.73)	1	
≥ 7 days	64 (79.01)	17 (20.99)	0.92 (0.55-1.54)	
Nasogastric or nasoenteral tube				0.76
No	127 (79.38)	33 (20.63)	1	
Yes	5 (100.00)	0 (0.00)	0.92 (0.55-1.54)	
Indwelling urinary catheter				0.92
No	89 (80.18)	22 (19.82)	1	
Yes	43 (79.63)	11 (20.37)	1.02 (0.60-1.76)	
Total days in use of IUC				0.30
< 3 days	12 (66.67)	6 (33.33)	1	
≥ days	31 (86.11)	5 (13.89)	0.48 (0.44-1.41)	
Drains				0.83
No	94 (79.66)	24 (20.34)	1	
Yes	38 (80.85)	9 (19.15)	0.94 (0.53-1.66)	
Total days in use of drains				0.46
< 5 days	21 (77.78)	6 (22.22)	1	
≥ 5 days	17 (85.00)	3 (15.00)	0.67 (0.23-1.95)	

* Significant p value <0.05
** Contains missing data

Source: The authors

In the adjusted analysis, being black, brown or yellow was a risk factor for readmission (RR: 2.06; 95%CI 1.13; 3.75), just as the use of an implant increases the risk of readmission twice (RR: 2.00; 95%CI: 1.05; 3.81). The urology/renal and gynecology specialties presented a two to three times higher risk for readmission when compared to other specializations (Table 3).

Table 3 - Adjusted analysis of the relative risk for readmission of surgical patients, Porto Velho/RO, 2019 (n=165)

Variable*	Adjusted relative risk	p value**
Sex		0.31
Female	1.32 (0.76 – 2.31)	
Schooling***		0.55
< 9 years	0.61 (0.37-1.01)	
Race/skin color**		0.02
Black, brown or yellow	2.06 (1.13- 3.75)	
Chronic disease		0.30
Yes	1.30 (0.80-2.17)	
Implant		0.03
Yes	2.00 (1.05; 3.81)	
Specialties		
Urology/renal	3.17 (1.59-6.31)	<0.01
Gynecology	2.18 (1.06-4.49)	0.03
Central venous access		0.85
Yes	1.09 (0.42-2.84)	

** Significant p value <0.05

*** Contains missing data

Source: The authors

The Hosmer Lemeshow statistical test was applied to verify the goodness of fit of the final model. The p value was 0.28 and the null hypothesis was rejected, indicating good fitness.

DISCUSSION

The incidence of readmission was 68 per 1,000 procedures and the incidence of Hospital acquired infections (HAI) in readmission was 182 users per 1,000 readmissions. Brown, black and yellow race/skin color, surgeries in the urology/renal and gynecology specialties, and use of implants were risk factors for readmission.

In 2013, 1,710 patients were evaluated in a university hospital in the state of Minas Gerais, and 22% were readmitted in an unplanned manner and approximately 3% due to post-surgical complications, representing an incidence rate of 29.82 readmissions per 1,000 procedures[11]. In another study conducted in São Paulo, with 62 cardiac surgery patients, the readmission rate was 5.9% (incidence of readmission 3.66/1,000 procedures) and surgical site infection was the main cause of readmission in 87.5% of these patients[10]. The readmission rate found in Rondônia was much higher than the rates found in these two studies.

In Rondônia, black, brown and yellow race/skin color was a risk factor for readmission. The influence of this variable on unfavorable outcomes is a reflection of the impact of historical sociopolitical and economic issues that hinder the access of certain groups of users to the health system[16]. In line with this finding, a study with 48 patients conducted in the city of São Paulo found an association between the black race and readmission within 30 days after surgical intervention for knee arthroplasty[12].

The use of implants was associated with a twofold increased risk of readmission, as expected. Risk factors for infection by implantable medical devices are related to the type of surgery, insertion technique and inherent characteristics of the device such as safety and efficacy. One of the important causes for readmissions in patients with the use of devices is the formation of biofilms, which can make the antibiotic effect less efficient and lead to the need for surgical reopening[17,18].

Urological/renal and gynecological surgeries implied a two-fold increased risk for readmission in Rondônia. A study conducted in 2012 in the United States of America with 498,875 individuals undergoing surgical procedures showed that 5.7% of patients were readmitted and surgeries in the area of gynecology and urology were among the procedures associated with the highest frequency of readmissions[19]). In terms of urological procedures, a study conducted in France for three years with 419,787 patients found a readmission frequency of 18.4%[20]. Another study conducted in Belgium, with data from 98% of hospitals in the country, found great heterogeneity in mortality rates, readmissions and length of stay between the institutions evaluated, indicating that differences related to the structure and work process interfered with post-surgical urological outcomes[21].

Many factors can interfere with the occurrence of HAI in these specialties, including direct and indirect actions performed with the patient. For example, the processing of medical devices used in urology brings important challenges due to the complexity of cleaning and sterilization, and this fact can increase the risk of surgical site infections[22,23]. The existence of institutional protocols that standardize patient care measures; good practices in the use of indwelling urinary catheter, hospital discharge as early as possible and adequate processing of the products are some actions that can reduce complications in the postoperative period of gynecological and urological surgeries[24-26].

Early identification of the causes of unplanned readmission is essential to support the planning improvements in care by health teams. It is necessary that institutions and health professionals recognize the role of active surveillance in the early detection of signs of infection and follow safe surgery protocols that effectively present good results[27,28]. There are actions that range from low technology, such as the use of bundles, to actions that require greater investment, such as the use of a biomarker that shortens the time to diagnose[29]. It is extremely important that health teams know the reality in order to plan and implement surveillance actions and good care practices aiming at the success, efficacy

and safety necessary to avoid unplanned readmissions[30-32].

This study has some limitations because only readmissions performed in the admission unit where the surgeries took place were considered, what implies that admissions to other health institutions were not investigated during the follow-up period, probably resulting in losses among patients living in other municipalities. Some sociodemographic information was not available in the medical records, resulting in missing data and limitations in the analyses. Finally, this investigation did not allow evaluating the support network of these users after discharge, a condition that contributes to recovery and unplanned readmission. Despite the limitations, it is believed that study showed useful data for the planning of preventive actions both in the scope of care in surgical procedures and in general care.

One of the strengths of this research is the novelty of the information, since there are few national data on readmissions among surgical patients, because these studies primarily seek to identify relationships between medical conditions rather than surgical contexts. The prospective method is another strong point of the study, for it made it possible to follow the users from the surgical procedure up to 30 days without implants and 90 days if implants were used.

CONCLUSION

In this investigation, the incidence rate was 68 readmissions per 1,000 procedures. Black, brown and yellow race/skin color, urological or gynecological procedures and the use of implants were risk factors for unplanned readmission. The unplanned readmission of surgical patients after discharge, as a metric to assess the quality of care and measure preventable errors, proved to be an important indicator to be used in the situational diagnosis of patient care practices. Thus, studies aimed at analyzing these complications in the postoperative period can clarify the most common reasons for this return, covering sociodemographic conditions, determinants in the health-disease process and care provided by health teams. It is recommended that health institutions maintain epidemiological surveillance through a screening system of their patients even after hospital discharge to detect the occurrence of infections, thus avoiding hospital readmission.

For future studies, it is suggested to investigate how products are used by the nursing team in surgical procedures, and investigate good practices in pre-, peri- and post-surgical management of patients and the level of patient safety culture among workers in the hospital. This assessment is essential for a situational diagnosis to strengthen safe practices in the institution. It is also interesting to assess the care provided by patients in their homes in order to understand how the discharge plan and follow-up of users in primary health care can contribute to reducing readmissions after surgical procedures.

REFERENCES

1. Linn AC, Azzolin K, Souza EN. Associação entre autocuidado e reinternação hospitalar de pacientes com insuficiência cardíaca. Rev bras enferm. 2016;69:469-474. Disponível em: https://doi.org/10.1590/0034-7167.2016690312i.

2. Maia CS, Freitas DRC, Gallo LG, Araújo WN. Notificações de eventos adversos relacionados com a assistência à saúde que levaram a óbitos no Brasil, 2014-2016. Epidemiol serv saúde. 2018;27:1-10. Disponível em: https://doi.org/10.5123/s1679-49742018000200004.

3. Chan B, Goldman LE, Sarkar U, Guzman D, Critchfield J, Saha S, et al. High perceived social support and hospital readmissions in an older multi-ethnic, limited English proficiency, safety-net population. BMC Health Serv Res. 2019;19:1-9. Disponível em: https://doi.org/10.1186/s12913-019-4162-6.

4. Rothenberg KA, Stern JR, George EL, Trickey AW, Morris AM, Hall DE, et al. Association of frailty and postoperative complications with unplanned readmissions after elective outpatient surgery. JAMA Netw Open. 2019;2:e194330. Disponível em: https://doi.org/10.1001/jamanetworkopen.2019.4330.

5. Havens JM, Olufajo OA, Cooper ZR, Haider AH, Shah AA, Salim A. Defining rates and risk factors for readmissions following emergency general surgery. JAMA Surg. 2016;151:330-336. Disponível em: https://doi.org/10.1001/jamasurg.2015.4056.

6. Aranaz-Andrés JM, Aibar-Remón C, Limón-Ramírez R, Amarilla A, Restrepo FR, Urroz O, et al. Prevalence of adverse events in the hospitals of five Latin American countries: results of the 'Iberoamerican study of adverse events' (IBEAS). BMJ Qual Saf. 2011;20:1043-1051. Disponível em: http://dx.doi.org/10.1136/bmjqs.2011.051284.

7. Ostariz VA, Castro MTGV, Rodríguez-Arias FL, Martín JLV, Remón CA, Puche JR, et al. Risk analysis for patient safety in surgery departments: cross-sectional design usefulness. Int J Environ Res Public Health. 2020;17:2516. Disponível em: https://doi.org/10.3390/ijerph17072516.

8. Wiest D, Yang Q, Wilson C, Dravid N. Outcomes of a citywide campaign to reduce Medicaid hospital readmissions with connection to primary care within 7 days of hospital discharge. JAMA Netw Open. 2019;2:e187369. Disponível em: https://doi.org/10.1001/jamanetworkopen.2018.7369.

9. Espírito Santo. Secretária de Saúde. Diretrizes para padronização de nomenclatura e indicadores do monitoramento assistencial dos contratos de gestão com organizações sociais de saúde. Diretrizes para Padronização de Nomenclatura e Indicadores do Monitoramento Assistencial dos Contratos de Gestão com Organizações Sociais de Saúde; 2018 [citado em 10 Fev 2021]. Disponível em: https://saude.es.gov.br/Media/sesa/OSS/Diretrizes%20para%20Padroniza%C3%A7%C3%A3o%20de%2

0Nomenclatura%20e%20Indicadores%20do%20Monitoramento%20Assistencial.pdf.

10. Barreiros BRN, Bianchi ERF, Turrini RNT, Poveda VB. Causas de readmissão hospitalar após cirurgia cardíaca. Rev eletrônica enferm. 2016;18:e1182. Disponível em: http://dx.doi.org/10.5216/ree.v18.39529.

11. Neta ACF, Jorge AO, Viudes MAA, Silva KL, Orlando CRP, Almeida LH , et al. O perfil de reinternações de um hospital de ensino de Belo Horizonte no ano de 2013. Rev Salusvita. 2017;36:443-461. Disponível em: https://secure.unisagrado.edu.br/static/biblioteca/salusvita/salusvita_v36_n2_2017_art_06.pdf.

12. Lehtonen EJ, Hess MC, McGwin Jr. G, Shah A, Godoy-Santos AL, Naranje S. Risk factors for early hospital readmission following total knee arthroplasty. Acta ortop bras. 2018;26:309-313. Disponível em: https://doi.org/10.1590/1413-785220182605190790.

13. Brasil. Agência Nacional de Vigilância Sanitária. Critérios Diagnósticos de Infecção Relacionada à Assistência à Saúde. 2ª ed. Brasília: Anvisa; 2017.

14. World Health Organization. Obesity: preventing and managing the global epidemic. Report of a World Health Organization Consultation. WHO | Obesity: preventing and managing the global epidemic; 2000 [citado em: 21 de fev. 2021]. Disponível em: https://apps.who.int/iris/handle/10665/42330.

15. Brasil. Conselho Nacional de Saúde. Resolução 466/12. Trata de pesquisas em seres humanos e atualiza a resolução 196. [Internet]. Diário Oficial da União. 12 dez. 2012.

16. Pacheco VC, Silva JC, Mariussi AP, Lima MR, Silva TR. As influências da raça/cor nos desfechos obstétricos e neonatais desfavoráveis. Saúde debate. 2018;42:125-137. Disponível em: https://doi.org/10.1590/0103-1104201811610.

17. El-Sayed MDD, Aksone Nouvong DPM. Infection Protocols for Implants. Clinics in podiatric medicine and surgery. 2019;36:627-649. Disponível em: https://doi.org/10.1016/j.cpm.2019.06.007.

18. Percival SL. Importance of biofilm formation in surgical infection. Br J Surg. 2017;104:e85-e94. Disponível em: https://doi.org/10.1002/bjs.10433.

19. Merkow RP, Ju MH, Chung JW, Hall BL, Cohen ME, Williams MV, et al. Underlying reasons associated with hospital readmission following surgery in the United States. JAMA. 2015;313:483-495. Disponível em: https://doi.org/10.1001/jama.2014.18614.

20. Manach Q, Rouprêt M, Reboul-Marty J, Drouin SJ, Guillot-Tantay C, Matillon X, et al. Hospital readmissions after urological surgical procedures in France: A Nationwide Cohort Study over 3 Years. Eur Urol Focus. 2018;4:621-627. Disponível em: https://doi.org/10.1016/j.euf.2017.06.001.

21. Van Wilder A, Cox B, Ridder D, Tambeur W, Maertens P, Stijnen P, et al. Unwarranted between-hospital variation in mortality, readmission, and length of stay of urological admissions: an important trigger for prioritising quality targets. Eur Urol Focus. 2021;S2405-4569(21)00292-3. Disponível em: https://doi.org/10.1016/j.euf.2021.11.001.

22. Ofstead CL, Heymann OL, Quick MR, Johnson EA, Eiland JE, Wetzler HP. The effectiveness of sterilization for flexible ureteroscopes: a real-world study. Am J of Infect Control, 2017;45:888–895. Disponível em: https://doi.org/10.1016/j.ajic.2017.03.016.

23. Ofstead CL e Hopkins KM. Sterilization central: the value of borescopes in detecting damage, soil, fluid, and foreign objects in flexible endoscopes. Biomed Instrum Technol. 2020;54:146–152. Disponível em: https://doi.org/10.2345/0899-8205-54.2.146.

24. Bhatta PN, Raya A, Yadav UK, Kumar V, Shahi S, Singh A. Median duration of hospital stay after early removal of foley's catheter among patients undergoing transurethral resection of prostate: a descriptive cross-sectional study. JNMA J Nepal Med Assoc. 2021;59(239):688-691. Disponível em: https://doi.org/10.31729/jnma.6384.

25. Vukovic N, Dinic L. Enhanced recovery after surgery protocols in major urologic surgery. Front Med (Lausanne). 2018;5:93. Disponível em: https://doi.org/10.3389/fmed.2018.00093.

26. Schiff LD, Voltzke KJ, Strassle PD, Louie M, Carey ET. Effect of length of hospital stay on infection and readmission after minimally invasive hysterectomy. Int J Gynaecol Obstet. 2019;145(3):293-299. Disponível em: https://doi.org/10.1002/ijgo.12812.

27. Mcintyre LK, Arbabi S, Robinson EF, Maier RV, et al. Analysis of risk factors for patient readmission 30 days following discharge from general surgery. JAMA Surg. 2016;151(9):855-861. Disponível em: https://doi.org/10.1001/jamasurg.2016.1258.

28. AORN - Association of Perioperative Registered Nurses. Guidelines for Perioperative Practice. Denver: Association of Perioperative Registered Nurses; 2020.

29. Tsalik EL, Li Y, Hudson LL, Chu VH, Himmel T, Limkakeng AT, et al. Potential cost-effectiveness of early identification of hospital-acquired infection in critically ill patients. Ann Am Thorac Soc. 2016 Mar;13(3):401-13. Disponível em: https://doi.org/10.1513/AnnalsATS.201504-205OC.

30. Zhou X, Su LX, Zhang, JH. Rules of anti-infection therapy for sepsis and septic shock. Chin Med J. 2019;132:589-596. Disponível em: https://doi.org/10.1097/CM9.0000000000000101.

31. Ling ML, Apisarnthanarak A, Abbas A, Morikane K, Lee KY, Warrier A, et al. APSIC guidelines for the prevetion of surgical site infections. Antimicrob Resist Infect Control. 2019;8. Disponível em: https://doi.org/10.1186/s13756-019-0638-8.

32. Forrester JA, et al. Clean Cut (adaptive, multimodal surgical infection prevention programme) for low-recurse settings: a prospective quality improvement study. BJS Open. 2020. Disponível em: https://bjssjournals.onlinelibrary.wiley.com/doi/10.1002/bjs.11997.

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