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SURGICAL ANTISEPSIS AS A QUALITY INDICATOR FOR PATIENT SAFETY

***,[1]Cyanea Ferreira Lima Gebrim, [2]Lorena Morena Rosa Melchior, [2]Thaynara Oliveira Silva, [2]Willyara Rodrigues Bezerra, [2]Maressa Noemia Rodrigues Queiroz, [2]Jessica Guimarães Rodrigues, [3]Karina Suzuki, [3]Marinesia Aparecida do Prado, [3]Maria Alves Barbosa, and [3]Regiane Aparecida Santos Soares Barreto**

[1]Nurse – University Hospital, Federal University of Goias, Master of Nursing, Goiania, Goias, Brazil
[2]Nurse – Federal University of Goias, Goiania, Goias, Brazil
[3]Nurse – Doctor of Nursing, Adjunct Professor, Faculty of Nursing, Federal University of Goias, Goiania, Goias, Brazil

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ABSTRACT

Objective: to analyze surgical skin antisepsis in clean surgeries as a process indicator for surgical site infection prevention in a university hospital in the central-western region of Brazil. Method: retrospective analytical cross-sectional study that analyzed the records of 700 medical records of patients older than 18 years submitted to clean surgery. A descriptive statistical analysis was performed. Results: 50.9% (n = 356) records were considered adequate, in which there was degermation followed by antisepsis. Inadequacies were observed in 40.2% (n = 282);in 16.4% (n = 115) there was only antisepsis, even with prior indication of degermation and 23.8% (n = 167) only degermation. In 5.9% (n = 41) of the cases, there was no record of the solution employed and 3.0% (n = 21) did not contain a record of the procedure. Conclusion: inadequacies in surgical skin antisepsis occur routinely, being able to interfere with patient safety and contribute to higher rates of surgical site infection.

INTRODUCTION

It is estimated that each year 234 million surgeries are performed worldwide, of these, approximately 7 million develop complications in the postoperative period and about one million patients will die intraoperatively or postoperatively. Such complications are most often avoided by the adequacy of techniques and procedures in the perioperative period (Figueiredo *et al*., 2012; WHO, 2009). In 2004, the World Health Organization (WHO) launched the Global Alliance for Patient Safety and Global Challenges for global security. In the perioperative period, from the patient's surgical decision to its total recovery, the "Safe Surgeries Saves Lives" program, proposed by the Alliance, aims at the commitment of teams to adopt methods to minimize risks and adverse events from care (WHO, 2009).

****Corresponding author: Cyanea Ferreira Lima Gebrim,***
Nurse – University Hospital, Federal University of Goias. Master of Nursing.Goiania, Goias, Brazil.

Such adverse events can occur when processes are not based on assurance of care, resulting in consequences for staff, institution, and patients. Health Care Related Infections, which comprise a serious public health problem in Brazil and the world, are examples of these events. Specifically, Surgical Site Infection (SSI), the third most common topography among the Infection, comprises 14% to 16% of these and is responsible for an increase in hospitalization time, hospital costs and mortality of these patients (Junior *et al*., 2013; WHO, 2009; Phillips, O'grady, and Baker, 2014; Souza, Nery and Nery, 2013). SSI originate from microorganisms contamination, especially during intraoperative handling. The sources of these agents may be the bacterial flora of the patient, the health team or the environment and surfaces, including the products and articles used. They can affect the subcutaneous tissue, deep soft tissues (fascia and muscle), and incised organs and cavities. They occur up to 30 days post-operative or one year, in prosthesis implants or similar (Junior *et al*., 2013; Phillips, O'grady, and Baker, 2014; Souza, Nery and Nery, 2013). Although most SSI originates from factors inherent to the patient, ineffective preoperative preparation, procedural

nonconformities, duration of surgeries, the team's technical ability, and surgical center environmental issues are among its predictors (Junior *et al*., 2013). ISC prevention is one of WHO's objectives, and in support of this goal, the National Agency for Sanitary Surveillance (ANVISA) has published a document that establishes nine process indicators for prevention of this event, to be applied in Brazilian institutions (Junior *et al*., 2013). Among these indicators, we have antisepsis of the operative field, which consists of the elimination of the microbial load in the superficial layers of the skin through the application of antiseptic agents. For its effectiveness three variables are fundamental: the area performed, the degermation and antisepsis technique itself, and the antiseptic product used (Junior *et al*., 2013). Many adversities can occur in practice related to surgical skin antisepsis processes. These routines are sometimes contradictory to those recommended by the literature, directly interfering with the patient's safety, encouraging reflection on the subject in different health institutions, making this process a topic to be studied. Thus, the purpose of this study is to analyze the surgical antisepsis of the skin in clean surgeries in a teaching hospital.

MATERIALS AND METHODS

It is a cross-sectional descriptive retrospective study, covering the period from January 2013 to December 2015 and carried out in a teaching hospital in the central-western region of Brazil. Initially, 3.823 records of patients older than 18 years who underwent clean surgery were identified at the surgical center and internal regulation center of the institution, in the period mentioned above. This classification followed the parameters of the National Agency of Sanitary Surveillance (ANVISA) (Junior *et al*., 2013). The sample was calculated considering an accuracy of 2.5%, for drawing effect of 1.5 and 95% confidence interval, totaling 626 records. Due to the possible losses, an increase of 11.8% was added to the sample size, totaling 700 medical records. Systematic probabilistic sampling was used to select the study participants, in which they were numbered from 1 to 3.823, arranged in alphabetical order and inserted in a Microsoft Excel. Thus, the selected charts were 11, 13, 15, 21, 23, 25, 31, 33, 35 and so on, successively until the 700 of the sample was completed.

The data collection was performed through the collection of records of surgical procedures, the source of information being the investigation of the record of the consumption of the products in the operating room and the antisepsis technique. These records were obtained from the entire period of hospitalization and outpatient appointments, up to 30 days after surgery, or up to one year, in the cases of prosthesis implantation or similar. The search of medical records occurred from July to October 2016, at the Medical Archive and Health Information Service of the hospital. For the records of the data an instrument was elaborated, following the National Classification Criteria of ANVISA, composed of objective questions about the process indicators for the prevention of SSI related to the surgical procedure, with emphasis on surgical skin antisepsis. This one was submitted to the evaluation of content and appearance by specialists, besides a pilot test with ten medical records, not used in the research. The medical records of patients ≥ 18 years of hospitalization were equal to or greater than 24 hours, and those who underwent more than one surgical procedure were excluded when at least one was not classified as clean, in addition to those with incomplete or illegible records.

To analyze this risk factor, the indicator proposed by ANVISA was considered (Junior *et al*., 2013):

$$\frac{\text{Total number of elective surgeries whose intraoperative conditions are considered adequate} \times 100}{\text{Total number of elective surgeries evaluated for intraoperative conditions}}$$

Adequate surgical procedures were considered adequate in which surgical skin antisepsis was performed prior to administration, when indicated, followed by antisepsis, with topical or alcoholic product, as well as the "surgical antisepsis" process indicator proposed by ANVISA. The data were entered into the database Statistical Package For The Social Science. Then, a descriptive statistical analysis was performed, using absolute frequency and percentage, presented in the form of tables and figure. The study was approved by the Human and Animal Research Ethics Committee of the Federal University of Goiás, Brasil.

RESULTS

Of the 700 medical records analyzed, 57.1% (n = 400) were female, with a predominant age ≤ 59 years, 69.7% (n = 489). As for the presence of comorbidities, 39.3% (n = 275) presented obesity, renal insufficiency or cardiopulmonary diseases, 12.7% (n = 89) diabetes, and 31.1% (n = 218) hypertension (Table 1).

Table 1. Characterization of the clean surgical procedures performed in patients of a teaching hospital, from 2013 to 2015. Goiania, 2016

Characterization	n	%
Sex		
Male	300	42,9
Female	400	57,1
Age		
18 |--| 29	139	19,9
30 |--| 49	244	34,9
50 |--| 59	106	15,1
60 |--| 69	108	15,4
70 |--| 79	66	9,4
≥ 80	37	5,3
Arterial hypertension		
Yes	218	31,1
No	482	68,9
Diabetes		
Yes	89	12,7
No	611	87,3
Chronic disease		
Yes	275	39,3
No	425	60,7
Surgical specialty		
Orthopedics	209	29,9
Vascular	139	19,9
Plastic	110	15,7
General	73	10,4
Mastology	58	8,3
Heart	43	6,1
Gynecology	27	3,9
Urology	12	1,7
Neurosurgery	8	1,1
Thoracic	8	1,1
Nephrology	7	1,0
Otolaryngology	6	0,9
Duration		
≤ 4 hours	585	83,5
> 4hours	115	16,5
Total	700	100

The majority of surgeries had a duration of ≤ 4 hours, 83.5% (n = 585). Of the twelve surgical specialties, 29.9% (n = 209) were orthopedic, 19.9% (n = 139) were vascular (Table 1). A total of 97% of antisepsis registries were identified, 42.1% (n = 295) had associations between polyvinylpyrrolidone-iodo (PVP-I) degermant and topical; 6.3% (n = 44) PVP-I degermant and alcoholic; 1.4% (n = 10) PVP-I degermant and 70% alcohol; And 1.0% (n = 7) chlorhexidine degermant and alcoholic. In 23.9% (n = 167) of the surgeries there was only the record of degermant use (Table 2).

Table 2. Antiseptics in clean surgical procedures in a teaching hospital, from 2013 to 2015. Goiania, 2016

Products	n	%
PVP-I degermant and topic	295	42,1
PVP-I degermant	167	23,9
PVP-I topic	99	14,1
PVP-I degermante and alcoholic	44	6,3
No record of antiseptic	41	5,9
No procedure record	21	3,0
PVP-I degermant and alcohol 70%	10	1,4
PVP-I topical and alcoholic	8	1,1
PVP-I alcoholic	7	1,0
Chlorhexidine degermant and alcoholic	7	1,0
Alcohol 70%	1	0,1
Total	700	100

50.9% (n = 356) records were considered adequate, in which there was degermation followed by antisepsis (Figure 1).

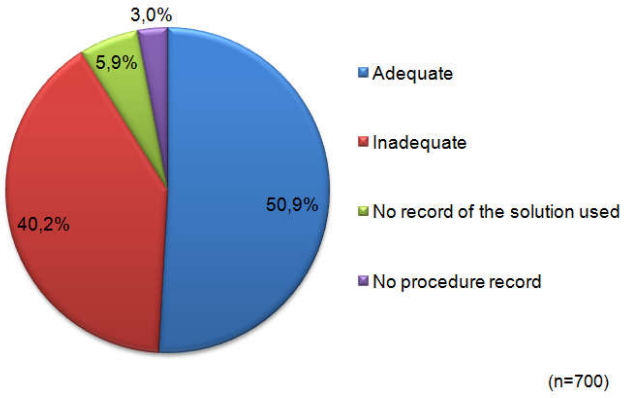

Figure 1. Surgical skin antisepsis in clean surgical procedures Goiânia, 2016

Inadequacies were observed in 40.2% (n = 282); in 16.4% (n = 115) there was only antisepsis, even with prior indication of degermation and 23.8% (n = 167) only degermation (Figure 1). In 5.9% (n = 41) there was no record of the solution used and 3.0% (n = 21) had no record of the procedure performed (Figure 1).

DISCUSSION

The development of surgical site infection is caused by several factors that may be related to the patient, such as age, diseases such as obesity, diabetes, arterial hypertension and others. Diabetes, causes metabolic changes that contribute to important complications, such as deficiency in healing when there is glycemic control. In the case of obesity, tissue irrigation is flawed, the duration of the surgical procedure is usually greater as well as the area of skin exposure (Aguiar *et al*., 2012; Ata *et al*., 2010; Junior *et al*., 2013; WHO, 2009; Sobecc, 2013; Souza, Nery and Nery, 2013). SSI occurs when a bacterium enters the surgical wound, most of which are from the patient's own microorganisms introduced during the surgical procedure, so reducing the number of bacteria at the incision site reduces the risk of infection. This can be achieved by surgical skin antisepsis, which substantially reduces the cutaneous microbiota through the combination of mechanical and chemical friction (Phillips, O'grady, and Baker, 2014). However, approximately 20% of the bacteria remain in the hair follicles and sweat glands after antisepsis. To ensure a better effectiveness, it is essential that the technique be adequate (Aguiar *et al*., 2012; Dumville *et al*., 2015; Sobecc, 2013; Tanner, 2012). In the intact skin is indicated degermação followed by the application of a tensoactive antiseptic, substance that modifies the tension of the dissolved liquid. This technique removes dirt and grease, protective barriers for the action of the antiseptic (Sobecc, 2013). Considering the products used in antisepsis of the skin, these should present low causticity and hypoallergenicity. In addition, the germicidal activity should include the cutaneomucous microbiota even in the presence of organic matter, such as blood, serum, mucus or pus (Darouiche *et al*., 2010; WHO, 2009).

Among the available antiseptics are iodophors, chlorhexidine, alcohol, hexachlorophene, triclosan and chloroxylenol. The most indicated are iodophors and chlorhexidine formulated in alcoholic or aqueous solutions. Alcoholic substances are contraindicated for mucous membranes by dehydrating the tissues (Darouiche *et al*., 2010; Dumville *et al*., 2015). Chlorhexidine has residual antimicrobial activity (up to 6 hours) and is effective against lipophilic viruses, such as HIV, influenza and herpes 1 and 2, although it has toxicity to mucous membranes, besides being ophtalmotoxic and ototoxic. Iodophors are indicated for antisepsis of intact skin and mucous membranes, however they are contraindicated in cases of hyperthyroidism and other thyroid disorders, pregnancy and lactation or to newborns, infants and patients allergic to such formulations (alexander, Solomkin and Edwards, 2011). Degermant PVP-I is recommended for prior cleansing in order to remove visible dirt and transient microbiota and topical and alcoholic PVPI exterminates fungi and spores and is therefore used after skin degermation (Dumville *et al*., 2015). In some surgeries there was only degermant PVP-I record, in addition to the few reports of the use of chlorhexidine, both suggest gaps in the records or gaps in the service protocol. It is known that when records are scarce and inadequate, they compromise the quality of care, directly interfere with the treatment and safety of the patient (Meneses *et al*., 2015). However, it is emphasized that in skin antisepsis, the use of degermant alone is not recommended, as this formulation does not have a fungicidal and sporicidal action, requiring the use of the antiseptic after the application of the same (Dumville *et al*., 2015; Tanner, 2012).

Both aqueous and alcoholic chlorhexidine is the most recommended antiseptic due to its residual antimicrobial action. In addition, once absorbed by the cell walls of the microorganisms, chlorhexidine destroys the membranes of the cells, which prevents their development. Because the duration of surgical procedures can not be predicted due to unexpected events, the greater the residual effect of the antiseptic, the greater the safety of the patient (Dumville *et al*., 2015). The use of chlorhexidine has superior antimicrobial efficacy compared to PVP-I because it is associated with a significant reduction in the rate of infection of the surgical site (Darouiche

et al., 2010; Dumville *et al*., 2015; Tanner, 2012). A study with 897 patients, chlorhexidine was used in 431 skin antisepsis and PVP-I in 466, resulted in an overall rate ISC of 9.5% and 16.1%, respectively, reaffirming the significant efficacy of chlorhexidine (Darouiche *et al*., 2010).

Conclusion

The analysis of surgical skin antisepsis in clean surgeries showed that the use of polyvinylpyrrolidone-iodine is predominant in relation to chlorhexidine in the hospital studied. The correct technique, that is, degermation followed by antisepsis occurred in the majority, however, other techniques were observed, being able to interfere in the safety of the patient. Antisepsis of the operative field is an indicator of the process to prevent infection of the surgical site that deserves discussions, since its execution has not been based on the current guidelines. It is believed that the use of protocols could guarantee the adequacy of this indicator, reducing technical discrepancies. Often the attitudes and behaviors in the options of techniques and products occur by personal character and without theoretical foundation. The use of protocols would also reinforce the trustworthiness of the registries, which were scarce in this study, configuring itself in its limitations. Thus, it is emphasized that the standardization of procedures of this nature based on the recommendations of the literature would favor the safety of surgical patients in line with the "Safe Surgeries Save Lives" program.

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