

BIOSURVEILLANCE: QUALITY AND SAFETY IN THE PROCESS OF ORGAN AND TISSUE DONATION AND TRANSPLANTATION

DOI: 10.5327/Z1414-4425202000010001

Health care in different care scenarios is permeated with risks, both for the patient and the professional. The process of organ and tissue donation and transplantation is not different.

According to the Brazilian Transplantation Registry (RBT), between January and September 2019, the waiting list for transplantation had 36,468 patients. In the same period, 2,775 organ and/or tissue donations were made, and more than 20 thousand transplants were performed (6,772 of solid organs, 10,995 of the cornea, and 2,575 of bone marrow)¹.

Such numbers have been increasing since 2009 when the Brazilian Association of Organ Transplantation (*Associação Brasileira de Transplante de Órgãos – ABTO*) started consolidating and periodically publishing these data¹. The significant number of transplants reveals that Brazil is the country with the most extensive public program for this type of procedure in the world².

In this context, the donation-transplantation process is characterized as a highly complex area. Therefore, it involves different professionals and services in distinct stages, among them: identification of the potential donor, diagnosis of brain death, family interview, donor maintenance, surgery to remove multiple organs and tissues, packaging, organ and/or tissue storage and transportation to the transplant center, transplantation, and follow-up of the transplanted individual.

Each of the stages comprises risks of adverse events that can harm the recipient, such as failure to perform the transplant, disease transmission, and infections and/or unexpected complications after the procedure³. Regarding living donor transplantation, concern and care for the donor, who is a healthy individual, further increases the complexity of the process.

Consequently, health professionals have a great responsibility concerning care quality and safety for the donor and recipient. The behavior of health professionals is a decisive factor for care safety⁴. Since communication is the impact factor for patient and professional safety in any health process, the use of indicators and the analysis and dissemination of results can contribute to best practices in the donation and transplantation process.

Countries such as Italy, Spain, the United States, and Australia have developed and implemented surveillance systems, aiming to map risks and analyze adverse events and, based on them, propose safety measures. Thus, biosurveillance corresponds to a set of monitoring and control actions that cover the entire cycle of organ and tissue donation and transplantation⁵.

In Brazil, the Ministry of Health, via the Brazilian Health Regulatory Agency (*Agência Nacional de Vigilância Sanitária – ANVISA*) has been implementing a biosurveillance system through a component of the Health Surveillance Notification and Investigation System (*Sistema de Notificação e Investigação em Vigilância Sanitária – VIGIPOS*). This system is used in the process of donation and transplantation of cells, tissues, and organs⁵, enabling those involved in both stages to notify the risks and adverse events.

The importance of notification stands out for the possibility of generating knowledge, learning from past situations, and creating strategies to increase safety and quality in the processes³.

It is noteworthy that quality and safety improvements in the donation and transplantation process presuppose the adoption of indicators and the analysis of results that can guide best evidence-based care practices. To that end, surveillance models already implemented in other countries should be investigated².


Thus, considering the insufficient number of donors to supply the waiting list and that transplantation is often the only chance of survival for many individuals, collective efforts are necessary, aiming at higher quality and safety in the organ and tissue donation and transplantation process². Therefore, biosurveillance systems can contribute significantly to successful results.

Patrícia Treviso 

Post-doctoral student of the Graduate Program in Nursing at Escola Paulista de Enfermagem, Universidade Federal de São Paulo (EPE-UNIFESP), São Paulo, Brazil. Assistant professor at the School of Health: Nursing of Universidade do Vale dos Sinos (UNISINOS), Porto Alegre, Brazil. Member of the Study Group on Organ and Tissue Donation and Transplantation – GEDOTT.

Maria Helena Costa Amorim 

Visiting full professor at the Department of Women's Health at EPE-UNIFESP, São Paulo, Brazil.

Janine Schirmer 

Full Professor at the Department of Nursing in Women's Health, Director of Escola Paulista de Enfermagem, Chief Editor of Revista Acta Paulista de Enfermagem, and Vice President of the Management Council of UNIFESP University

Hospital. Member of the Study Group on Organ and Tissue Donation and Transplantation – GEDOTT.

Bartira de Aguiar Roza 

Associate professor at the Department of Clinic and Surgery and Post-Doctoral supervisor of the Graduate Program at EPE-UNIFESP, São Paulo, Brazil. Leader of the Study Group on Organ and Tissue Donation and Transplantation – GEDOTT.

REFERENCES

1. Associação Brasileira de Transplantes de Órgãos (ABTO). Registro Brasileiro de Transplantes. Dados numéricos da doação de órgãos e transplantes realizados por estado e instituição no período: janeiro/março 2019 [Internet]. São Paulo: ABTO; 2019 [acessado em 30 jan. 2020]. Disponível em: <http://www.abto.org.br/abtov03/Upload/file/RBT/2019/RBT-2019-jan-set-completo.pdf>
2. Roza BA, Kusahara DM, Pessoa JLE, Treviso P, Oliveira PC, Leite RF, et al. Modelos e iniciativas de biovigilância e transplante: uma revisão narrativa. *Vigil Sanit Debate*. 2019;7(4):10-6. <https://doi.org/10.22239/2317-269x.01403>
3. Stewart DE, Tlusty SM, Taylor KH, Brown RS, Neil HN, Klassen DK, et al. Trends and patterns in reporting of patient safety situations in transplantation. *Am J Transplantation*. 2015;15(12):3123-33. <https://doi.org/10.1111/ajt.13528>
4. McElroy LM, Daud A, Lapin B, Ross O, Woods DM, Skaro A, et al. Detection of medical errors in kidney transplantation: a pilot study comparing proactive clinician debriefings to a hospital-wide incident reporting system. *Surgery*. 2014;156(5):1106-15. <https://doi.org/10.1016/j.surg.2014.05.013>
5. Agência Nacional de Vigilância Sanitária (ANVISA). Guia de Biovigilância de Células, Tecidos e Órgãos & Manual de Notificação. Brasília: Agência Nacional de Vigilância Sanitária; 2016.

(DIS)CONFORMITY OF THE WORKING PROCESS IN THE MATERIAL AND STERILIZATION CENTER

(Des)conformidade do processo de trabalho no centro de material e esterilização

(Des)conformidad del proceso de trabajo en el centro de material y esterilización

Luciana Santana Lobo Silva^{1*} , Maria Pontes de Aguiar Campos² , Flávia Janólio Costacurta Pinto da Silva³ ,
Eliana Ofélia Llapa-Rodriguez⁴ , Maria Cláudia Tavares de Mattos² 

ABSTRACT: Objectives: To evaluate the nursing work process in a Material and Sterilization Center (MSC) of a teaching hospital in Northeastern Brazil and to calculate the compliance rates of the work processes of hospital health products (HP) in the CME. **Method:** Observational study, with quantitative analyses. The target population consisted of nursing technicians and assistants, through systematic observation in the development of work processes. The sample resulted in 24 professionals, corresponding to 80% of the population. **Results:** Of the observed processes, the compliance rate was lower (29.17%) in sterilization and higher (56.94%) in the storage/distribution of the products. As for subprocesses, it was higher (90.28%) in sealing and lower (8.33%) in rinsing the HP. **Conclusion:** The average process compliance showed an index below the limit of 70%, compromising most of the nursing team's work process.

Keywords: Quality indicators, health care. Sterilization. Employee performance appraisal.

RESUMO: Objetivo: Avaliar o processo de trabalho de enfermagem em um Centro de Material e Esterilização (CME) de um hospital de ensino no Nordeste brasileiro e calcular os índices de conformidades dos processos de trabalho dos produtos para saúde (PPS) hospitalares no CME. **Método:** Estudo observacional, com análises quantitativas. A população-alvo constituiu-se de técnicos e auxiliares de enfermagem, por meio de observação sistemática no desenvolvimento dos processos de trabalho. A amostra resultou em 24 profissionais, correspondendo a 80% da população. **Resultados:** Dos processos observados, o índice de conformidade foi menor (29,17%) na esterilização e maior (56,94%) na guarda/distribuição dos produtos. Quanto aos subprocessos, foi maior (90,28%) na selagem e menor (8,33%) no enxágue dos PPS. **Conclusão:** A média de conformidade dos processos apresentou índice abaixo do limite de 70%, comprometendo a maioria do processo de trabalho da equipe de enfermagem.

Palavras-chave: Indicadores de qualidade em assistência à saúde. Esterilização. Avaliação de desempenho profissional.

RESUMEN: Objetivos: Evaluar el proceso de trabajo de enfermería en un Centro de Material y Esterilización (CME) de un hospital docente en el noreste de Brasil y calcular las tasas de cumplimiento de los procesos de trabajo de productos de salud (PS) en hospitales en CME. **Método:** Estudio observacional, con análisis cuantitativos. La población objetivo consistió en técnicos de enfermería y asistentes, a través de la observación sistemática en el desarrollo de procesos de trabajo. La muestra resultó en 24 profesionales, que corresponden al 80% de la población. **Resultados:** De los procesos observados, la tasa de cumplimiento fue menor (29.17%) en esterilización y mayor (56.94%) en el almacenamiento / distribución de productos. En cuanto a los subprocessos, fue mayor (90.28%) en sellado y menor (8.33%) en enjuague del PS. **Conclusión:** El cumplimiento promedio del proceso mostró un índice por debajo del límite del 70%, comprometiendo la mayor parte del proceso de trabajo del equipo de enfermería.

Palabras clave: Indicadores de calidad de la atención de salud. Esterilización. Evaluación del rendimiento de empleados.

¹Graduated in Nursing (Bachelor's Degree) by Universidade Tiradentes (Unit). Master by the Postgraduate Program in Nursing at Universidade Federal de Sergipe (UFS). Specialist in Emergency Nursing and Pre-Hospital Emergency and Gynecological and Obstetric Nursing by Unit. Assistance nurse at Maternidade Nossa Senhora de Lourdes - Aracaju (SE), Brazil.

²PhD Professor at the Nursing Department and the Postgraduate Program in Nursing at UFS - Aracaju (SE), Brazil.

³PhD Professor at the Nursing Department at UFS. Head of the Nursing Division at Hospital Universitário de Sergipe - Aracaju (SE), Brazil.

⁴Postdoctoral Professor at the Nursing Department and the Postgraduate Program in Nursing at UFS - Aracaju (SE), Brazil.

*Corresponding author: lucys_lobo@yahoo.com.br

Received: 07/15/2019 - Approved: 01/20/2020

DOI: 10.5327/Z1414-4425202000010002

INTRODUCTION

Historically, the Material and Sterilization Center (MSC) was responsible only for the sterilization phase. From 1970, the MSC's spectrum of activity was broadened and, at the end of the 20th century, it started to perform all processes due to the requirement of a unique and appropriate physical structure, qualified human resources, and product complexity^{1,2}.

Thus, the functioning of the MSC became centralized, covering the services that need to process health products (HP)³, through good practices, preventing infections related to health care (IRHC), mainly to failures in any of the stages².

Therefore, to evaluate the quality of the assistance provided at the MSC, there are structural indicators; material and human resources; organizational policy; process-activities that, when executed, transform inputs into results; and these results indicate a safe and satisfactory product⁴.

This research is justified due to the empirical finding of non-conformities in the processing of products³. Thus, it is intended to contribute to a situational diagnosis that will allow investments to ensure a more adequate and standardized assistance, aiming at excellence.

Therefore, the study's intention was to answer the question: what work processes, performed by nursing professionals in the MSC of a teaching hospital, have conformity indexes?

OBJECTIVES

- To analyze the work process of the nursing team at the MSC of a teaching hospital in Northeast Brazil.
- To calculate the compliance rates of the work processes of hospital HP in the MSC.

METHOD

This is an observational study, whose data were treated using quantitative methods. Its universe was a teaching hospital, located in the Brazilian Northeast, which provides hospital care of medium and high complexity to users of the Unified Health System (*Sistema Único de Saúde – SUS*), being a field for research and extension. The observation unit was a type II MSC³.

The target population consisted of 30 nursing technicians and assistants, from the three work shifts, through systematic

observation in the development of work processes. The sample, sorted by convenience, was composed of 80% of nursing professionals (24), ensuring the homogeneity of the facts.

Inclusion criteria were: being fully booked and present at the MSC on data collection days. Exclusion criteria were: absence due to vacation, leave, time off, and absences.

The data collection instrument was a checklist adapted from Graziano *et al.*⁵, after being authorized by these authors and based on the current national³ and international standards⁶⁻⁸. A pilot test was carried out which, after adjustments, consisted of 102 items corresponding to the cleaning, chemical disinfection, preparation, sterilization, storage/conditioning and distribution processes.

Each professional was observed only once in the full completion of each process.

Present and compliant processes (PC) were considered to be compliant and present non-compliant (PNC) and absent processes (AS) were not compliant. The data were analyzed using the Statistical Package for the Social Science (SPSS) ® 21.0.

For qualitative variables, in relation to the characterization of the sample, a descriptive analysis was carried out, obtaining frequencies and percentages. For quantitative variables, descriptive statistics were used, by calculating measures of central tendency (mean) and variability (standard deviation).

A significance level of 5% ($p \leq 0.05$) was used, along with the Student's *t* test, for paired comparisons with normal data, the ANOVA analysis of variance for data that follows the normal distribution, and the Tukey test for those who did not present normality. By calculating the Carter positivity index (CPI)⁹, the processes analyzed accordingly were classified as: CPI of 100% — desirable assistance; 90–99% — adequate; 80–89% — safe; 70–79% — borderline; and below 70% — poor. For this study, items with a CPI of 80% or greater for process safety were considered of quality.

The project was analyzed and approved by the Research Ethics Committee of the research institution (CAAE: 57210916.0.0000.5546) and is part of the Master's thesis in Nursing entitled *Evaluation of the work of the nursing team in a Material and Sterilization Center (Avaliação do trabalho da equipe de enfermagem em um Centro de Material e Esterilização)*.

RESULTS

Characterizing the sample, it was identified that of the 24 nursing professionals, 54.17% (13) were nursing technicians

and 45.83% (11) were assistants, of which 91.67% (22) were female, 33.33% (8) worked in the morning shift, 29.17% (7) in the afternoon, and 37.50% (9) on night shifts.

The age ranged between 26 and 54 years, with an average of 37.62 years. The mean working time was approximately three years in the hospital, one year in the sector under study, featuring professionals with a short time in the practice. As for the qualification in MSC, 54.17% (13) of the subjects did not have it and 45.83% (11) had improvement and participation in in-service education.

As for the professional category, there was a statistically significant relationship with the sterilization process; however, professional qualification and the compliance index did not show a statistically significant relationship. Nursing assistants had a higher average compliance rate than technicians.

The compliance rate of the processes observed in the MSC was low. The lowest rate was in sterilization and the highest in the storage/distribution of products (Table 1).

Complete clothing was considered as the use of individual clothing, cap, closed shoes, and disposable shoe cover. Analyzing this variable (Table 2), the highest mean of compliance was observed in cleaning (66.67%) and the lowest in preparation (46.87%). Among the elements of complete clothing, the use of closed shoes showed a lower rate of compliance, with incorrect use or non-use in cleaning equal to 58.33% (14), disinfection 70.83% (17), preparation 87.50% (21), sterilization and custody/distribution 83.33% (20). Private clothing showed compliance in 95.83% (23) of the cases, being considered adequate. The rest of the elements of the complete outfit were mostly PNC or AS. It was found that 62.50% (15) of the professionals wore adornments, such as long earrings and chains.

Regarding the use of personal protective equipment (PPE), the following were observed: gloves (long sleeve, procedure and thermal), goggles, simple mask, apron, waterproof cover,

and ear protector. Higher conformity means were obtained in the storage/distribution of materials and in disinfection, 58.33 and 30.55% respectively, considered to be poor assistance.

It was found that the use of the simple mask was in compliance, although with lower rates in the preparation processes 54.17% (13). In the cleaning process, AS was present in 100% (24) of the observations, use of the long-sleeve glove, apron, waterproof cover, goggles in 75 (18), and 79.17% (19) in disinfection, all considered to be poor.

In preparation, it was proven that 75% (18) of the employees did not use procedure gloves when handling critically washed items. It should be noted that, in 100% (24) of the situations, there was no hand hygiene before and after the execution of the processes, showing poor assistance.

The mean compliance of processes, referred to in this study as subprocesses (Table 3), which obtained the highest conformities, were assembly (81.25%), sealing (90.28%), and separation (83.33%); on the other hand, the rinsing of semi-critical items showed less conformity (8.33%) in disinfection.

In Cleaning, it was found that the subprocess Reception of PNC HP was: conference of contaminated semi-critical materials 75% (18), critical 83.33% (20), and registration of material input control 95.83% (23).

In Pre-cleaning, PNC was 83.33% (20) in relation to the dilution of the enzymatic detergent; 45.43% (11) did not use graduated containers for dilution; 70.83% (17) did not wash the materials in running water; conversely, 66.67% (16) disassembled the articles before submersion in the detergent, characterizing poor assistance.

Table 1. Mean rate of compliance and CPI of work processes in the MSC.

Sectors	Mean compliance	Standard deviation	CPI
Cleaning	41.38	05.80	Poor
Chemical disinfection	41.22	11.91	Poor
Preparation	50.77	04.14	Poor
Sterilization	29.17	05.84	Poor
Storage/Distribution	56.94	09.08	Poor

CPI: Carter positivity index; MSC: Material and Sterilization Center.

Table 2. Average rate of conformity and CPI in the use of complete clothing and PPE, according to the work processes at the MSC.

Conformity		Mean	Standard deviation	CPI
Cleaning	Clothing	66.67	24.08	Poor
	PPE	29.17	13.64	
Disinfection	Clothing	53.12	18.52	Poor
	PPE	30.55	09.41	
Preparation	Clothing	46.87	16.99	Poor
	PPE	14.58	31.20	
Sterilization	Clothing	48.96	20.16	Poor
	PPE	16.67	38.07	
Storage/distribution	Clothing	47.92	22.01	Poor
	PPE	58.33	31.85	

CPI: Carter positivity index; PPE: personal protective equipment; MSC: Material and Sterilization Center.

When Washing, PNC was evidenced, 91.67% (22) did not use the indicated sponge; 45.83% (11) did not rinse piece by piece; 75% (18) did not completely submerge critical and semi-critical articles in the enzymatic detergent; 70.83% (17) did not meet the recommended time; 62.50% (15) did not rub in the direction of the grooves, and 100% (24) of the items washed by hand were not brushed submerged in the enzymatic solution.

In addition, 79.17% (19) of the washing of critical items was complemented with automated cleaning; 87.50% (21) opened the instruments, at the same time, reaching borderline and safe assistance, however 54.17% (13) performed the rinsing correctly. All critical and semi-critical items (100% / 24) were dried manually, appropriately and at a desirable rate; however, they were not dried immediately after washing.

The disinfected articles were the thermosensitive semi-critical ones, and safe compliance rates were verified in the

dilution of the disinfectant 83.33% (20), in the identification of the container regarding the expiration date of the 87.50% dilution (21). The PNC were 66.67% (16) not completely submersing the materials and 70.83% (17) the recommended time of submersion. In the sub-process Rinsing, there was PNC 83.33% (20) in duration and PC 100% (24) of the articles were adequately dried with air flow.

In the preparation of articles for sterilization, it was noted that PC was found to be 70.83% (17) observation of tears, holes, and darning in the tissues; 100% (24) placement of absorbents at the bottom of the case; 79.17% (19) packaging of surgical instruments in the boxes obeying 80% of their capacity; 83.33% (20) were arranged open; 95.83% (23) of the envelopes were tight; 100% (24) used an external indicator, and 75% (18) an internal one. PNC, 91.67% (22) did not inspect the instruments for functionality and 100% (24) did not verify cleaning with a magnifying glass, due to AS related to the latter.

In the Monitoring subprocess, the identification of the articles was 100% AS (24) regarding the registration of the number of the cargo or batch that would be sterilized. However, 95.83% (23) PC were the identification records of surgical boxes, 91.67% (22) the number of pieces, and 100% (24) the sterilization date and validity.

As for the Sealing subprocess, in a heat sealer, compliance was found in 100% (24) of the surgical grade packaging, in 95.83% (23) the temperature met the standards, and 75% (18) of them sealed the primary and secondary packaging based on the weight and nature of the material, showing adequate results.

In the Sterilization process, monitoring showed 100% (24) of compliance in the Bowie-Dick and biological tests, however the second is exclusive to the nurse, both its preparation and reading. 100% (24) of the actions referring to the registration of cargo entry control by autoclave were AS. Regarding the disposition of the articles in the autoclave, there was conformity in the positioning of the packages in 62.50% (15) of the actions, 79.17% (19) obeyed the gap between them and 95.83% (23) of the concave-convex items were arranged in an upright/ inclined position, resulting in poor, borderline, and adequate indices.

After sterilization, 75% (18) of the employees inspected the packages to check for the presence of moisture and cooling. It should be noted that the autoclave's internal camera did not use to be cleaned.

In the Storage/ Distribution process, the average non-conformity related to the Storage sub-process showed a high

Table 3. Mean compliance rates and CPI of the subprocesses performed at the MSC.

Subprocesses	Mean	Standard deviation	CPI
Cleaning			
Reception	15.28	29.97	Poor
Pre-cleaning	52.08	17.16	Poor
Washing	38.89	07.74	Poor
Drying	41.15	07.80	Poor
Disinfection			
Validation/Dilution	61.67	16.59	Poor
Immersion	31.25	43.77	Poor
Rinsing	08.33	19.03	Poor
Drying	66.67	00.00	Poor
Preparation			
Inspection/Functionality	20.83	15.18	Poor
Assembly	81.25	13.29	Safe
Monitoring	62.50	22.12	Poor
Sealing	90.28	15.48	Adequate
Sterilization			
Monitoring	17.71	11.61	Poor
Autoclave arrangement	59.72	27.76	Poor
Post-sterilization inspection	75.00	39.01	Borderline
Storage/ Distribution			
Storage	12.50	33.78	Poor
Sorting	83.33	28.23	Segura

CPI: Carter positivity index; MSC: Material and Sterilization Center.

percentage, since 87.50% (21) did not obey the sterilization chronological order. However, 95.83% (23) stored critical and semi-critical items in a clean, dry place, separating disinfected articles from sterilized ones and protected from the sun's rays, characterizing appropriate action.

DISCUSSION

The processes developed at the MSC are complex, thus highlighting the relevance of their validation, as it prevents contamination, controls quality and avoids IRHC. Thus, nursing professionals must adopt national/international regulations and receive periodic training².

The profile observed consisted, in its majority, of young women, with little time in the MSC and without specific professional qualification. This result was close to the profile of the study carried out by COFEN¹⁰ in a teaching hospital in the state of Rio de Janeiro¹¹. As for age, this similarity may have occurred due to the fact that the institution under investigation held a public tender shortly before the survey.

Most of the observed work processes showed compliance rates below the borderline for desirable assistance, considering the CPI similar to that of surveys carried out in São Paulo¹², Bahia¹³, and Piauí¹⁴. This result may be a reflection of the population being mostly newly hired, without experience in this unit and without participation in a continuing education program. Therefore, permanent education practices overcome difficulties, can standardize and reduce failures, and encourage a culture of safety¹⁵.

It was found that nursing assistants had a higher rate of compliance in processing than nursing technicians. This finding can be justified by the assistants having more time in the institution and being more experienced.

Correlating the rate of compliance of processes with professional qualification, it was found that there was no statistically positive relationship. Whether or not qualification, in this sample, did not interfere with compliance rates. However, this finding does not diminish the importance attributed to training, proven by scientific studies that recommended periodic training to MSC professionals³. This result can be justified due to the sample's being small.

Complete clothing is indispensable for everyone who works at the MSC, to promote safety for professionals, their families, and patients⁶; however, it was observed to be in disagreement, mainly due to the inappropriate use of closed shoes, disposable shoe cover, and adornments. In relation to the

use of disposable shoe covers, probably due to there being strong divergences in the specific scientific literature regarding their effectiveness, one can induce isolated non-use conducts.

Although the use and disposal of PPE are essential for the safety of the professional¹⁶, it was observed that they were not compliant, mainly in cleaning and preparation, similarly to the result obtained in a survey conducted in the states of Bahia¹³ and Minas Gerais¹⁷, but unlike the observations found in Rio Grande do Sul¹⁸, where there was a culture of safety among professionals. This divergent finding may be justified by the fact that Rio Grande do Sul invests more in Permanent Health Education Programs and update courses for its employees¹⁹.

The sectors in the CME require the full use of PPE: elbow-length impermeable, thermal⁷ and procedure gloves, waterproof apron with long sleeves, face mask or goggles, ear protector, and simple masks^{3,15,20}, mainly in purge⁶, however, their complete use showed non-conformity due to the lack of some PPE.

In the Preparation area, the average compliance was lower in the use of full clothing and PPE, especially gloves for the preparation of surgical boxes, which may expose professionals to occupational diseases. A French study carried out in a teaching hospital on the use of gloves found that trained professionals complied more than untrained ones²¹. This result is in line with that found in the present study, referring to the professional qualification that presented low rates, which may have corroborated to the non-compliance in the use of PPE in this environment.

Another unfavorable result was the non-hygiene of the hands by the professionals, violating the recommendation of the indispensability of this action, before starting the work, when completing it, during breaks, after removing the gloves and always when the hands are contaminated⁷.

PPS have become increasingly complex, which requires automated cleaning, abundant rinsing, and drying²². The cleaning process observed, in its majority, showed non-conformity regarding the use of inputs and performance, contrary to normalization³ and allowing the formation of biofilm, which interferes with the action of the sterilizer and increases occupational risks².

A study on prion contamination after cleaning and sterilization found that decontamination occurred after the complete processing cycle, that is, achieving safe results depends on the process, inputs, temperature, and time in physical and physical-chemical sterilization²³. Thus, automated cleaning was performed and the handling of the washing machine

obeyed the recommendations, contrary to what was found in the research carried out in public health establishments in Santa Catarina²⁴.

Regarding HP Rinsing, it should be carried out in abundant running water, without leaving a trace of the sanitizing agent. Contrary to the specific literature^{2,20}, there was a failure in this process, resulting in a break in the effectiveness that interferes with product safety.

The Drying subprocess, relevant for sterilization/disinfection, prevents bacterial growth and prevents disinfectants from inactivity due to hyperdilution, and must be dried in hot air or by hand with a clean towel that does not release particles⁷. However, it was found that the washed material was left on the bench to dry in room air and placed for disinfection before drying, which could cause loss of sanitizing effectiveness².

Regarding non-compliance with the identification of the packages related to the number of the autoclave, batch or load and identification of the assembler, it goes against international standards⁶, resulting in the difficulty or impossibility of tracking the articles^{3,8}. Thus, in addition to the indispensability of the information, the record must be legible, with non-toxic ink and that does not smudge. However, for tissue fields, identification on adhesive tape is permitted in the absence of self-adhesive labels⁶, as found in this and in other hospital units in Rio Grande do Sul²⁵. This routine differs from research in a teaching hospital in São Paulo, as the identification was made by a traceability label²⁶.

The inspection of the fields followed what is recommended by the rules^{3,6}, contributing to patient safety. The opposite situation was found in public establishments in the city of Goiânia, state of Goiás¹.

To guarantee the surgical sterile barrier, especially when preparing perforating, heavy or large-sized items, they must present double sealed packages^{1,2,6}. Such determinations showed conformity, once that the assembly of HP was standardized and followed the recommendations^{2,6}. Most of the HP were organized in the autoclave accordingly, as was the case in Goiânia, with the largest packages being arranged at the bottom of the chamber and the smallest ones at the top²⁷.

A study on sterilization control carried out in Tabriz, Iran, for a period of 14 years, found that there was a significant result regarding the use of chemical indicators²⁸. Likewise, it was observed that chemical integrators were used and placed in surgical boxes, in the fields that cover the patient, in packages for invasive procedures.

It was found that the sterilization control of the autoclaves was performed daily, although the validation practiced

was only chemical and biological, without verification of the physical parameters, due to the absence of printed tape and records. Such occurrence demonstrates insufficient financial investment in the health sector and the need for management control. The opposite situation was found in 60% of public institutions in the city of Goiânia²⁷.

In addition, there was no routine for disinfecting autoclaves and surfaces, a worrying result, as this increases the risk of cross and occupational infections, contrary to the recommendation that all surfaces and equipment should be disinfected²⁹.

The products, when carried to the Storage/Distribution sector, must be inspected for humidity, completeness, color change of the external indicator, and arrangement in the cabinets/shelves in chronological order of sterilization². These items were observed accordingly, except in relation to the chronological order of sterilization, a data similar to the study carried out in Goiânia, where a health establishment carried out the process in a properly manner²⁷. This non-compliance can be a contributing factor to the increase in health care costs.

Monitoring the processing of articles in the MSC is complex and requires specific attention from cleaning to distribution, so institutions must plan work according to quality and patient safety paradigms.

Summarily, it is the nurse's role not only to have technical-scientific knowledge about the functioning of the MSC, but mainly to coordinate, guide, supervise, stimulate, and support the technical-scientific improvement of nursing professionals, fulfilling their functions ethically and in observance of the guiding principles of the profession.

As a limitation of this study, there is a little comparative discussion between Brazilian states and other countries due to the scarcity of articles with an international approach on this topic.

CONCLUSION

The calculations of the conformity indexes of the work processes of hospital HP in the MSC allowed to conclude that the mean of compliance presented indifferent indexes of classification by the CPI. However, these processes were compromised by the deficiency in the physical structure, absence of periodic training, and supervision of nurses.

The general analysis of the nursing team's work process in a MSC of a teaching hospital in Northeast Brazil adds conformities and non-conformities similar to the studies

carried out in other Brazilian regions, in non-compliance with current national and international standards, mainly in public services and in investment in health care and, in particular, MSC.

The results obtained reflect the need for greater investment in the physical structure, inputs, policies and practices of continuing education, in order to abolish flaws in the processes necessary for safe care for patients.

REFERENCES

1. Ascari RA, Vidori J, Moretti CA, Perin EMF, Silva OM, Buss E. O processo de esterilização de materiais em serviços de saúde: uma revisão integrativa. *Braz J Surg Clin Res.* 2013;4(2):33-8.
2. Associação de Enfermeiros de Centro Cirúrgico, Recuperação Anestésica e Centro de Material e Esterilização (SOBECC). Diretrizes de práticas em enfermagem cirúrgica e processamento de produtos para a saúde. 7ª ed. São Paulo: SOBECC; Barueri: Manole; 2017. p. 7-180.
3. Brasil. Agência Nacional de Vigilância Sanitária (ANVISA). RDC nº 15, de 15 de março de 2012. Dispõe sobre requisitos de boas práticas para o processamento de produtos para saúde e dá outras providências [Internet]. 2012 [acessado em 10 ago. 2017]. Disponível em: <http://www.anvisa.gov.br>
4. Donabedian A. The quality of care. *JAMA.* [Internet]. 1998;260(12):1743-8. <http://doi.org/10.1001/jama.1988.03410120089033>
5. Graziano KU, Lacerda RA, Turrini RTN, Bruna CQM, Silva CPR, Schmitt C, et al. Indicadores de avaliação do processamento de artigos odonto-médico-hospitalares: elaboração e validação. *Rev Esc Enferm USP.* 2009;43(N. Esp. 2):1174-80. <https://doi.org/10.1590/S0080-62342009000600005>
6. Association for the Advancement of Medical Instrumentation (AAMI). American national standard comprehensive guide to steam sterilization and sterility assurance in health care facilities. *Advancing Safety in Medical Technology A4.* Arlington: AAMI; 2013.
7. Provincial Infectious Diseases Advisory Committee (PIDAC). Best practices for cleaning, disinfection and sterilization of medical equipment/devices [Internet]. 3rd ed. Toronto, ON: Queen's Printer for Ontario; 2013 [acessado em 17 dez. 2018]. Disponível em: https://www.publichealthontario.ca/en/BrowseByTopic/InfectiousDiseases/PIDAC/Pages/Cleaning_Disinfection_Sterilization.aspx
8. Morton PJ, Conner R. Implementing AORN. Recommended practices for selection and use of packaging systems for sterilization. *AORN J* [Internet]. 2014 [acessado em 17 set. 2018];99(4):495-505. Disponível em: <https://www.ncbi.nlm.nih.gov/pubmed/24674795> <https://doi.org/10.1016/j.aorn.2014.02.014>
9. Padilha EF, Matsuda LM. Qualidade dos cuidados de enfermagem em terapia intensiva: avaliação por meio de auditoria operacional. *Rev Bras Enferm.* 2011;64(4):684-91.
10. Conselho Federal de Enfermagem (COFEN). Pesquisa perfil da enfermagem no Brasil [Internet]. Rio de Janeiro: COFEN; 2013 [acessado em 21 abr. 2018]. Disponível em: <http://www.cofen.gov.br/perfilenfermagem>
11. Costa CCP, Souza NVDO, Pires AS. Perfil dos trabalhadores de uma central de material e esterilização: uma análise das características sócio-profissionais. *J Res Fundam Care Online* [Internet]. 2016 [acessado em 17 jan. 2018];8(1):3633-45. Disponível em: http://www.seer.unirio.br/index.php/cuidadofundamental/article/view/3667/pdf_1768 <http://doi.org/10.9789/2175-5361.2016.v8i1.3633-3645>
12. Roseira CE, Silva DM, Passos IPBD, Orlandi FS, Padoveze MC, Figueiredo RM. Diagnosis of compliance of health care product processing in primary health care. *Rev Latino-Am Enferm* [Internet]. 2016 [acessado em 30 jan. 2018];24:e2820. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0104-11692016000100426&lng=en <https://doi.org/10.1590/1518-8345.1439.2820>
13. Costa EAM, Dórea EO, Alves MA, Nery F, Schettini H, Belmonte M, et al. Reprocessamento de produtos para saúde: análise da qualidade sanitária em hospitais públicos. *Rev SOBECC.* 2015;20(1):17-23. <https://doi.org/10.5327/Z1414-4425201500010003>
14. Madeira MZA, Santos AMR, Batista OMA, Rodrigues FTC. Processamento de produtos para saúde em centro de material e esterilização. *Rev SOBECC.* 2015;20(4):220-7. <https://doi.org/10.5327/Z1414-4425201500040006>
15. Petersen BT, Cohen CJ, Hambrick R, Buttar N, Greenwald DA, Buscaglia JM, et al. Multisociety guideline on reprocessing flexible GI endoscopes: 2016 update. *Gastrointest Endosc* [Internet]. 2017 [acessado em 11 set. 2018];85(2):282-94. Disponível em: [http://www.giejournal.org/article/S0016-5107\(16\)30647-2/fulltext](http://www.giejournal.org/article/S0016-5107(16)30647-2/fulltext) <https://doi.org/10.1016/j.gie.2016.10.002>
16. Brasil. Ministério do Trabalho. Norma Regulamentadora 6 – NR 6. Equipamento de proteção individual (EPI). Manual de legislação Atlas - Segurança e Medicina do Trabalho. 71ª ed. São Paulo: Atlas; 2013.
17. Freire EMR, Martinez MR. Situational diagnosis: an aid tool in quality management. *J Nurs UFPE on line.* 2014;8(5):1405-12. <https://doi.org/10.5205/1981-8963-v8i5a9827p1405-1412-2014>
18. Espindola MCG, Fontana RT. Riscos ocupacionais e mecanismos de autocuidado do trabalhador de um centro de material e esterilização. *Rev Gaúcha Enferm.* 2012;33(1):116-23. <https://doi.org/10.1590/S1983-14472012000100016>
19. Brasil. DATASUS - Tecnologia da Informação a Serviço do SUS [Internet]. Brasília: Ministério da Saúde; 2010 [acessado em 21 abr. 2018]. Disponível em: <http://tabnet.datasus.gov.br/cgi/tabcgi.exe?ibge/censo/cnv/escbRS.def>
20. Cowperthwaite L, Holm RL. Guideline implementation: surgical instrument cleaning. *AORN J* [Internet]. 2015 [acessado em 17 dez. 2018];101(5):542-52. Disponível em: <https://www.ncbi.nlm.nih.gov/pubmed/25946180> <https://doi.org/10.1016/j.aorn.2015.03.005>

21. Turco M, Chalaye C, Poulard E, Gocko C, Neyron C, Courbon G, et al. Évaluation de l'impact d'une formation pluridisciplinaire sur le bon usage des gants à l'hôpital Médecine et Maladies Infectieuses [Internet]. 2014 [acessado em 20 fev. 2018];44(6):268-74. Disponível em: <https://doi.org/10.1016/j.medmal.2014.04.001>
22. Mansur JM. Reuse of single-use devices: understanding risks and strategies for decision-making for health care organizations [Internet]. Joint Commission International; 2017 [acessado em 12 out. 2018]. Disponível em: <https://www.jointcommissioninternational.org/news/reuse-of-single-use-devices>
23. McDonnell G, Dehen C, Perrin A, Thomas V, Igel-Egalon A, Burke PA, et al. Cleaning, disinfection and sterilization of surface prion contamination. J Hosp Infect [Internet]. 2013 [acessado em 2 fev. 2018];85(4):268-73. Disponível em: <https://www.ncbi.nlm.nih.gov/pubmed/24074640> <https://doi.org/10.1016/j.jhin.2013.08.003>
24. Schwaab G, Jacoby AM, Lunkes JT, Ascari RA, Lautert L. Esterilização de produtos para saúde em serviços públicos. Recife. Rev Enferm UFPE online [Internet]. 2016 [acessado em 2 ago. 2018];10(12):4591-8. Disponível em: <https://doi.org/10.5205/revol.9978-88449-6-ED1012201621>
25. Araujo GM, Reisdorfer N, Silva LA, Soder RM, Santos AM. Segurança do paciente: embalagens, acondicionamento e tempo de guarda de materiais esterilizados na atenção básica. Ciênc Cuid Saúde. 2016;15(4):662-8. <https://doi.org/10.4025/ciencucuidsaude.v15i4.29925>
26. Tomé MF, Lima AFC. Mapeamento do processo de reprocessamento de campos cirúrgicos de tecido de algodão. Rev SOBECC. 2015;20(4):197-201. <https://doi.org/10.5327/Z1414-442520150004003>
27. Mendonça ACC, Bezerra ALQ, Tipple AFV, Tobias GC. Indicadores de qualidade de processamento de produtos para a saúde em autoclaves a vapor. Rev Enferm UFPE on line [Internet]. 2017 [acessado em 20 mar. 2018];11(Supl. 2):906-14. Disponível em: <https://periodicos.ufpe.br/revistas/revistaenfermagem/article/viewFile/13459/16148> <https://doi.org/10.5205/revol.10263-91568-1-RV.1102sup201705>
28. Jabbari H, Alikhah H, Alamdari NS, Behzad MN, Mehrabi E, Borzui L, et al. Developing the use of quality indicators in sterilization practices. Iran J Public Health [Internet]. 2012 [acessado em 20 mar. 2018];41(7):64-9. Disponível em: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3469009/>
29. Rutala WA, Weber DJ. Monitoring and improving the effectiveness of surface cleaning and disinfection. Am J Infection Control [Internet]. 2016 [acessado em 20 jan. 2018];44(5 Supl.):e69-e76. Disponível em: <https://www.ncbi.nlm.nih.gov/pubmed/27131138> <https://doi.org/10.1016/j.ajic.2015.10.039>

NURSES' KNOWLEDGE ABOUT PREVENTION OF SURGICAL SITE INFECTION

Saberes dos enfermeiros sobre prevenção de infecção do sítio cirúrgico

Conocimiento de enfermeras en la prevención de la infección quirúrgica del sitio

Karolayne Vieira de Souza^{1*} , Solange Queiroga Serrano² 

ABSTRACT: Objective: To understand the experiences of nurses about their practices in preventing surgical site infection (SSI). **Method:** This is an exploratory qualitative study of nurses from the general surgery service of a public hospital in Northeastern Brazil. Between December 2018 and January 2019, a semi-structured interview was conducted for data collection. It was recorded in digital audio and lasted about 20 minutes. We analyzed the transcribed accounts using the Discourse of the Collective Subject technique. **Results:** Nine nurses participated in the study, mostly female, with a mean age of 40.9 years. The following thematic categories were listed: measures to prevent SSIs; adequate nursing care to prevent SSIs; qualified nursing staff; adequate working and material conditions; and ongoing training. **Conclusion:** We identified concern for minimizing risks of SSI in patients through the adoption of preventive actions, such as hand washing, use of personal protective equipment, daily dressing change using the aseptic technique, in addition to the use of adequate supplies, balanced technical-scientific knowledge, and effective team-building. **Keywords:** Surgical wound infection. Surgical wound. Containment of biohazards. Nursing. Perioperative care.

RESUMO: Objetivo: Conhecer as experiências de enfermeiros sobre suas práticas na prevenção de infecção do sítio cirúrgico (ISC). **Método:** Estudo exploratório e qualitativo com enfermeiros da clínica cirúrgica geral de um hospital público do nordeste brasileiro. Entre dezembro de 2018 e janeiro de 2019, realizou-se entrevista semiestruturada, gravada em áudio digital, com duração média de 20 minutos, para coleta de dados. Os depoimentos transcritos foram avaliados pela técnica de análise do discurso do sujeito coletivo. **Resultados:** Participaram nove enfermeiros, a maioria do sexo feminino, com idade média de 40,9 anos. Elencaram-se as seguintes categorias temáticas: medidas de prevenção contra ISC; assistência de enfermagem adequada na prevenção de ISC; equipe de enfermagem capacitada; adequadas condições de trabalho e de materiais; e treinamento contínuo. **Conclusão:** Observou-se preocupação em minimizar os riscos de ISC de pacientes por meio da adoção de ações preventivas, como lavagem das mãos, uso de equipamentos de proteção individual, troca de curativos diários com técnica asséptica, além do uso de insumos adequados, conhecimento técnico-científico harmonioso e estímulo do relacionamento eficaz entre a equipe. **Palavras-chave:** Infecção da ferida cirúrgica. Ferida cirúrgica. Contenção de riscos biológicos. Enfermagem. Cuidados perioperatórios.

RESUMEN: Objetivo: Conocer las experiencias de las enfermeras sobre sus prácticas en la prevención de la infección del sitio quirúrgico (ISQ). **Método:** estudio exploratorio y cualitativo con enfermeras de la clínica quirúrgica general de un hospital público en el noreste de Brasil. Entre diciembre de 2018 y enero de 2019, se grabó una entrevista semiestructurada, grabada en audio digital, con una duración promedio de 20 minutos, para la recopilación de datos. Los testimonios transcritos se evaluaron utilizando la técnica de análisis del discurso del sujeto colectivo. **Resultados:** participaron nueve enfermeras, la mayoría mujeres, con una edad promedio de 40,9 años. Se enumeraron las siguientes categorías temáticas: medidas preventivas contra SSI; asistencia de enfermería adecuada para prevenir SSI; equipo de enfermería capacitado; condiciones adecuadas de trabajo y materiales; y entrenamiento continuo. **Conclusión:** se observó preocupación por minimizar los riesgos de ISQ de los pacientes mediante la adopción de acciones preventivas, como el lavado de manos, el uso de equipos de protección personal, el intercambio de vendajes diarios con una técnica aséptica, además del uso de suministros adecuados, conocimiento armonioso técnico-científico y estimulando la relación efectiva entre el equipo. **Palabras clave:** Infección de la herida quirúrgica. Herida quirúrgica. Contención de riesgos biológicos. Enfermería. Atención perioperativa.

¹Nurse; graduated at Universidade de Pernambuco (UPE) – Recife (PE), Brazil.

²Nurse; Ph.D. in Child and Adolescent Health from the Universidade Federal de Pernambuco (UFPE) – Recife (PE), Brazil.

*Corresponding author: karolaynevieira316@gmail.com

Received: 06/20/2019 – Approved: 01/15/2020

DOI: 10.5327/Z1414-4425202000010003

INTRODUCTION

Healthcare-associated infections (HAIs) are regarded as a serious risk to the health of hospital users, contributing to increased mortality, hospital length of stay, and costs in these institutions. In Brazil, the first ministerial decrees that prioritized control and prevention of hospital infections were published in the 1980s¹.

Among the HAIs, surgical site infections (SSIs) stand out as one of the main complications associated with surgical procedure, ranging from 14 to 16%¹. Risk factors include length of preoperative hospital stay over 24 hours, duration of surgery, potential for surgical wound contamination, classification of patient's clinical status (American Society of Anesthesiologists' — ASA — Classification of Physical Status)², obesity, smoking, diabetes mellitus, and use of steroids, immunosuppressants, among others¹.

Once installed, the infection may cause major socio-economic burdens due to rising morbidity and care costs, given the increase in the length of stay, associated antibiotic therapy, subsequent surgeries for tissue reconstruction, in addition to the patient's extended period out of work and family activities^{2,3}.

The staff that provides perioperative care for the patient is responsible for minimizing surgical complications. It is possible to prevent most of these adverse events by following recommended and validated actions; thus, ensuring the patient's safety throughout the hospital stay³. Among the recommendations adopted to prevent and control SSIs are the standard precautions (SPs), taken whenever there is a risk of contact with the patient's blood and body fluids, regardless of risk factors or underlying disease^{4,5}.

Among the SPs, we highlight the correct hand hygiene before and after the procedure; use of gloves to reduce contamination from microorganisms, as well as change the gloves between procedures; use of gowns and masks or facial protection to avoid contact with patient fluids, such as blood, body fluids, secretion and excretion (except sweat), non-intact skin, and mucous membranes; and prevention of accidents with biological material³.

Implementing SPs in the health staff professional routine requires technical knowledge of the subject. Thus, this matter should be frequently discussed, and adherence to it encouraged. We underline the importance of nursing staff

participation in the SSI prevention process, since they provide direct care to the patient⁶.

Nurses should evaluate predisposing and risk factors for infection and adopt preventive and educational measures for all involved through a collective awareness process, which may contribute to reducing the incidence of this post-surgical complication³.

Considering that nurses plan, manage, and assess the care provided, it is necessary to evaluate the activities and measures implemented by this professional for proper SSI control, as well as for promoting patient safety.

OBJECTIVE

To understand the experiences of nurses about their practices in preventing SSIs.

METHOD

This is exploratory and descriptive research, with a qualitative approach, developed in the general surgery service unit of a large public hospital that performs about 800 emergency and elective surgeries per month, in the city of Recife, Pernambuco, Brazil.

Individuals were invited to take part in the investigation according to the following inclusion criteria: being a nurse and having experience of at least six months in surgical patient care. We excluded professionals on medical leave, maternity leave, or vacation.

Data were collected in December 2018 and January 2019, from semi-structured individual interviews. The following guiding questions were asked:

- What do you understand by SP measures?;
- What are the priority actions you perform to prevent SSIs?;
- What are the facilities for developing your actions?;
- What are the difficulties for developing your actions?;
- What steps do you take to get your staff to establish prevention criteria?

The interview was conducted in a private room without interruptions. It lasted about 20 minutes and was recorded in digital audio. Sample closure occurred by saturation, that is, when there was no new information in the accounts.

We identified the participants by the letter E, followed by Arabic numbers in the order of the interviews (E1, E2, E3...) to ensure anonymity. The transcribed data were evaluated with the Discourse of the Collective Subject (DCS) technique, which uses methodological figures (keywords and central ideas), grouping individual statements with similar meanings to categorize and aggregated them into a synthesis discourse written in the first person singular, representing the idea of collective⁷. We used the software Qualiquantisoft[®] to tabulate data⁸.

All nurses signed the Informed Consent Form (ICF), and the research project was submitted to and approved by the Research Ethics Committee (Report No. 3,105,257), complying with the Resolution No. 466/2012 of the National Health Council.

RESULTS

The sample consisted of 9 on-call nurses (6 working the day shift and 3 working the night shift), 7 of them females, with a mean age of 40.9 years. The time since graduation ranged from 1 to 29 years. All participants worked in more than one institution, with a mean workload of 42.22 hours per week, and were undergoing training.

Three nurses participating in the research had only undergraduate nursing education. Regarding *lato sensu* courses, the nurses had specializations in Family Health (3 nurses), Emergency (2), Administration of Health Services (2), Occupational Health Nursing (1), Nephrology (1), Health Education (1), Pediatrics (1), Surgery (1), and Obstetrics (1). It is noteworthy that some interviewees had more than one graduate degree, and only one specialized in the surgical field.

Six categories associated with good SSI control practices emerged from the analysis of the interviews based on DCS. Next, we present each of the discourses formulated, the respective discussions, and the central idea (CI).

CI1/DCS1: Measures to prevent surgical site infections

When answering about the concept of SP measures, nurses defined hand washing and use of personal protective equipment (PPE) as main actions to prevent infection, making the following discourse:

These are measures that every health professional should take to prevent contamination by bacteria that, in contact with the patient, leads to infections. I must always, as a norm, wash my hands before and after the procedure; use PPE such as mask, gloves, glasses, surgical gown, and surgical cap.

CI2/DCS2: Adequate nursing care to prevent surgical site infections

Regarding the priority actions performed in SSI prevention, nurses highlighted hand washing, daily dressing change using the aseptic technique and appropriate materials, as well as teaching self-care to patients:

As priority actions to prevent infections, I wash my hands before and after procedures. I clean and change the surgical wound dressing daily and whenever necessary, using appropriate materials and the proper technique. I guide the patient and their companion about hygiene. I perform maintenance of drains and probes.

The question about the facilities found in developing preventive actions led to the identification of two thematic categories, as described below.

CI3/DCS3: Qualified nursing staff

Interviewees pointed out that the nursing role in preventing SSI is based on teamwork. They also reported the relevance of their technical knowledge in providing care, as expressed in the discourse:

I believe that knowledge is the greatest facility, knowing my work and the procedures. Having a whole staff focused on one purpose and enjoying doing what they do.

CI3/DCS4: Adequate material resources for care

With respect to the quality of care, nurses also underlined enough materials as facilitators of their actions:

Having the proper material in adequate quantity for the procedure makes things easier. Sometimes we do not see the evolution of surgical wound healing due to the shortage of products such as solutions, ointments, and special dressings. These products really make our work and precautionary measures easier.

CI4/DCS5: Adequate working and material conditions

Regarding difficulties in the performance of their actions, interviewees reported that the lack of materials makes it impossible to provide adequate care and that, in this situation, the professional tends to use inappropriate materials. Poor communication among sectors was indicated as another harmful factor for care development:

Lack of materials is the greatest obstacle because it makes our actions concerning patient care very difficult. Very often, we must improvise, find a way, because there may be a lack of water, soap, and paper towel for hand washing, for example. Lack of communication among professionals from various sectors (pharmacy, warehouse, [Central Sterile Supply Department] CSSD, [Hospital Infection Control Committee] HICC, among others) also affects the actions.

CI5/DCS6: Ongoing in-service training

With respect to the measures established so the staff can prevent SSIs, participants emphasized the importance of dialog as a tool to encourage staff adherence. This communication consists of exchanging information and experiences. Training and the use of digital technology were considered allies in SSI prevention:

I usually use dialog and the exchange of information and experience among employees to improve knowledge; and, thus, put into practice our infection prevention and control action plans. I undergo training, and whenever I have questions, I search on the Internet about the case and pass on the information to the staff. Many people resist using protective equipment, but what I can do is remind employees to

protect themselves and their patient. In private health services, you are punished if you do not use the equipment. However, in public service, there is no punishment; there is no supervision.

DISCUSSION

Surgical procedures are widely performed in hospitals. Despite all progress in research and technology, surgical treatments offer risks to the patient⁹. SSIs have a high cost due to the increase in surgical interventions and the complexity of these patients. Studies indicate that SSIs can be reduced if the actions established in protocols and norms of institutions are evidence-based¹⁰.

SP measures are taken to control HAIs. In this study, SPs were defined as actions aimed at preventing bacterial contamination that lead to infections through contact with the patient. The professional must be properly clothed, wearing a mask, gloves, glasses, surgical gown, and surgical cap. Other studies corroborated this definition and emphasized that professionals should routinely take these measures in patient care^{6,11,12}.

Hand washing before and after procedures was listed as the priority action in infection control. Considering that the hands of health professionals are the main responsible for the dissemination of microorganisms; sanitizing them is a simple and effective measure, with a good cost-benefit ratio, to prevent HAIs^{13,14}. By adhering to these measures, the professional contributes to the development of the healthcare quality, favoring the reduction in morbidity and mortality¹². Dressing change and adequate management of probes and catheters were other actions reported.

These results demonstrate that the actions of nurses are general, ignoring the specificities of each operative period. We found that professionals have a fragmented knowledge about factors that may lead to postoperative complications associated with the pre- and intraoperative periods, and which may be connected to an unsatisfactory approach during their academic studies, as well as the lack of ongoing training¹⁵.

Only one nurse in the sector had a specialization in the surgical field, which may reveal a culture of underusing specialists in different sectors, since this professional would be more suitable – in a matter of specific knowledge – to deal with

characteristic work relations related to surgical patient care. The specialist is able to quickly and safely master common or unexpected situations with proactivity and effectiveness¹⁶.

A study conducted in a public referral school hospital identified SSI risk factors related to the preoperative period, such as smoking, alcohol consumption, hypertension, and diabetes, which should be controlled before the surgery¹⁵. Regarding the intraoperative period, procedures classified as clean-contaminated and clean surgeries were indicated as those with the highest prevalence of SSI, in addition to prolonged surgical period and the use of drains. Finally, the measures listed to reduce infections in the postoperative period were the fluid culture examination, management of drains and dressings, and adequate control of comorbidities¹⁵.

Among the facilitating factors, the participants mentioned technical knowledge associated with teamwork and adequate materials as important in achieving effective care and ensuring patient safety. Considering that nurses manage interventions performed by the nursing staff, the professional must have theoretical-practical and technical-scientific knowledge. In addition to these factors, it is important to show initiative, interest, persistence, and leadership. All these characteristics are of paramount importance for quality care¹⁷.

Other facilitating factors for quality care, not reported by the nurses, are standard protocols and routines adapted for the service and the promotion of patient safety culture through continuing education, as both contribute to reducing adverse events^{18,19}. We also underline the active participation of the HICC in the development of these actions¹⁹.

As to difficulties, the nurses pointed out the lack of materials as harmful to the care. Unstable environments have a negative influence on the activities performed by professionals and cause stress associated with dissatisfaction at work. Inadequate working conditions impair the work routine, overloading the nurse, who, consequently, gives direct patient care a low priority¹⁸. A study points out that nursing professionals are exposed to several occupational risks regarding structures, equipment, physical space, and the limited number of workers²⁰.

The nurses also declared that poor communication is a barrier to providing care. In order to properly develop SSI prevention and control actions, professionals should establish effective communication among the several sectors of the hospital environment. Other studies have indicated an insufficient number of professionals, the absence of lectures

and courses, and a lack of care standardization and epidemiological surveillance as factors that contribute to the increase in infections^{18,19}.

The nurse's performance in the nursing staff was considered a relevant factor. The care staff is essential in infection control, since they provide care to the patient throughout the hospitalization. Prevention requires that all involved perform actions based on evidence³.

The educational methods reported, such as training, dialog, exchange of experiences, and use of technological innovations from the Internet, contribute to quality care. By analyzing risk factors, nurses can actively act in the prevention of SSIs, using educational methods so that everyone involved adopt preventive measures, thus, reducing this severe complication. The challenge lies in professionals taking responsibility in the process of reducing infections, since they are still resistant to adhere to safe and validated practices³.

The limitations of the study relate to the answers given by nurses, which may have been briefer because the interview occurred during working hours, and the professionals might have been concerned about compromising their work due to the time used to answer.

FINAL CONSIDERATIONS

The development of this study made it possible to understand the experiences of nurses from a public referral hospital, in Northeastern Brazil, in preventing SSIs. The actions listed by professionals about their SSI control practices were hand washing, use of PPE, change of dressings, use of adequate supplies, technical-scientific knowledge, and good teamwork.

Nurses, as well as their staff, play an important role in properly preventing HAIs, specifically of SSIs, and ensuring patient safety. Adequate care demands technical knowledge, with actions based on scientific evidence.

We found that nurses suffer due to weaknesses associated with the service structure and the lack of theoretical foundation. It is crucial to promote patient safety culture. As a consequence, it will be possible to distinguish the probable causes and allow reflections by the nursing staff, who, consequently, will adopt measures to prevent infections and reduce errors.

We suggest deepening the theme, based on scientific evidence, in nursing care practice in surgical units.

REFERENCES

1. Brasil. Ministério da Saúde. Agência Nacional de Vigilância Sanitária. Critérios diagnósticos de infecções relacionadas à assistência à saúde. Brasília: ANVISA; 2017.
2. Carvalho RLR, Campos CC, Franco LMC, Rocha AM, Ercole FF. Incidência e fatores de risco para infecção de sítio cirúrgico em cirurgias gerais. *Rev Latino-Am Enferm*. 2017;25:e2848. <http://dx.doi.org/10.1590/1518-8345.1502.2848>
3. Santana CA, Oliveira CGE. Assistência de enfermagem na prevenção de infecções de sítio cirúrgico: uma revisão integrativa da literatura. *Rev Eletrôn Atualiza Saúde* [Internet]. 2015 [accessed on March 22, 2018];1(1). Available on: <http://atualizarevista.com.br/wp-content/uploads/2015/01/ASSISTENCIA-DE-ENFERMAGEM-NA-PREVENCAO-DE-INFECCOES-DE-SITIO-CIRURGICO-UMA-REVIS%C3%83O-INTEGRATIVA-DA-LITERATURA-REVISTA-ATUALIZA-SAUDE-N1-V1.pdf>
4. Reis RG, Rodrigues MCS. Infecção de sítio cirúrgico pós-alta: ocorrência e caracterização de egressos de cirurgia geral. *Cogitare Enferm* [Internet]. 2017;22(4):e51678. [accessed on January 22, 2019]. Available on: <http://docs.bvsalud.org/biblioref/2017/12/876610/51678-220463-1-pb.pdf>
5. Garcia L, César ICO, Braga CA, Souza GAAD, Mota ÉC. Epidemiological profile of hospital infections by multidrug-resistant bacteria in a hospital in northern Minas Gerais. *Rev Epidemiol Control Infect*. 2013;3(2):45-9. <http://dx.doi.org/10.17058/reci.v3i2.3235>
6. Lacerda MKS, Souza SCO, Soares DM, Silveira BRM, Lopes JR. Precauções padrão e precauções baseadas na transmissão de doenças: revisão de literatura. *Rev Epidemiol Control Infect* [Internet]. 2014 [accessed on February 5, 2019];4(4):254-9. Available on: <https://online.unisc.br/seer/index.php/epidemiologia/article/viewFile/4952/3985>
7. Figueiredo MZA, Chiari BM, Goulart BNG. Discurso do Sujeito Coletivo: uma breve introdução à ferramenta de pesquisa qualitativa. *Distúrb Comum* [Internet]. 2013 [accessed on February 11, 2019];25(1):129-36. Available on: <https://revistas.pucsp.br/index.php/dic/article/view/14931>
8. Lefèvre F, Lefèvre AMC. Discurso do sujeito coletivo. *Qualiquanti soft*. Passo a passo. São Paulo: IPDSC; 2010.
9. Silva FG, Oliveira Junior NJ, Oliveira DO, Nicoletti DR, Comin E. Analysis of adverse events in an outpatient surgical center. *Rev SOBECC*. 2015;20(4):202-9. <http://dx.doi.org/10.5327/Z1414-4425201500040004>
10. Berríos-Torres SI, Umscheid CA, Bratzler DW, Leas B, Stone EC, Kelz RR, et al. Centers for Disease Control and Prevention Guideline for the Prevention of Surgical Site Infection, 2017. *JAMA Surg* [Internet]. 2017 [accessed on February 6, 2019];152(8):784-91 Available on: <https://jamanetwork.com/journals/jamasurgery/fullarticle/2623725> <http://dx.doi.org/10.1001/jamasurg.2017.0904>
11. Dutra GG, Costa MP, Ott Bosenbecker E, Lima LM, Siqueira HCH, Cecagno D. Controle da infecção hospitalar: função do enfermeiro. *Rev Cuidado é Fundamental Online* [Internet]. 2015 [accessed on September 15, 2019];7(1):2159-68. Available on: <https://www.redalyc.org/articulo.oa?id=505750945033> <http://dx.doi.org/10.9789/2175-5361.2015.v7i1.2159-2168>
12. Organização Pan-Americana da Saúde. Centro Latino-Americano de Perinatologia, Saúde da Mulher e Reprodutiva. Prevenção de infecções relacionadas à assistência à saúde em neonatologia. Montevideu: CLAP/SMR-OPS/OMS; 2016. (CLAP/SMR. Publicação Científica, 1613-03).
13. Belela-Anacleto ASC, Peterlini MAS, Quarry MLG. Hand hygiene as a caring practice: a reflection on professional responsibility. *Rev Bras Enferm* [Internet]. 2017 [accessed on February 8, 2019];70(2):442-5. Available on: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0034-71672017000200442&lng=en <http://dx.doi.org/10.1590/0034-7167-2016-0189>
14. Luangasanatip N, Hongsuwan M, Lubell Y, Limmathurotsakul D, Srisamang P, Day NPJ, et al. Cost-effectiveness of interventions to improve hand hygiene in healthcare workers in middle-income hospital settings: a model-based analysis. *J Hosp Infect* [Internet]. 2018 [accessed on February 9, 2019];100:165-75. Available on: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6204657/pdf/main.pdf> <https://doi.org/10.1016/j.jhin.2018.05.007>
15. Aguiar APL, Prado PR, Opitz SP, Opitz SP, Vasconcelos SP, Faro ARMC. Fatores associados à infecção de sítio cirúrgico em um hospital na Amazônia ocidental brasileira. *Rev SOBECC*. 2012;17(3):60-70.
16. Oliveira NB, Silva FVC, Assad LG. Competências do enfermeiro especialista em nefrologia. *Rev Enferm UERJ*. 2015;23(3):375-80. <http://dx.doi.org/10.12957/reuerj.2015.9789>
17. Püschel VAA, Costa D, Reis PP, Oliveira LB, Carbogim FC. Nurses in the labor market: professional insertion, competencies and skills. *Rev Bras Enferm* [Internet]. 2017 [accessed on February 5, 2019];70(6):1220-6. Available on: http://www.revenf.bvs.br/scielo.php?script=sci_arttext&pid=S0034-71672017000601220&lng=pt <http://dx.doi.org/10.1590/0034-7167-2016-0061>
18. Sell BT, Amante LN, Martins T, Sell CT, Pinho FM, Silva R. Adverse events in a hospital surgical unit: a descriptive study. *Rev SOBECC*. 2016;21(3):146-53. <http://dx.doi.org/10.5327/Z1414-4425201600030005>
19. Claudino HG, Fonseca LCT. Infecção de sítio cirúrgico: ações preventivas da comissão de controle de infecção hospitalar. *Rev Enferm UFPE* [Internet]. 2011 [accessed on March 1, 2019];5(5):1180-6. Available on: <https://periodicos.ufpe.br/revistas/revistaenfermagem/article/viewFile/6844/6092> <http://dx.doi.org/10.5205/revuol.1302-9310-2-LE.0505201113>
20. Shoji S, Souza NVDO, Farias SNP, Vieira MLC, Progianti JM. Proposals for improving working conditions at an out patient clinic: the nursing stand point. *Esc Anna Nery* [Internet]. 2016 [accessed on February 4, 2019];20(2):303-9. Available on: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1414-81452016000200303&lng=en <http://dx.doi.org/10.5935/1414-8145.20160041>

PATIENT SAFETY IN HEALTH SERVICES: AN ANALYSIS IN THE CITY OF SALVADOR, BAHIA

Segurança do paciente em serviços de saúde: uma análise na cidade de Salvador, Bahia

Seguridad del paciente en servicios de salud: un análisis en la ciudad de Salvador, Bahia

Eliana Auxiliadora Magalhães Costa^{1*} , William Mendes Lobão² , Camila Lapa Matos Ribas³ , Nathália Muraiviechi Passos³ 

ABSTRACT: Objective: To evaluate the national policy of patient safety in large hospitals in Salvador. **Method:** Study of multiple cases in tertiary hospitals. Data collection occurred between October 2017 and October 2018, with professionals from a Center for Patient Safety (CPS). Four independent variables were analyzed: composition of CPS; action plan for management of adverse events (AE); technical and operational activities developed by the CPS; and monitoring of AE in the hospital. **Results:** In a sample of 20 CPS, 12 (60%) were studied. All hospitals have a CPS established, 91.7% have patient safety plan, and 50% have a professional exclusively dedicated to it. Among the institutions, 58.3% implement all required protocols. The most frequent are patient identification (83.3%) and hand hygiene (83.3%). Percentages of AE identified were: pressure wound (88.9%), bed fall (77.8%) and medication errors (75.0%). **Conclusion:** The AE mentioned here signal the need for adjustments for patient safety. The CPS do not fully meet Brazil's current regulatory policies, thus lacking adequacies and effective sanitary control.

Keywords: Patient safety. Patient harm. Hospital legislation. Healthcare quality assurance.

RESUMO: Objetivo: Avaliar a política nacional de segurança do paciente em hospitais de grande porte de Salvador. **Método:** Estudo de casos múltiplos em hospitais terciários. A coleta de dados ocorreu entre outubro de 2017 e outubro de 2018, com profissionais dos núcleos de segurança do paciente (NSP). Foram analisadas quatro variáveis independentes: constituição dos NSP; ações de planejamento do controle dos eventos adversos (EA); atividades técnico-operacionais desenvolvidas pelos NSP; e ações de monitoramento dos EA no hospital. **Resultados:** Dos 20 NSP existentes, estudaram-se 12 (60%). Todos os hospitais possuem NSP constituídos, 91,7% têm plano de segurança do paciente, e 50% contam com profissional com dedicação exclusiva. Das instituições, 58,3% implementam todos os protocolos obrigatórios, sendo identificação do paciente (83,3%) e higienização das mãos (83,3%) os mais frequentes. Os percentuais de EA identificados foram: lesão por pressão (88,9%), queda do leito (77,8%) e erros de medicamentos (75,0%). **Conclusão:** Os EA aqui referidos sinalizam a necessidade de adequações em prol da segurança do paciente. Os NSP não atendem totalmente às políticas regulatórias vigentes no país, carecendo, portanto, de adequações e de controle sanitário efetivo.

Palavras-chave: Segurança do paciente. Dano ao paciente. Legislação hospitalar. Garantia da qualidade dos cuidados de saúde.

RESUMEN: Objetivo: evaluar la política nacional de seguridad del paciente en grandes hospitales de Salvador. **Método:** estudio de caso múltiple en hospitales terciarios. La recopilación de datos tuvo lugar entre octubre de 2017 y octubre de 2018, con profesionales de los núcleos de seguridad del paciente (NSP). Se analizaron cuatro variables independientes: constitución de la NSP; planificación de acciones para controlar eventos adversos (EA); actividades técnico-operativas desarrolladas por NSP; y acciones de monitoreo de AE en el hospital. **Resultados:** De los 20 NSP existentes, 12 (60%) fueron estudiados. Todos los hospitales tienen un NSP establecido, el 91.7% tiene un plan de seguridad del paciente y el 50% tiene un profesional con dedicación exclusiva. De las instituciones, el 58.3% implementa todos los protocolos obligatorios, siendo la identificación del paciente (83.3%) y la higiene de las manos (83.3%) las más frecuentes. Los porcentajes de EA identificados fueron: lesión por presión (88.9%), caída de la cama (77.8%) y errores de medicación (75.0%). **Conclusión:** El AE al que se hace referencia aquí indica la necesidad de ajustes a favor de la seguridad del paciente. Los NSP no cumplen totalmente con las políticas regulatorias vigentes en el país, por lo tanto, necesitan ajustes y un control sanitario efectivo.

Palabras clave: Seguridad del paciente. Daño del paciente. Legislación hospitalaria. Garantía de la calidad de atención de salud.

¹PhD in Public Health. Adjunct professor at Universidade do Estado da Bahia (UNEB) – Salvador (BA), Brazil.

²Nurse; PhD in Biotechnology in Health and Investigative Medicine. Assistant professor at UNEB – Salvador (BA), Brazil.

³Student of Nursing at UNEB – Salvador (BA), Brazil.

*Corresponding author: costaeliana2003@hotmail.com

Received: 05/04/2018 - Approved: 12/23/2019

DOI: 10.5327/Z1414-4425202000010004

INTRODUCTION

Technological advances incorporated into health care have provided benefits for health recovery and life span increase. However, the use of these technologies has also brought serious risks to patients, raising theoretical-practical issues of safety and effectiveness of processes. In this context, thousands of patients are harmed by diagnostic and therapeutic errors that occurred during health care, and the role of hospitals, regulatory agencies and health service managers has been widely discussed, as well as the identification of risk factors that compromise patient safety¹⁻³.

Recognizing that patient safety is a global public health problem, the World Health Organization (WHO) launched in 2004 the World Alliance for Patient Safety, aiming to develop universal norms and standards to promote evidence-based policies, to support countries in several key areas and to contribute to a global agenda for research in this field⁴. To this end, this alliance has launched three global challenges: the first in 2005, focusing on preventing Health care-associated infections (HAIs); the second, in 2008, focused on safety in surgical procedures⁵; and the third, launched in 2017, to reduce the level of severe avoidable harm related to medications⁶.

In Brazil, the Ministry of Health (*Ministério da Saúde* – MS) and the National Health Surveillance Agency (*Agência Nacional de Vigilância Sanitária* – ANVISA), meeting the global challenges of WHO, launched, in 2013, Report No. 529/2013⁷ and the Collegiate Board Resolution (*Resolução de Diretoria Colegiada* – RDC) No. 36/2013⁸, which establish, respectively, the National Patient Safety Program (NPSP) and actions for patient safety in health services.

Subsequently, the MH published the ministerial decrees No. 1,377 and No. 2,095, of 2013^{9,10}, which approve patient safety basic protocols to be implemented in Brazilian hospitals:

- Safety surgery;
- Hand hygiene practice in health services;
- Prevention of pressure wounds;
- Prevention of falls in hospitalized patients;
- Patient identification;
- Safety in prescription, use and administration of medications.

Due to these ministerial decrees, all health services in the country must establish centers for patient safety (CPS) to define and implement a patient safety plan (PSP), according to the need and specificities of the service.

Besides regulatory issues, the development of a patient safety culture as a health service framework should promote the implementation of safe practices that seek the improvement of organizational processes, to reduce the incidence of adverse events (AE) and to promote the continuous improvement of quality care¹¹.

Hence, this study seeks to answer the following central question: how the hospitals of the City of Salvador are implementing the NPSP? This central question leads to the underlying questions: how CSP are composed in these hospitals? What are the most frequent adverse events in hospitals in the capital of Bahia?

OBJECTIVE

To assess the implementation of the NPSP through CSP of hospitals in the city of Salvador, considering the health protection of patients hospitalized in the institutions studied.

METHOD

This is an evaluation descriptive multiple-case study, whose unit of analysis was the implementation of actions of CPS of hospitals evaluated and mentioned in this case study methodology¹².

The research project was approved by the Committee for Ethical Compliance in Research Involving Human Beings at *Universidade Estadual da Bahia* (UNEB), registered on *Plataforma Brasil* (Certificate of Presentation for Ethical Consideration – CPEC: 84683315.0.0000.0057), final opinion 2,574,463; and received financial support from the National Council for Scientific and Technological Development (*Conselho Nacional de Desenvolvimento Científico e Tecnológico* – CNPQ) (case 400316/2016-1).

The study included large public and private hospitals (with more than 150 beds) located in the metropolitan region of Salvador (BA), selected through data from the Health Secretariat of the State of Bahia – twenty hospitals were identified. These hospitals were selected because they provide care to numerous patients in a wide range of medical specialties, resulting in a higher level of care complexity, and due to the high turnover rate of patients and professionals¹³⁻¹⁵, which may imply an increase in probability of occurrence of AE in patients hospitalized in these institutions.

After identification, hospitals were contacted by telephone to be informed of the research objectives; if permission was

given and the data collection was scheduled, it was performed in person from December 2017 to October 2018.

Data collection consisted of an interview with the professional in charge of the CPS of each hospital, through a semi-structured form elaborated by the authors, and it was performed by two Nursing scholarship holders from UNEB, properly trained and supervised for this activity.

Four independent variables were analyzed:

- Composition of the CPS and its organic and functional structure (human resources associated infrastructure; professional in charge and other professionals; resources, equipment, supplies, materials to the CPS);
- Planning actions of AE control in the health service (HS) (PSP; safety protocols adopted);
- Technical and operational activities developed by the CPS;
- Actions to monitor adverse events in the hospital.

The collected data were tabulated by the software EpiData[®] version 3.1, and statistical analyses were performed by statistical package STATA[®] version 12.

RESULTS

Twenty hospitals met the inclusion criterion, 8 of which (40%) did not authorize data collection for several reasons; hence, 12 (60%) are part of this study.

All hospitals that participated in this study are large (Table 1), with a mean of 376 beds (variation=150–955; standard deviation – SD=67.07), and three (25%) are school hospitals. Regarding the board of trustees, five (41.7%) are public, four (33.3%) are philanthropic, two (16.7%) from private sector and one (8.3%) from a public-private partnership. The hospitals which participated have, on average, four intensive-care units (variation=1–7; SD=2.16), with a mean of 68.4 beds (variation=20–124; SD=37.2).

These institutions are intended mainly for the adult (11 cases/91.7%), pediatric (eight/66.7%) and neonatological populations (four/33.3%) and provide care for several medical specialties, especially medical clinic (11/91.7%) and surgical (10/83.3%), general (five/41.7%), pediatrics (five/41.7%) and orthopedics (five/41.7%). In addition to hospital care, these institutions also provide ambulatory care (11/91.7%), hemodialysis (nine/75%) and hemodynamics (seven/58.3%).

Table 1. Characterization of participating hospitals (n=12)*.

Board of trustees	n (12)	%	Specialties	n (12)	%
Public	5	41.7	Medical clinic	11	91.7
Philanthropic	4	33.3	Surgical clinic	10	83.3
Private	2	16.7	General	5	41.7
Public-private partnership	1	8.3	Pediatrics	5	41.7
Attendance profile	n (12)	%	Orthopedics	5	41.7
Adult	11	91.7	Cardiology	4	33.3
Pediatric	8	66.7	Urology	4	33.3
Neonatology	4	33.3	Angiology/vascular surgery	4	33.3
School-hospital	n (12)	%	Neurology	3	25
Yes	3	25	Gastroenterology	3	25
Additional services	n (12)	%	Neonatology	3	25
Ambulatory services	11	91.7	Nephrology	2	16.7
Hemodialysis	9	75	Neurosurgery	1	8.3
Hemodynamic	7	58.3	Other specialties	8	66.7
Notification system	n (12)	%	Descriptive statistics	Mean	SD
Electronic	7	63.6	Beds (150-955)	376,01	67.07
Manual	4	36.4	ICU Number (1–7)	4	2.16
Nonexistent	1	8.3	ICU beds (20-124)	64,9	37.2

*It may vary depending on the number of missing; ICU: intensive care unit; SD: standard deviation.

Regarding the notification of incidents involving patients, in four hospitals (36.4%) this task is still performed manually, in seven cases (63.6%) it occurs through a computerized system, and in one case (5%) there is no AE notification system.

Table 2 describes the organic functional structure of CPS of the hospitals studied.

Among the 12 CPS of hospitals studied, 9 (75%), have an exclusive room for the CPS and 11 (91.7%) have the aid of computers. Eleven CPS (91.7%) have supplies and material resources, however only 4 (33.3%) have their own financial resources for the development of safety activities.

These centers were formally established by the hospital trust board in all cases, five of which (41.7%) are included in the quality service, four (33.3%) are organized as autonomous services and three CPS (25%) are in other organizational compositions of an advisory nature.

The existence of a professional in charge of and exclusively dedicated to the CPS, as recommended by legal regulations⁷, was identified in only six hospitals (50%).

In relation to the implementation period, ten CPS (90.9%) were implemented in 2013, in compliance with national regulations, and one (9.1%) before this obligation. Most hospitals (seven/63.6%) adopted the internal incident reporting system after 2013.

Almost all CPS (11/91.7%) have specific PSP for the institution: seven PSP (58.3%) have strategies to promote the participation of patients and family members in providing care; on nine PSP (75%), there are strategies to promote safety in enteral and parenteral nutritional therapies; and in ten (83.3%), there are strategies to promote safety in prescription, use and administration of blood and blood components.

Among the professionals working in the CPS studied, it was identified that nurses are part of all centers (12/100%), physicians of 11 (91.7%), pharmacists of ten (83.3%) and other professional categories of nine (75.0%) institutions. Most staff working in these centers do not have specific training for this area of activity, although three of them have graduate studies in patient safety and one in hospital management.

The basic patient safety protocols recommended by the HM and implemented by the CPS of the hospitals studied are described in Table 3.

Among the 12 CPS studied, only seven (58.3%) implemented all six basic protocols recommended by the MH, and two CPS (16.7%) did not follow any of them. The most adopted protocols are: patient identification and hand hygiene (83.3%), safe surgery and prevention of pressure wound (75%). The least implemented protocols are: prevention of medication errors and bed fall prevention (66.7%).

Table 2. Organofunctional structure of centers for patient safety (CPS) of hospitals studied (n=12)*.

Feature	n	%
Exclusive room for CPS (n=12)	9	75
Computer (n=12)	11	91.7
Existence of own financial resources (n=12)	4	33.3
Existence of supplies and materials for development of activities (n=12)	11	91.7
CPS formally composed (n=12)	12	100
CPS inserted in quality service (n=12)	5	41.7
CPS as autonomous service (n=12)	4	33.3
CPS with other constitutions of advisory nature	3	25
Exclusive professional in charge (n=12)	6	50
Year of implementation of the center for patient safety (n=11)		
2011	1	9.1
2013	2	18.2
2014	1	9.1
2015	3	27.3
2016	2	18.2
2017	1	9.1
2018	1	9.1
Year of implementation of the internal incident notification system (n=11)		
2005	1	9.1
2010	2	18.2
2012	1	9.1
2014	1	9.1
2015	1	9.1
2016	2	18.2
2017	3	27.3
2018	1	9.1
There is written and available planning in the CPS with specific goals for controlling of adverse events in the hospital (n=12)	11	91.7
The PSP presents strategies to promote the participation of patients and family members in providing care (n=12)	7	58.3
The PSP presents strategies to promote safety in enteral and parenteral nutritional therapies (n=12)	9	75
The PSP presents strategies to promote safety in prescription, use and administration of blood and blood components (n=12)	10	83.3

*It may vary depending on the number of missing, due to the number of CPS that have not provided this information; PSP: patient safety plan.

In addition to the mandatory protocols, it was identified that eight CPS (66.7%) performed additional protocols, such as central venous catheter bundles, prevention of venous thromboembolism (three/37.5%), sepsis and bronchoaspiration (two/25%).

Technical and operational activities developed by the CPS are described in Table 4.

Regarding the training of the multidisciplinary health team on patient safety, all CPS perform this activity and have

Table 3. Patient safety protocols implemented by center of safety of the hospitals studied (n=12).

Number of protocols implemented	n	%
No	2	16.7
Three	1	8.3
Four	1	8.3
Five	1	8.3
Six	7	58.3
Basic protocols implemented	n	%
Patient identification	10	83.3
Hand hygiene	10	83.3
Safe surgery	9	75.0
Pressure wound prevention	9	75.0
Prevention of medication errors	8	66.7
Fall prevention	8	66.7
Other protocols	8	66.7

Table 4. Technical and operational activities developed by center for patient safety (CPS) of the hospitals studied (n=12).

Technical and operational activities developed by the CPS	N	%
Performance of training programs about PS for health professionals	12	100
Analysis and evaluation of the data about incidents and AE in the hospital	12	100
Encouragement to employees notify incidents	11	91.7
Monitoring indicators of PS protocols	11	91.7
Monitoring of actions described in PSP	10	83.3
Sharing and disclosure of data about AE occurred in the hospital	10	83.3
Notification to the National Health Surveillance System of AE occurred in the hospital until the 15th working day	9	75
Notification of deaths to the National Health Surveillance System within 72 hours of the AE	6	50
Conducting other activities	10 (83.3)	

PS: patient safety; AE: adverse event; PSP: patient safety program.

a record of this action. To this end, they use several communication strategies: one-off campaigns, illustrated step-by-step instructions on patient safety, panels and alerts, information wheels and annual theoretical seminars.

Among the technical-operational activities developed by the CPS studied, it was identified that 100% analyzed the data on incidents and AE in the hospital; and 11 (91.7%) encouraged the notification of incidents by hospital employees and monitored the indicators of PS protocols.

Among participating CPS, ten (83.3%) follow the actions described in the PPS, share and disseminate data on AE occurred in the hospital. However, the notification to the National Health Surveillance System of an AE occurred in the hospital until the 15th working day occurs in nine CPS (75%), and the notification within 72 hours of an AE that evolved to death was only identified in six (50%) of the eight CPS that provide this information.

The main incidents and AE occurred in the large hospitals of Salvador reported by the CPS studied are described in Table 5.

Only nine CPS (75%) provided information for the distribution analysis of incidents and AE occurred in large hospitals in Salvador. The AE and incidents reported by CPS as the most prevalent were: pressure wound (88.9%), bed fall (77.8%), medication errors (75%), phlebitis (50%), accidental removal of drains and tubes (42.9%), patient identification errors (33.3%), lack of hand hygiene during care (25.0%) and other AE (50%), reported as: health care-associated infection, pulse oximeter-induced digital injury, bladder probe loss and diet changes. There was no notification of AE during the performance of surgical procedures among CPS that answered this research item.

Table 5. Percentage distribution of incidents and adverse events occurred in large hospitals in Salvador, BA (n=9)*.

Adverse event	n	%
Pressure wound (n=9)	8	88.9
Bed fall (n=9)	7	77.8
Medication errors (n=8)	6	75
Phlebitis (No.8)	4	50
Accidental removal of drains and tubes (n=7)	3	42.9
Patient identification (n=9)	3	33.3
Lack of hand hygiene (n=8)	2	25
Surgery errors (n=8)	0	0
Other adverse events (n=8)	4	50

*It may vary depending on the number of missing, due to the number of centers for patient safety that have not provided this information.

DISCUSSION

Among the 20 CPS of the large hospitals of the City of Salvador, 12 (60%) were studied, the vast majority in public, philanthropic and private institutions, three (25%) in teaching hospitals; thus, encompassing CPS in institutions with different forms of organizational management.

All centers are formally established, and most have a PSP organized according to the specificities of each institution, a situation that denotes the institutional character of these services within the hospitals studied, as well as concern in planning its activities.

Most CPS were implemented after 2013, supposedly in compliance with the requirements defined in the regulatory frameworks on patient safety in the country⁷⁻¹⁰, however we identified one institution whose CPS was set up before the launching of the NPSP, pointing out that safety and risk management was already part of the organization's agenda, regardless of the obligation required by current regulations.

It was identified that CPS work with different executive models, either as autonomous service within hospital, whether in quality control services, such as advisory bodies, all in accordance with the resolution of ANVISA, which recommends that "the health service board can use the already existing structure of committees, commissions, management offices, coordination boards or nuclei for the performance of the CPS duties"⁸.

Only half of the CPS studied have an exclusive professional in charge of patient safety activities, which contradicts the regulatory norm and does not help the implementation of work processes to prevent errors in these health services, to the extent that the professionals in half of these centers work in other services and respond to them, fragmenting the patient safety activity. In addition, most professionals who work in these centers do not have specific training in the field of patient safety, which can be an obstacle to their practice. These findings can pose a challenge to the implementation of a security culture in these organizations, led by the CPS and defined as individual and group behavior patterns, which determine the commitment, style, and proficiency of the administration of a healthy and safe organization^{2,3,11,16}.

Despite these limitations, all CPS studied analyze data on incidents and AE in the hospital and 91.7% encourage hospital employees to notify incidents; thus, they foster a culture of overcoming the fear of registering and informing healthcare error, in line with the understanding of the multi factorial character of healthcare errors, whose premise is that human beings make mistakes, and that errors are consequences and

not causes. After all, it is known that the main factors that contribute to the occurrence of AE are deficiencies of the health care system in its conception, as well as in its organization and operation¹⁶.

The notification of errors and incidents that do or do not harm patients is the guiding element of a safety program in healthcare, since the knowledge of errors make it possible to delineate the magnitude of these events in the organization, and also to develop indicators and to make decisions. A quality indicator is defined as a quantitative measure on some aspect of patient care, and the inclusion of these indicators by CPS represents an important strategy for promoting safety of hospitalized patients¹⁷.

Regarding the notification to the National Health Surveillance System of AE occurred in the hospital until the 15th working day of the following month, we identified that most CPS meet this recommendation, although some do so within 72 hours, when the AE evolve to death, omitting from ANVISA, in real-time, the most serious events that occurred in the institution, as well as making it impossible to this regulatory agency to monitor the actions proposed by hospitals in order to elucidate and propose strategies to prevent more serious events.

Among the basic protocols recommended by the MH, only seven CPS (58.3%) implement them all; five (41.6%), only a few; and two centers (16.7%) do not adopt any of the mandatory protocols, configuring nonconformity and non-compliance with patient safety plans, since these protocols are essential for the minimum support of a program and an institutional security culture.

Moreover, the lack of adherence to mandatory patient safety protocols in hospitals with complex profiles such as those studied here, which provide care to patients under more serious clinical conditions, submitted to multiple interventions and, therefore, more likely to suffer unwanted effects of the care provided, evidences the gap in the health control of these health institutions that should be exercised by health surveillance.

In this sense, health surveillance, an organ of the national health system whose constitutional concept is to "control risks associated with products, processes and services relevant to human health"⁸, is thus responsible for the supervision of CPS according to the resolution in force⁸ and, in doing so, can be a catalyst for the successful implementation of the patient security policy in the country.

The most implemented safety protocols were patient identification and hand hygiene, followed by safe surgery

and pressure wound prevention protocols, and the least implemented were the ones for preventing medication errors and falling prevention. These protocols, defined as basic, are pillars of care quality for any health service, and their implementation directly interferes with health indicators, such as rates of permanence, morbidity and hospital mortality.

The most prevalent incidents and AE reported by the CPS in the hospitals surveyed were pressure wound, bed fall and medication errors. There was also the occurrence of phlebitis, as well as errors in drain and tube removal, in patient identification and lack of hand hygiene. No AE associated to surgical procedures were reported.

The AE recognized here are, *a priori*, likely to be predicted and differ from the literature data which report that most incident AE are associated to surgery, followed by those associated to medication, diagnosis, therapy, clinical procedures and falls¹⁸⁻²⁰.

The identified percentages of pressure wound, bed fall, accidental removal of drains and medication errors indicate that greater efforts of work processes for patient safety are necessary in these institutions. Additionally, the percentage of errors associated with patient identification and hand hygiene technique is noteworthy, since the most implemented protocols by the CPS studied here are patient identification and hand hygiene (both 83.3%), pointing out that implementing the protocols is not enough; it is necessary to monitor the associated practices.

CONCLUSION

This study data allowed us to analyze, in the third largest capital of the country, the implementation of the NPSP, instituted in 2013, and they contribute as a parameter for evaluating the adherence of this regulation to regulatory and supervisory bodies.

The sample, 60% of CPS of hospitals investigated, constitutes a limitation and an opportunity for future follow-up studies.

It was identified that all large hospitals studied respond positively to the NPSP. The CPS examined develop their activities in a planned manner, and most implement the basic recommended safety protocols in the country, as well as other activities associated to patient safety.

The percentages of AE found by the CPS of the hospitals surveyed ratify previous studies that indicate that Brazil has one of the highest avoidable rate of AE in the world, signaling the need for maintenance and intensification of work processes for preventing errors in health care, as well as the development of a culture of safety in health organizations, especially in the most complex, as those in this work.

We observed a gap in health control which should be performed by health surveillance in some institutions investigated and, in this sense, we believe that it is up to the State to not only regulate processes and health services imperatively, but also to have the operational capacity to enforce compliance with its regulations.

REFERENCES

1. Flodgren G, Conterno LO, Mayhew A, Omar O, Pereira CR, Shepperd S. Interventions to improve professional adherence to guidelines for prevention of device-related infections. *Cochrane Database Syst Rev* [Internet]. 2013 [accessed on April 26, 2019];(3). Available on: <http://doi.wiley.com/10.1002/14651858.CD006559.pub2>
2. Pereira FGF, Matias ÉO, Ceatano JÁ, Lima FET. Segurança do paciente e promoção da saúde: uma reflexão emergente. *Rev Baiana Enfermagem* [Internet]. 2015 [accessed on April 23, 2019];29(3):278. Available on: https://portalseer.ufba.br/index.php/enfermagem/article/view/12205/pdf_10. <http://dx.doi.org/10.18471/rbe.v29i3.12205>
3. Okuyama JHH, Galvão TF, Silva MT. Healthcare professional's perception of patient safety measured by the hospital survey on patient safety culture: a systematic review and meta-analysis [Internet]. *ScientificWorldJournal*. 2018 [accessed on April 25, 2019]:1-11. Available on: <https://www.hindawi.com/journals/tswj/2018/9156301/>
4. World Health Organization (WHO). The World Alliance for Patient Safety. Geneva: WHO; 2004 [accessed April 26, 2019].33 p. Available on: http://www.who.int/patientsafety/en/brochure_final.pdf
5. World Health Organization (WHO). WHO Patient Safety. World alliance for patient safety. The second global patient safety challenge: safe surgery saves lives [Internet]. Geneva: WHO Press; 2008 [accessed on January 20, 2019]. 32 p. Available on: https://apps.who.int/iris/bitstream/handle/10665/70080/WHO_IER_PSP_2008.07_eng.pdf?sequence=1&isAllowed=y
6. World Health Organization (WHO). Global patient safety challenge: medication without harm. WHO Glob Patient Saf Chall [Internet]. 2017 [accessed on January 20, 2019]. 16 p. Available on: <http://apps.who.int/iris/bitstream/10665/255263/1/WHO-HIS-SDS-2017.6-eng.pdf?ua=1&ua=1>

7. Brasil. Ministério da Saúde. Portaria nº 482, de 1º de abril de 2014. Institui o Programa Nacional de Segurança do Paciente (PNSP) [Internet]. Diário Oficial da União; 2013 [accessed on December 2, 2018]. p. 1-4. Available on: http://bvsms.saude.gov.br/bvs/saudelegis/gm/2014/prt0482_01_04_2014.html
8. Agência Nacional de Vigilância Sanitária (ANVISA). RDC nº 36, de 25 de julho de 2013. Institui ações para a segurança do paciente em serviços de saúde e dá outras providências. Diário Oficial da União; 2013.
9. Brasil. Ministério da Saúde. Portaria nº 1.377, de 9 de julho de 2013. Aprova os Protocolos de Segurança do Paciente [Internet]. Diário Oficial da União; 2013 [accessed on Dec 2, 2018]. Available on: <http://bvsms.saude.gov.br/bvs/publicacoes/parto.pdf>
10. Brasil. Ministério da Saúde. Portaria nº 2.095, de 24 de setembro de 2013. Aprova os Protocolos Básicos de Segurança do Paciente. Diário Oficial da União; 2013.
11. Andrade LEL, Lopes JM, Souza Filho MCM, Vieira Júnior RF, Farias LPC, dos Santos CCM, et al. Cultura de segurança do paciente em três hospitais brasileiros com diferentes tipos de gestão. Ciênc Saúde Coletiva [Internet]. 2018 [accessed on March 21, 2019];23(1):161-72. Available on: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1413-81232018000100161&lng=pt&tlng=pt
12. Yin RK. Estudo de caso: planejamento e Métodos. 2. ed. Porto Alegre: Bookman; 2001. 200 p.
13. Leitão IMT de A, Sousa FSP de, Santiago JC dos S, Bezerra IC, de Morais JB. Absenteísmo, rotatividade e indicadores de qualidade do cuidado em enfermagem: estudo transversal. Online Brazilian J Nurs [Internet]. 2017 [accessed on December 2, 2018];16(2):119-29. Available on: www.objnursing.uff.br/index.php/nursing/article/view/5623. <https://doi.org/10.17665/1676-4285.20175623>
14. Novaretti MCZ, Santos E de V, Quitério LM, Daud-Gallotti RM. Nursing workload and occurrence of incidents and adverse events in ICU patients. Rev Bras Enferm [Internet]. 2014 [accessed on December 2, 2018]; 67(5):692-9. Available on: <https://doi.org/10.1590/0034-7167.2014670504>
15. Siman AG, Brito MJM. Mudanças na prática de enfermagem para melhorar a segurança do paciente. Rev Gaúcha Enferm [Internet]. 2016 [accessed on December 2, 2018];37(esp.):1-9. Available on: <http://www.scielo.br/pdf/rge/v37nspe/0102-6933-rge-1983-14472016esp68271.pdf>. <http://dx.doi.org/10.1590/1983-1447.2016.esp.68271>
16. Reis CT, Martins M, Laguardia J. A segurança do paciente como dimensão da qualidade do cuidado de saúde: um olhar sobre a literatura. Ciênc Saúde Coletiva [Internet]. 2013;18(7):2029-36. Available on: http://www.scielo.org/scielo.php?script=sci_arttext&pid=S1413-81232013001500018
17. Brasil. Agência Nacional de Vigilância Sanitária (ANVISA). Assistência segura: uma reflexão teórica aplicada à prática [Internet]. Brasília; 2017 [accessed on December 20, 2018].p. 18-27 Available in: <http://portal.anvisa.gov.br/documents/33852/3507912/Caderno+1+-+Assistência+Segura+-+Uma+Reflexão+Teórica+Aplicada+à+Prática/97881798-cea0-4974-9d9b-077528ea1573>
18. Ortega DB, D'Innocenzo M, Silva LMG da, Bohomol E. Análise de eventos adversos em pacientes internados em unidade de terapia intensiva. Acta Paul Enferm. 2017;30(2):168-73. <http://dx.doi.org/10.1590/1982-0194201700026>
19. Carlesi KC, Padilha KG, Toffoletto MC, Henriquez-Roldán C, Juan MAC. Patient safety incidents and nursing workload. Rev Latino-Am Enfermagem [Internet]. 2017 [accessed on December 20, 2018];25. Available on: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0104-11692017000100319&lng=en&tlng=en. <http://dx.doi.org/10.1590/1518-8345.1280.2841>
20. de Araújo IS, de Carvalho R. Eventos adversos graves em pacientes cirúrgicos: ocorrência e desfecho. Rev SOBECC. 2018;23(2):83. <https://doi.org/10.5327/Z1414-4425201800020004>

OCCUPATIONAL RISKS AND HEALTH CARE WASTE IN THE SURGERY CENTER

Riscos ocupacionais e os resíduos de serviços de saúde em centro cirúrgico

Riesgos ocupacionales y residuos de salud en un centro quirúrgico

Graciele Pinheiro de Moraes Justiniano¹ , Aline Helena Appoloni Eduardo² , Cibele Correia Semeão Binotto³ , Juice Ishie Macedo⁴ , Tatiane Bonametti Veiga⁵ , Silvia Helena Tognoli⁶ , Adriana Aparecida Mendes^{7*} 

ABSTRACT: Objective: To understand the relationship between occupational risks and health care waste (HCW), from the perspective of nursing professionals working in the surgery center (SC). **Method:** This is exploratory and descriptive field research with a qualitative approach. Data were collected through recorded interviews, with three open questions on the generation and management of waste and health risks to nursing professionals. The sample consisted of 11 technicians and two auxiliary nurses. Data were organized and analyzed according to the collective subject discourse (CSD) method. **Results:** The speeches revealed concern in adequately managing the generated waste, particularly biological and sharp ones. Professionals understand that failure to comply with safe management practices can lead to damage to their health, that of the patient, and that of other professionals. **Conclusion:** The results showed the exposure of nursing professionals to the waste generated in the SC, which reinforces the need for ongoing guidance practices and training for the appropriate management of these residues, in order to minimize risks of exposure for professionals, patients, and the environment. **Keywords:** Occupational health. Occupational risks. Medical waste. Surgicenters. Nursing.

RESUMO: Objetivo: Conhecer a relação dos riscos ocupacionais com os resíduos de serviços de saúde (RSS), na perspectiva de profissionais de enfermagem que atuam no centro cirúrgico (CC). **Método:** Trata-se de uma pesquisa de campo de caráter exploratório e descritivo e abordagem qualitativa. Os dados foram coletados por meio de entrevista gravada, com três questões abertas sobre a geração e o manejo de resíduos e riscos à saúde dos profissionais de enfermagem. A amostra foi composta de 11 técnicos e dois auxiliares de enfermagem. Os dados foram organizados e analisados segundo a proposta do método do discurso do sujeito coletivo (DSC). **Resultados:** Os discursos revelaram preocupação em realizar o manejo adequado dos resíduos gerados, com destaque para os biológicos e perfurocortantes. Os profissionais compreendem que o não cumprimento de práticas seguras de manejo pode expor prejuízos à própria saúde, à do paciente e à de outros profissionais. **Conclusão:** Os resultados evidenciaram exposição dos profissionais de enfermagem aos resíduos gerados no CC, o que reforça a necessidade de práticas contínuas de orientações e treinamentos para o manejo apropriado desses resíduos, com a finalidade de minimizar riscos de exposição dos profissionais, dos pacientes e do ambiente. **Palavras-chave:** Saúde do trabalhador. Riscos ocupacionais. Resíduos de serviços de saúde. Centros cirúrgicos. Enfermagem.

RESUMEN: Objetivo: Conocer la relación entre riesgos laborales y los residuos de los servicios de salud (RSS), desde la perspectiva de los profesionales de enfermería que trabajan en quirófano (CQ). **Método:** Esta es una investigación de campo exploratoria y descriptiva con un enfoque cualitativo. Los datos se recopilieron mediante entrevistas grabadas, con tres preguntas abiertas sobre la generación y gestión de residuos y riesgos para la salud de los profesionales de enfermería. La muestra consistió en 11 técnicos y dos auxiliares de enfermería. Los datos fueron organizados y analizados de acuerdo con el método del discurso del sujeto colectivo (DSC). **Resultados:** Los discursos revelaron una preocupación por llevar a cabo el manejo adecuado de los

¹Nurse from Universidade de Araraquara (UNIARA) – Araraquara (SP), Brazil.

²Nurse, Ph.D. in Sciences from Escola de Enfermagem de Ribeirão Preto, Universidade de São Paulo. Professor of Nursing at Universidade Federal de São Carlos (UFSCar) – São Carlos (SP), Brazil.

³Nurse, Ph.D. student at Universidade Federal de São Carlos. Professor of Nursing at UNIARA – Araraquara (SP), Brazil.

⁴Nurse, Ph.D. in Nursing from Universidade Federal de Minas Gerais. Retired professor from Universidade Estadual do Centro-Oeste – Guarapuava (PR), Brazil.

⁵Civil engineer, Ph.D. in Sciences from Escola de Enfermagem de Ribeirão Preto, Universidade de São Paulo (USP). Professor at Universidade Estadual do Centro-Oeste – Guarapuava (PR), Brazil.

⁶Nurse, Ph.D. student at Escola de Enfermagem de Ribeirão Preto, USP – Ribeirão Preto (SP), Brazil.

⁷Nurse, Ph.D. in Sciences from Escola de Enfermagem de Ribeirão Preto, USP. Professor of Nursing at UNIARA – Araraquara (SP), Brazil.

*Corresponding author: adrianaapmendes@yahoo.com.br

Received: 08/13/2019 – Approved: 01/29/2020

DOI: 10.5327/Z1414-4425202000010005

desechos generados, con énfasis en productos biológicos y objetos punzantes. Los profesionales entienden que el incumplimiento de las prácticas de gestión segura puede exponer el daño a su propia salud, la del paciente y la de otros profesionales. **Conclusión:** Los resultados evidenciaron la exposición de los profesionales de enfermería a los desechos generados en el CQ, lo que refuerza la necesidad de orientación continua y prácticas de capacitación para el manejo adecuado de estos desechos, a fin de minimizar los riesgos de exposición de profesionales, pacientes y medio ambiente

Palabras clave: Salud laboral. Riesgos laborales. Residuos sanitarios. Centros quirúrgicos. Enfermería.

INTRODUCTION

Health care should be a safe act, with minimal incidence of adverse events. However, in daily work, there is excessive exposure to situations that offer risk to the health of the professional, especially those that occur in the surgery center (SC), a place where the worker is vulnerable to harmful events¹.

It is noteworthy that nursing professionals represent a significant number of SC workers and are exposed to various strain situations. We emphasize that risk factors present in this type of environment can cause damage to the quality of production and care provided in different circumstances, directly compromising the health of workers. These risk factors are a consequence of exposure to and handling of physical, chemical, biological, ergonomic, and psychosocial agents, causing occupational accidents²⁻⁵.

In view of this reality, we underline the risks related to exposure to health care waste (HCW), continuously generated in the SC, resulting from different types of procedures performed during the care practice.

According to the Collegiate Board Resolution (*Resolução da Diretoria Colegiada – RDC*) no. 222/2018 of the Brazilian Health Regulatory Agency (*Agência Nacional de Vigilância Sanitária – ANVISA*), HCW generators encompass all services related to human and animal health care, whether in-home care or in analytical laboratories for health products, mortuaries, funeral homes, mobile clinics, among other similar services⁶.

According to RDC no. 222/2018, HCW is classified into the following groups:

- Group A: biological waste, which includes infectious agents in its composition;
- Group B: chemical waste, such as medicines and sanitizers;
- Group C: radioactive waste, represented by products that may contain more radionuclides than the established by the National Nuclear Energy Commission;
- Group D: general waste, which does not present any of the characteristics of the other groups;
- Group E: sharps waste, such as blades, needles, among others⁶.

We highlight that SC generates all types of waste.

Among the professionals, those who comprise the nursing team are in daily contact with the waste when performing procedures in their practice, which exposes them to risks related to such materials⁷. The nursing team has a greater number of workers and is responsible for directing the flow of waste⁸.

HCW management is a set of management procedures duly planned and implemented based on scientific, technical, normative, and legal aspects. Its purpose is to reduce the generation of waste and adequately handle their final disposal, aiming at safety and the health of professionals, patients, and the environment⁶.

The number of studies investigating the problems involving HCW among SC nursing professionals is still small, and this type of research should be explored to strengthen the practice of managing the waste generated, minimizing the exposure of professionals, patients, and environments to it.

OBJECTIVE

To understand the relationship between occupational risks and HCW from the perspective of nursing professionals working in the SC.

METHOD

This is exploratory and descriptive field research with a qualitative approach conducted in the SC of a hospital in the inland of São Paulo in June 2016.

The 32 nursing professionals (nurses, technicians, and auxiliary nurses) working in the selected SC were invited to participate in the study. The study was carried out at a reserved time and place, as previously agreed with the sector coordination, without interfering in the work routine.

The inclusion criteria were working in SC for more than 12 months, agreeing to participate in the study,

and being in the unit during the data collection period. The exclusion criteria were being on vacation, a day off, or out of the work unit for some reason during the data collection period.

Among the 32 professionals, 19 did not meet the inclusion criteria, resulting in a total of 13 participants – 11 technicians and two auxiliary nurses.

For the data collection, an instrument with three open questions was elaborated, according to the collective subject discourse (CSD) method⁹:

1. In the activities performed in the SC, different types of non-invasive and invasive procedures that generate waste are performed. Tell me about this waste;
2. In your daily work in the SC, you perform non-invasive and invasive procedures that generate waste, which requires proper management (handling) so as not to cause damage to your health, that of the patient, and that of the environment. Tell me how you manage (handle) this waste;
3. In the SC environment, the procedures performed generate waste that may pose risks to your health. Could you talk about these risks?

The individual data collection took place after the approval by the Research Ethics Committee, following the recommendations of Resolution no. 466/2012¹⁰, under opinion 1,447,657 and the Certificate of Presentation for Ethical Consideration (*Certificado de Apresentação para Apreciação Ética – CAAE*) no. 53337316.0.0000.5383. After the participants signed the Informed Consent Form, the information was collected in the morning, afternoon, and evening shifts and recorded on a voice recorder, with an average duration of three minutes and ten seconds for each interview.

For the data analysis, we used the CSD method, with the interviews recorded and transcribed manually. Next, we extracted the key expressions, which represent the principal passages or segments found in the full transcripts of the responses received in the main content, and selected the central ideas, with subsequent construction of the discourses⁹.

RESULTS

In view of the results obtained in the interviews, the three guiding questions produced six CSDs, presented below.

CSD 1: Waste generated and exposure of health professionals to occupational risks

Nursing professionals pointed out the different types of waste generated in SC and the concern with risk exposure situations.

Sharp objects, other types [...], the remains of small amputations, skins [...], anatomopathological materials, chemical products, medicines, disposable products [...], also [...] needles [...], Abocath® [...], central lines that the doctor place [...] which sometimes create a risk [...] for the employee [...], doctors, not being well handled [...], in the rush, they leave it exposed [...]. All procedures generate a lot of waste [...]. In a femoral fracture repair, [...] many surgical sponges are used to stop the bleeding and [...] are thrown into the hamper [...]. They are always very dirty [...], leave a lot of filth in the room, and have a lot of residues [...]. Also, a lot of thread is used, as in cardiac surgery [...], which requires opening many boxes [...], clamps [...] and several different materials [...], glove, gauze [...], drapes, needle, syringe, drain [...]. We have the general waste [...], which are paper towels that we use during the hand washing procedure [...]. The waste that is sterile, because here we use sterile disposable drapes, gowns [...]. So, that generates waste [...]. There is solid waste, which includes sharp objects [...], contaminated ones [...], common [...], glass ampoules [...], various types of waste [...]. Everything with blood on it, contact with patient [...], secretion [...], blades.

CSD 2: Exposure of health professionals to occupational accidents with sharps waste

The study participants revealed that, in daily work, among the waste generated, sharps waste can lead to occupational risks, compromising their health.

What we handle most here are sharp objects [...], syringes [...], needles [...], glass ampoules [...]. We usually ask the scrub nurse or intern to remove them from the table, but they do not always comply. When accidents happen [...], someone can get punctured, I have already gotten punctured myself [...] for not throwing the waste in the right place, not [...] organizing the table [...]. We must

be very careful not to leave the Descarpack® (waste disposal container) too full because we could get hurt [...], hurt the colleague who takes it [...]. The sharps waste [...] must be disposed of in the Descarpack® [...], the contaminated waste, [...] thrown into the white trash [...], the [...] common [...], into the black trash.

CSD 3: Nursing professionals' care when handling the waste generated

Another concern of the participants identified in the responses was the need for safe handling of the different types of materials in order to minimize risk exposure.

When we handle [...], we try to take possible precautions [...]. It's a bit difficult because the SC is a sector that [...] doesn't stop [...]. So, we don't always see a sharp object on the table, and that's why we end up getting punctured [...], getting hurt [...]. We try to preserve our health and that of the patient, not to touch these garbage when the patient is in the room, try to send the patient to the recovery room before removing all these materials [...], paying more attention on the table when removing the waste [...], looking at everything again, checking if everything has been put in the box to go down to central. [...] When we handle this kind of waste, we pay a lot of attention, always using gloves. Depending on the waste and the quantity, I usually wear two gloves, so I don't have the problem of getting my hand dirty if one gets punctured [...]. Handling requires disposal in the correct place, [...] but when it's on the operating table, I always pick it up with clamps. We always remove the scalpel with a needle holder, so there is no risk of it jumping and hurting someone or ourselves [...], avoiding accidents [...]. I never use my hand to pick it up, because even if you puncture your finger wearing a glove [...] your finger will be there. Just using a glove doesn't protect you from anything basically [...], because we use many drapes. We must be extra careful [...], we must use procedure [...] gloves [...]. When using a needle syringe, you can't recap, you must discard the entire syringe [...], always wearing gloves and, depending on the case, a mask too, to avoid splashes [...] on you.

CSD 4: Occupational risks related to waste disposal

The participants were concerned about the need to be careful at the time of waste disposal and warned about this, as they understand this practice involves risks.

"Sometimes" the resident or intern says they've already removed the sharp object. But then we'll check [and] they didn't. [...] When it comes to taking out the waste, even [...] the recyclable, because sometimes someone can throw something into the recyclable [...], this ends up putting us at risk [...]. You look at the ground, pay attention... because there are people who drop things on the floor [...]. When you find it, you need to get it, of course, but first, you put on the glove, you have to be careful, and pick it up the right way so as not to take risks, and discard it in the proper place [...]. There's the secretion aspirator. Sometimes, in surgery, the doctor starts aspirating [...] for us to discard later, the urine drainage bag [...], the Portovac® drain [...] in the toilet, which should be discarded in the slop hopper, [...] taking great care [...], wearing gloves and, usually depending on the content, such as a scalpel blade, using a Kelly forceps [...], we discard [...] in the Descarpack® [...], then we put the recyclables in the proper transparent bag, the contaminated [...] in the white bag, the clothes in the blue bag. [...] We must follow the procedure here at the hospital, we have to separate the recyclable waste, that is, packaging and everything else that we put in the transparent bag.

CSD 5: Insecurity of nursing professionals related to the lack of information about the patient

The professionals mentioned the lack of information about the clinical conditions of the patient treated in the SC, reinforcing the need to use personal protective equipment.

Always wearing gloves, mask, gown, because we don't know what the patient's disease is. Sometimes the patient arrives in the emergency room and goes straight up [...], we don't know what diseases this patient has. Here, it's like an entrance door, as if it were an emergency room [...]. We know there are biological risks.

Most of the time, when the patient has tuberculosis, we don't know, we don't wear a mask, because we don't have this protocol for all patients [...]. When you know, the patient has already been diagnosed, has moved past here, is already in the room [...], but most of the time, you deal with the patient without knowing what they have [...]. We can get contaminated with secretions that are left behind sometimes, that can splash in our eyes, infecting us [...]. So, you protect yourself, wearing gloves, a mask [...]. And even when you use the proper PPE, [...] you are still at risk of contracting something from the patient without knowing.

CSD 6: Risks related to the waste generated

The professionals pointed out the need to maintain adequate waste handling practices during care activities.

*As I said, we try not to put ourselves at risk [...], nor the patient [...], nor anyone in the room [...]. We're at risk all the time [...]. The concern here in the working environment and that the [Hospital Infection Control Committee] HICC always reinforces is that we always wear glasses, mask, because of this risk of contamination [...], of getting some residue in the eye, [...] or secretion [...]. Now we have these procedures with devices, which are more practical, we collect the needle, but sometimes we can forget, does this represent a risk? Yes! But now, the risk of puncture is much lower [...]. It's also safer for us regarding accidents [...]. Before, when they couldn't be recapped, punctures would happen [...]. Also, when the garbage is not disposed of in the right place [...], or collected at the right times, of course it accumulates, and it can create risks [...], for example, if it has a sharp object, [...] you can puncture yourself. And I believe there would be more risk with sharp objects than the rest. If you wear the PPE, there is no danger of blood spattering or anything like that [...]. Risks [...] of everything, disease, [...], especially hepatitis [...]. Sometimes, a surgical procedure is a contaminated surgery [...], these *Pseudomonas* [...] are the ones that represent the most risk for us [...], they are strong types of bacteria present in hospitals, hepatitis C, [human immunodeficiency virus] HIV, everything, syphilis as well [...]. Biological risks from solid waste [...], needles, suture threads, which can*

puncture us [...], cut or contaminate us [...], and other types of accident. As we discard urine [...], putting the drapes inside the hamper, secretion can escape, this is a very high risk [...]. There are several risks because of the fluids [...], all of them [...], one must be very careful [...]. You may be contaminating yourself, except for the recyclables, if they are not dirty, or you would be contaminated [...] if you were not protected, the inhalants, depending on what you are touching [...]. For the patients, the risks generated, I suppose, a badly discarded needle. Regarding [...] aerosols, [...] these airborne diseases [...], the chemical can fall on the skin and cause an allergy [...]. We must separate the garbage correctly because a glove we put on the bag that should be disposable can contaminate everything. So, when it goes to the people downstairs [...], they see a glove or gauze inside the recyclable material, they have to put everything in the contaminated material [...], increasing the cost [...] for the proper final disposal.

DISCUSSION

In this study, the nursing professionals' concern with the exposure to the waste generated in the SC was evidenced in the speeches, as well as the attention to meet the norms implemented by the institution to avoid exposure to occupational risks.

The study of perceiving the risks inherent to the waste generated in health care facilities is relevant to the elaboration and implementation of actions that minimize the damage to workers, the community, and the environment¹¹.

Another situation identified in the participants' speech was related to the continuous generation of waste, since this unit treats patients in urgent and emergency situations, and this waste is generated at different moments of the care practice and procedures performed by the multidisciplinary team.

The participants also mentioned that, among the variety of waste generated, there are also anesthetic gases, as well as the possibility of exposure to radiation; risk situations that can interfere with the worker's professional performance and quality of life.

According to data from a study conducted in a public university hospital, the exposure of nursing workers to occupational accidents may occur in daily activities as a result of their workload. This exposure is associated with chemical,

physical, psychic, and mechanical factors, especially biological ones, which can also lead to occupational diseases¹².

Still on the potential of occupational exposure of nursing professionals working in the SC to the different types of waste generated during care practices, the participants stated that the risk increases in situations without the adequate management of these materials.

Among the waste generated, sharp objects stood out, since the nursing team handles them constantly, and they can offer risks to the worker's health, causing concern in this professional category.

The inadequate management of waste generated in health facilities, particularly in some sectors, such as blood banks, operating rooms, and laboratories, represents risks for people and the environment due to its characteristics, as it may contain infectious, radioactive, and sharp agents among others¹³.

Another study carried out in Family Health Units in the city of São Carlos, inland of São Paulo, points out that exposure to potentially contaminated materials, including sharp ones, is frequent in the activities of the nursing professional, a fact related to the excessive manipulation of this type of material in daily work¹⁴.

Thus, as described in Regulatory Standard (*Norma Regulamentadora* – NR) 32/2005, which determines standards for the safety and health of workers in health care facilities regarding exposure to sharp materials, an action plan aimed at minimizing this type of contact must be implemented and supervised¹⁵.

Also, data from a study carried out in a university hospital in João Pessoa, Paraíba, with the purpose of identifying the main types of accidents that affect nursing professionals, revealed a prevalence of exposure to sharp materials, followed by contact with patient secretions, assault, among others. These situations interfere with the professionals' health quality and, in some cases, result in leaves of absence¹⁶.

A study conducted in a public hospital in the inland of Ceará identified that, with respect to the waste generated, the handling stages, consisting of separation, packaging, and identification of sharp objects, were properly followed. The authors declared that the professionals involved showed caution regarding occupational exposure to this type of waste¹⁷.

The discourse of the participants in this research revealed their attention to the careful handling of waste, which is present in the practice at different stages, from generation to disposal in an appropriate container, as a way of protecting their health in care situations.

A study carried out at the Universidade Federal de Minas Gerais with undergraduate students from the Department of Biological and Health Sciences, aiming at identifying the knowledge of these students about the management of waste from biological and sharp groups, showed that their partial knowledge about the adequate disposal of sharp objects is concerning, as the research participants represent a group responsible for occupational exposure¹¹.

With respect to the completion of the management stages, the participants' discourse demonstrated their concern about their safety, as they are aware of being exposed to different types of risks, including those related to the waste generated. They are also aware that the management stages must be safely followed to preserve their health, as well as that of the patient and other professionals who work in the SC. It is noteworthy that the management stages are included in the managing of this waste⁶.

Another study, performed in a blood bank in Paraná, with the purpose of understanding the management of the HCW generated in the institution, evidenced the need for a different look at the handling stages, as well as for the strengthening of the practice of continuing in-service education due to risks to public health and the environment¹⁸.

Concerning the practice, this study revealed another concern related to the compliance with the proper disposal of waste because when this stage is not correctly followed, and the general waste is discarded as contaminated, the cost for the adequate final disposal increases.

Thus, we can affirm that, when separation is not done properly, the other management stages are compromised, and waste disposal without prior treatment or in an inappropriate place creates a risk of exposure for the patient, the professional, and the environment^{17,19,20}.

However, the nursing professional is not the only one responsible for the generation of waste when assisting the patient; professionals from other health areas also produce it. Nevertheless, the responsibility for handling and packaging this waste is delegated to the nursing team, as they are in charge of the continuity of care during the patient's treatment and recovery process.

Considering the nursing professionals' practice of handling the waste generated, we can state that they are the starting point in the management of HCW, since separation, the initial handling stage, is mostly performed by them⁷.

Therefore, the nursing professional needs to know the stages of waste management, as described in RDC no. 222/2018⁶, to minimize the chance of occupational exposure.

Another topic addressed in the present study was the issue of insecurity identified in the participants' speech in relation to the patient treated. According to their statements, professionals stay alert in the surgical block, as a patient can be admitted to this environment at any time, either in urgent or emergency situations, at different levels of complexity regarding their health status. This fact, as claimed by professionals in the area, does not leave enough time for communication prior to the period preceding the interventions in the SC, which makes this situation prone to exposure to risks.

In view of this situation, the professionals mentioned that, for their safety, they put into practice preventive actions, such as the proper use of PPE, as a means to minimize exposure to this type of adverse occurrence, as well as receive continuous attention and care from the HICC.

The waste produced in the SC results from actions performed during anesthesia and surgical procedures. Examples are disposable gowns, surgical drapes, sponges, gauze, wrapping of the materials used, among others²¹.

Thus, the performance of procedures in a mechanical, accelerated, or distracted manner can lead the professional not to consider their safety and health in the work environment. In the SC, the need to carry out care actions intensely predisposes professionals to exposure to waste²².

FINAL CONSIDERATIONS

The results of this research revealed that nursing professionals consider that different types of waste are generated in the SC and that, when identified and handled improperly, these materials can cause damage to their health, as well as that of other professionals and patients.

The management of the waste generated in the daily work of these professionals is constant. They understand that the handling, separation, and packaging stages are fundamental to ensure the integrity of the health of workers and patients, with a clear concern about handling the waste properly.

The speeches of the participants highlighted that they feel more exposed to biological and sharps waste during the performance of their work activities and recognize that these exposures can impact their health, causing losses.

Another fact pointed out by the participants was the lack of attention from other professionals that make up the health team working at the SC regarding the inappropriate disposal of waste. This situation, consequently, generates insecurity and concern.

Therefore, we recommend that these professionals receive periodic guidance and training in the proper management of HCW, minimizing risks of exposure to the waste generated and damage to their health, as well as that of the patient, other professionals, and the environment.

The fact that we did not include other professional categories that are part of the SC team due to the reduced time for research can be considered a limitation of the study.

REFERENCES

1. Lima RMS, Duarte GL, Couceiro TCM, Nascimento MKS, Lima LC. Conhecimento dos anesthesiologistas da cidade do Recife com relação aos riscos potenciais no centro cirúrgico: estudo transversal. *Rev Bras Anesthesiol.* 2014;64(2):116-20. <http://dx.doi.org/10.1016/j.bjan.2013.06.019>
2. Januário GC, Carvalho PCF, Lemos GC, Gir E, Toffano SEM. Acidentes ocupacionais com material potencialmente contaminado envolvendo trabalhadores de enfermagem. *Cogitare Enferm.* 2017;22(1):1-9. <http://dx.doi.org/10.5380/ce.v22i1.48893>
3. Carvalho M, Gatti MAN, Conti MHS, Vitta A, Marta SN, Simeão SFAP. Qualidade de vida da equipe de enfermagem do centro cirúrgico. *Rev Catarse [Internet].* 2014 [accessed on Oct, 30th. 2019];2(1):71-84. Available in: <http://revistas.faculdadeunicampo.edu.br/index.php/RevistaCatarse/article/view/304/136>
4. Soares LG, Sarquis LMM, Kirchof ALC, Cruz EDA. Percepção do risco biológico em trabalhadores de enfermagem. *Cogitare Enferm.* 2013;18(1):36-42. <http://dx.doi.org/10.5380/ce.v18i1.31300>
5. Silva LS, Valente GSC. Riscos químicos hospitalares e gerenciamento dos agravos à saúde do trabalhador de enfermagem. *Rev Pesq Cuidado Fundamental.* 2012;(supl.):21-4. <http://dx.doi.org/10.9789/2175-5361.rpcf.v0.1662>
6. Brazil. Ministério da Saúde. Agência Nacional da Vigilância Sanitária (ANVISA). Resolução da Diretoria Colegiada (RDC) nº 222, de 28 de março de 2018. Regulamenta as Boas Práticas de Gerenciamento dos Resíduos de Serviços de Saúde e dá outras providências. *Diário Oficial da União [Internet].* 2018 [accessed on Oct, 30th. 2019]. Available in: http://portal.anvisa.gov.br/documents/10181/3427425/%282%29RDC_222_2018_.pdf/679fc9a2-21ca-450f-a6cd-6a6c1cb7bd0b

7. Nunes TSP, Gutemberg ACB, Armando CB, Pinto FF, Lemos MC, Passos JP. Gerenciamento de Resíduos de Serviços de Saúde: uma revisão de literatura. *Rev Pesq Cuidado Fundamental*. 2012;(supl.):57-60. <http://dx.doi.org/10.9789/2175-5361.2012.v0i0.57-60>
8. Santana JCB, Almeida LG, Oliveira RL, Melo LC, Costa IMS, Silva CCD, et al. Rotina dos profissionais de enfermagem no trabalho com resíduos em saúde em um hospital público. *Rev Enferm UFPE*. 2013;7(5):1333-41. <http://doi.org/10.5205/reuol.3960-31424-1-SM.0705201304>
9. Lefevre F, Lefevre AMC. Pesquisa de representação social: um enfoque quali-quantitativo: a metodologia do discurso do sujeito coletivo. 2ª ed. Brasília: Líber Livros; 2012.
10. Brazil. Conselho Nacional de Saúde. Resolução nº 466, de 12 de dezembro de 2012 [Internet]. 2012 [accessed on Dec 5th. 2018. Available in: <http://conselho.saude.gov.br/resolucoes/2012/Reso466.pdf>
11. Stehling MC, Cunha LM, Louredo LM, Camargo CG, Haddad JPA, Silva IJ, et al. Gestão de resíduos com risco biológico e perfurocortantes: conhecimento de estudantes de graduação das áreas Biológicas e da Saúde da Universidade Federal de Minas Gerais. *REME*. 2013;17(3):594-600. <http://www.dx.doi.org/10.5935/1415-2762.20130044>
12. Oliveira AC, Goncalves JA. Acidente ocupacional por material perfurocortante entre profissionais de saúde de um centro cirúrgico. *Rev Esc Enferm USP*. 2010;44(2):482-7. <https://doi.org/10.1590/S0080-62342010000200034>
13. Quinto-Mosquera Y, Jaramillo-Pérez LM, Cardona-Arias JA. Conocimientos y prácticas de los trabajadores de un hospital sobre el manejo de residuos hospitalarios, Chocó, Colombia, 2012. *Medicas UIS* [Internet]. 2013 [accessed on Apr 22th. 2018];26(1):9-20. Available in: <http://www.scielo.org.co/pdf/muis/v26n1/v26n1a02.pdf>
14. Cardoso ACM, Figueiredo RM. Situações de risco biológico presentes na assistência de enfermagem nas unidades de saúde da família. *Rev Latino-Am Enferm*. 2010;18(3):73-8.
15. Conselho Regional de Enfermagem (COREN). Norma Regulamentadora (NR) nº 32, de 11 de novembro de 2005. Segurança e Saúde no Trabalho em Serviços de Saúde [Internet]. 2005 [accessed on Oct 8th. 2019. Available in: <https://portal.coren-sp.gov.br/>
16. Rezende LCM, Leite KNS, Santos SR, Monteiro LC, Costa MBS, Santos FX. Acidentes de trabalho e suas repercussões na saúde dos profissionais de enfermagem. *Rev Baiana Enferm*. 2015;29(4):307-17. <http://dx.doi.org/10.18471/rbe.v29i4.13559>
17. Castro RR, Guimarães OS, Lima VML, Lopes CDF, Chaves ES. Management of healthcare waste in a small hospital. *Rev Rede Enferm Nordeste*. 2014;15(5):860-8. <http://doi.org/10.15253/2175-6783.2014000500016>
18. Macedo JI, Ferreira MRMN, Betolini DA, Mendes AA, Takayanagui AMM. Medical waste management in a blood center of Paraná state. *Rev Bras Ciências Ambientais* [Internet]. 2013 [accessed on Oct 8th. 2018];27:55-60. Available in: http://abes-dn.org.br/publicacoes/rbciamb/PDFs/27-07_Materia_5_artigos344.pdf
19. Takayanagui AMM. Gerenciamento de resíduos de serviços de saúde. In: Philippi JA, editor. Saneamento, saúde e ambiente: fundamento para o desenvolvimento sustentável. Barueri: Manole; 2005. p. 323-74.
20. Mendes AA, Veiga TB, Ribeiro TML, André SCS, Macedo JI, Penatti JT, et al. Medical waste in mobile prehospital care. *Rev Bras Enferm*. 2015;68(6):1122-9. <http://dx.doi.org/10.1590/0034-7167.20156806181>
21. Pinter MG, Jardim DP. Segregação e diminuição de resíduos sólidos no bloco cirúrgico: uma experiência bem-sucedida. *Rev SOBECC*. 2014;19(4):226-32. <https://doi.org/10.5327/Z1414-4425201400040009>
22. Lemos MC. Gerenciamento de resíduos de um hospital público do Rio de Janeiro: um estudo sobre o saber/fazer da enfermagem no centro cirúrgico e central de materiais [dissertação]. Rio de Janeiro: Universidade Federal do Estado do Rio de Janeiro; 2012.

PROFESSIONAL SATISFACTION OF NURSES AT A SURGICENTER IN AN EXCELLENCE HOSPITAL

Satisfação profissional de enfermeiros que atuam no bloco cirúrgico de um hospital de excelência

Satisfacción profesional de enfermeras que trabajan en centro quirúrgico de un hospital de excelencia

Lúcia Helena de Almeida Gouveia¹ , Vivian Finotti Ribeiro² , Rachel de Carvalho^{3*} 

ABSTRACT: Objectives: To analyze and compare the professional satisfaction index (PSI) of surgical block (SB) nurses. **Method:** Comparative and quantitative field study that used the PSI in the evaluation of autonomy, interaction, compensation, organizational standards, professional status and work requirements of nurses working in the SB of a private hospital in São Paulo. **Results:** Of the 49 nurses in the sample, 39 worked in the operating room (OR) and post-anesthesia recovery room (PARR) and 10 worked in the material and sterilization center (MSC). Interaction was the most important component, and professional status was the least important. However, professional status obtained the highest level of satisfaction, while work requirements received the lowest. The PSI was 11.04 (low level), considering possible variation between 0.9 and 37.1. There was a significant difference for interaction, with greater satisfaction of OR/PARR nurses compared to MSC nurses. **Conclusion:** Professional satisfaction of SB nurses assessed by PSI was low. It is important to have knowledge of the factors that influence this index, as satisfaction directly interferes in the quality of care and prevents occupational diseases, besides being an indicator of results in the work process.

Keywords: Job satisfaction. Surgicenters. Operating room nursing. Recovery room. Sterilization.

RESUMO: Objetivos: Analisar e comparar o índice de satisfação profissional (ISP) de enfermeiros do bloco cirúrgico (BC). **Método:** Estudo de campo, comparativo e quantitativo que utilizou o ISP na avaliação da autonomia, interação, remuneração, normas organizacionais, status profissional e requisitos do trabalho de enfermeiros atuantes do BC de um hospital privado de São Paulo. **Resultados:** Dos 49 enfermeiros da amostra, 39 atuavam em centro cirúrgico (CC) e sala de recuperação pós-anestésica (SRPA) e 10 no centro de material e esterilização (CME). A interação foi o componente de maior importância, e o status profissional, o de menor; no entanto status profissional obteve o maior nível de satisfação, e requisitos do trabalho, o menor. O ISP foi 11,04 (baixo nível), considerando possível variação entre 0,9 e 37,1. Houve diferença significativa para interação, com maior satisfação dos enfermeiros do CC/SRPA em comparação com os do CME. **Conclusão:** A satisfação profissional de enfermeiros do BC avaliada pelo ISP foi baixa. Conhecer os fatores que influenciam nesse índice é importante, pois a satisfação interfere diretamente na qualidade da assistência, previne doenças ocupacionais, além de ser indicador de resultados no processo de trabalho.

Palavras-chave: Satisfação no emprego. Centros cirúrgicos. Enfermagem de centro cirúrgico. Sala de recuperação. Esterilização.

RESUMEN: Objetivos: analizar y comparar el índice de satisfacción profesional (ISP) de las enfermeras en el quirófano. **Método:** Estudio de campo, comparativo y cuantitativo que utilizó el ISP en la evaluación de autonomía, interacción, remuneración, normas organizacionales, estatus profesional y requisitos de trabajo de enfermeras que trabajan en el BC de un hospital privado en São Paulo. **Resultados:** De las 49 enfermeras de la muestra, 39 trabajaron en el centro quirúrgico (CQ) y la sala de recuperación postanestésica (SRPA) y 10 en el centro de material y esterilización (CME). La interacción fue el componente más importante, y el estado profesional, el más bajo, sin embargo, el estado profesional obtuvo el mayor nivel de satisfacción y los requisitos laborales, el más bajo. El ISP fue 11.04 (nivel bajo), considerando una posible variación entre 0.9 y 37.1. Hubo una diferencia significativa en la interacción, con una mayor satisfacción de las enfermeras de CQ/SRPA en comparación con las de CME. **Conclusión:** La satisfacción profesional de las enfermeras de quirófano evaluadas por el ISP fue baja. Es importante conocer los factores que influyen en este índice, ya que la satisfacción interfiere directamente con la calidad de la atención, previene enfermedades ocupacionales, además de ser un indicador de resultados en el proceso de trabajo.

Palabras clave: Satisfacción en el trabajo. Centros quirúrgicos. Enfermería de quirófano. Sala de recuperación. Esterilización.

¹Master in Nursing from Faculdade Israelita de Ciências da Saúde Albert Einstein (FICSAE) – São Paulo (SP), Brazil.

²Nurse from Universidade Federal de Uberlândia (UFU); postdoctoral fellow in Health Sciences from Universidade Federal do Estado de São Paulo (UNIFESP) – São Paulo (SP), Brazil.

³Nurse from Universidade de São Paulo (USP) de Ribeirão Preto; master and postdoctoral fellow in Nursing from USP. Professor of undergraduate and graduate courses at FICSAE – São Paulo (SP), Brazil.

*Corresponding author: prof.rachelcarvalho@gmail.com

Received: 10/11/2019 – Approved: 1/16/2020

DOI: 10.5327/Z1414-4425202000010006

INTRODUCTION

Professional satisfaction should be understood as a measure of workers' quality of life, since a satisfied person is more productive. It stems from the relationship between activities at work and what the person aspires to receive, and goes beyond material and financial rewards, being determined by a set of stimuli¹. It is a pleasant state that comes from the result of the worker's evaluation of their actions and what they receive, meeting important life goals². Professional satisfaction is related to low staff turnover³.

Work has been studied throughout history, since it is essential and complementary to the life of human beings, providing them with social activity and *status*. In this sense, it is not exclusively a way of meeting basic needs. It is also a source of identity, self-esteem, expansion of potentialities, and a way to feel like an active participant in society's undertakings⁴.

In health, especially in the hospital field, the work process is stressful and exhausting, but it is also developed through a very close relationship with the patient, which can evoke feelings of joy, satisfaction and pleasure to workers, without which the professional practice would be virtually impossible.

For nursing, the concept of work comprises knowledge of the practice resulting from aspects that are particular to the type of care and management taking place within a hospital, in which activities go uninterrupted, divided into relay shifts, in order to guarantee the provision of care⁵.

The basis for the nurse's work are the human relations with the patient and their family and/or the multidisciplinary team. The practice of nurses in a surgical block (SB), which includes the operating room (OR), post-anesthesia recovery room (PARR) and material and sterilization center (MSC) areas, goes beyond performing technical-scientific procedures, because the satisfaction of these professionals may change according to the working conditions. There are many factors that influence the triggering of job satisfaction. Therefore, staying motivated is imperative for the quality of care provided to patients by the nursing staff⁶.

In the context of the practice of nurses in the SB, a survey was conducted in a teaching hospital whose results showed general satisfaction of the 17 nurses with professional activity and work recognition, but there was dissatisfaction with physical and psychological stress, location of the company, benefits, *status* of professional role and personal development⁷.

Thus, the importance of studying the factors causing satisfaction and dissatisfaction in the work of perioperative nurses is justified.

OBJECTIVES

- To analyze the professional satisfaction index of nurses working in the surgical block of a private hospital in São Paulo;
- To compare the professional satisfaction index of nurses working in the operating room and in the post-anesthesia recovery room to that of nurses working in the material and sterilization center.

METHOD

Descriptive-exploratory, quantitative and comparative study carried out in a private large excellence hospital in São Paulo, recognized by national and international organizations. Subjects were 49 nurses of the SB, divided according to areas of expertise: 39 from the OR and PARR and 10 from the MSC. The OR and PARR professionals in this study were jointly analyzed for acting in both areas, according to the scale of work. Therefore, they are the same professionals, and all are exposed to the same variables.

Data collection was carried out between December 2015 and February 2016, by means of an instrument to characterize professionals and the professional satisfaction index (PSI), created by Paula Stamps (in 1997) and translated and validated into Portuguese by Margarete Lino⁸. It is a closed, self-explanatory questionnaire with 44 questions that determine professional satisfaction, based on six components: autonomy, interaction, remuneration, organizational standards, professional *status* and work requirements. The components are presented in a model of discrepancy between the expectations and rewards perceived by the worker, which is measured by the importance and level of satisfaction given to each component by the nurse.

The PSI consists of two parts:

- Part A (pairwise comparisons): measures the importance given to each component. It lists six components that describe how people feel about their work. After reading the definition of each one of the components, professionals should choose the one they think is the most important among two, from a list of 15 combinations. For analysis, a frequency matrix that points out how many times each component is chosen in relation to the others is created. The more times the component is chosen, the more important it is for the participant;

- Part B (attitude scale): identifies professional satisfaction regarding the six components assessed in Part A by means of a seven-point Likert type scale, made up of declarative items expressing the subject's degree of agreement or disagreement. The direction of the scale is positive, and higher scores are given for responses that indicate a higher level of satisfaction. For items with positive wording, the highest score (7) is given for the answer "I completely agree" and the lowest (1) for "I completely disagree". For items with negative wording, the highest score (7) is given for "I completely disagree" and the lowest (1) for "I completely agree".

For the analysis of part A of the PSI, the proportions were converted to standard deviations, based on the normal distribution of responses, generating a Z-matrix. For each of the components, the average of the Z-scores was calculated and a correction factor of 2.5 was added (to eliminate negative Z-scores), resulting in the weighting coefficient of the component, which represents the importance attributed to each of the six components on the scale.

For part B of the PSI, the total component score was calculated by adding the scores of its items and dividing by the number of nurses. The total score of the scale was calculated by adding the total scores of the components, and its value can vary between 44 and 308. The average component score was calculated by dividing the total component score by the number of items comprising it. The average score of the scale was calculated using the average scores of the components, and its value is between 1 and 7.

To determine the PSI of each component, the adjusted score of the component was calculated by multiplying the weighting coefficient of the component (part A) by the average score of the component (part B). The PSI was calculated by averaging the adjusted scores of the components. The values of the adjusted scores of the components are obtained with weighted averages between the importance given by nurses to the components of the scale and their perception of professional satisfaction regarding them⁹. These scores represent the actual level of professional satisfaction and range from 0.9 to 37.1.

Statistically, categorical variables are described by absolute and relative frequencies, and numerical variables by summarized measures, such as mean and standard deviation (SD) or median and quartiles, besides minimum and maximum values. The Shapiro-Wilk normality test was applied to the

distribution of the adjusted scores of the components and the PSI. To compare the groups of SB nurses (OR/PARR and MSC) in relation to the adjusted scores of the components and the PSI, Student's *t* test was applied. The analyses were carried out with the Statistical Package for the Social Sciences (SPSS) software, considering a 5% significance level.

The research followed the recommendations of Resolution 466/2012 of the National Health Council, and was approved by the Research Ethics Committee of the institution, via Plataforma Brasil (Certificado de Apresentação para Apreciação Ética — CAAE 50921115.0.0000.0071/opinion 1.335.637).

RESULTS

Most of the 49 nurses participating in the survey were female (79.6%), lived with a partner (79.6%), were aged between 25 and 56 years, average of 37.6 years (SD=8.0) and worked in the OR and PARR section (39/79.6%).

As for the level of education, more than half had concluded a post-graduation course (69.4%), mainly *lato sensu*, with courses related to management and Master of Business Administration (MBA) in hospital administration (34.7%). The length of experience in nursing varied between two and 30 years, and half of the professionals had, on average, eight years of experience in nursing (Q1=5 years and Q3=12 years).

Table 1 shows data from the components related to professional satisfaction.

Regarding the satisfaction with the autonomy component, most items were evaluated positively. The nurses agree that they have enough participation in patient care planning (79.6%) and freedom to make important decisions, with the support of the management (71.4%). They disagree that the management makes all decisions, leaving them with no direct control over their own work (73.5%), and do not feel that they are supervised more than necessary (65.3%).

Regarding satisfaction with the interaction component, most items were evaluated positively, except for the desire for doctors to show more respect for the skills and knowledge of the nursing team (85.7%). The nurses agree that everyone is willing and helpful (87.8%), that there is teamwork and cooperation (75.5%), and disagree that there is a lot of distinction between positions (89.8%).

As for the professional *status* component, nurses consider their work important. However, regarding external recognition, they agree that nursing is not widely recognized

Table 1. Responses provided by the 49 nurses in the surgical block (SB) to the items on the professional satisfaction index (PSI) attitude scale.

Autonomy	Agree N (%)	Neutral or undecided N (%)	Disagree N (%)
7. I feel I am supervised more directly ("closely") than necessary**	6 (12.2)	11 (22.4)	32 (65.3)
13. I feel I have enough participation in the planning of care for each of my patients*	39 (79.6)	1 (2.0)	9 (18.4)
17. I have many responsibilities and little authority**	22 (44.9)	5 (10.2)	22 (44.9)
20. In my service, my manager makes all the decisions. I have little direct control over my own work**	8 (16.3)	5 (10.2)	36 (73.5)
26. A great deal of independence is allowed, if not required by me*	20 (40.8)	23 (46.9)	6 (12.2)
30. Sometimes I feel frustrated because all my activities seem to be pre-programmed for me**.	11 (22.4)	11 (22.4)	27 (55.1)
31. In my job, sometimes I must do things that go against my better professional judgment**	16 (32.7)	5 (10.2)	28 (57.1)
43. In my work, I am free to make important decisions that I consider appropriate, and I count on my manager to support me*.	35 (71.4)	5 (10.2)	9 (18.4)
Interaction			
3. In my service, the nursing staff is available and helps when things are hectic*	43 (87.8)	0 (0.0)	6 (12.2)
6. In my unit, doctors usually cooperate with the nursing staff*	21 (42.9)	11 (22.4)	17 (34.7)
10. In my unit, it's hard for newcomer nurses to feel comfortable**	13 (26.5)	5 (10.2)	31 (63.3)
16. In my service, there is much teamwork and cooperation between the various levels of the nursing staff*	37 (75.5)	5 (10.2)	7 (14.3)
19. In my unit, there's a lot of teamwork between nurses and doctors*	28 (57.1)	7 (14.3)	14 (28.6)
23. In my service, the nursing staff is not as friendly or extroverted as I would like**	12 (24.5)	6 (12.2)	31 (63.3)
28. In my unit, there are many distinctions in positions: nurses rarely talk to those with less experience or different types of educational backgrounds**	2 (4.1)	3 (6.1)	44 (89.8)
35. I would like the doctors here to show more respect for the nursing staff's skills and knowledge**	42 (85.7)	5 (10.2)	2 (4.1)
37. The doctors at this hospital generally understand and appreciate what the nursing staff does*	27 (55.1)	6 (12.2)	16 (32.7)
39. The doctors at this hospital underestimate the nursing staff**	27 (55.1)	10 (20.4)	12 (24.5)
Professional Status			
2. Nursing is not widely recognized as an important profession**	30 (61.2)	2 (4.1)	17 (34.7)
9. Most people recognize the importance of nursing care to hospitalized patients*	37 (75.5)	2 (4.1)	10 (20.4)
11. There is no doubt in my mind: what I do in my work is important*	47 (95.9)	0 (0.0)	02 (4.1)
27. What I do in my job adds nothing significant**	0 (0.0)	1 (2.0)	48 (98.0)
34. I feel proud when I talk to other people about what I do in my work*	47 (95.9)	2 (4.1)	00 (0.0)
38. If I had to decide everything again, I'd still get into nursing*	40 (81.6)	3 (6.1)	6 (12.2)
41. My work, in particular, does not require much skill or specific knowledge**	1 (2.0)	0 (0.0)	48 (98.0)

Continue...

Table 1. Continuation.

Autonomy	Agree N (%)	Neutral or undecided N (%)	Disagree N (%)
Work Requirements			
4. In this hospital, the nursing staff has a lot of administrative and paperwork-related tasks**	43 (87.8)	2 (4.1)	4 (8.2)
15. I think I could do a better job if I didn't have so much to do all the time**	30 (61.2)	7 (14.3)	12 (24.5)
22. I am satisfied with the types of activity I perform in my work*	48 (98.0)	1 (2.0)	0 (0.0)
24. I have enough time and opportunities to discuss the issues of patient care with other members of the nursing staff*	12 (24.5)	9 (18.4)	28 (57.1)
29. I have enough time for direct patient care*	21 (42.9)	6 (12.2)	22 (44.9)
36. I could provide much better care if I had more time with each patient**	41 (83.7)	5 (10.2)	3 (6.1)
Organizational rules			
5. At my hospital, the nursing staff has enough control over the scheduling of their own work shift*	28 (57.1)	3 (6.1)	18 (36.7)
12. There is a big gap between the management of this hospital and the daily problems of the nursing service**	21 (42.9)	13 (26.5)	15 (30.6)
18. In this hospital, there are not enough promotion opportunities for the nursing staff**	11 (22.4)	4 (8.2)	34 (69.4)
25. There are a lot of opportunities for the nursing team to participate in the administrative decision-making process*	21 (42.9)	9 (18.4)	19 (38.8)
33. In this hospital, administrative decisions greatly interfere with patient care**	24 (49.0)	13 (26.5)	12 (24.5)
40. I have all the power I want in the planning of this hospital's and my unit's standards and procedures*	17 (34.7)	5 (10.2)	27 (55.1)
42. Nursing manager usually consults with staff on daily problems and procedures*	30 (61.2)	4 (8.2)	15 (30.6)
Compensation			
1. My current salary is satisfactory*	34 (69.4)	3 (6.1)	12 (24.5)
8. I have the impression that a large part of the nursing staff at this hospital is dissatisfied with their salary**	18 (36.7)	7 (14.3)	24 (49.0)
14. Considering what is expected from the nursing staff, the salary we receive in this hospital is reasonable*	33 (67.3)	4 (8.2)	12 (24.5)
21. In this hospital, the current rate of salary readjustment of nursing staff is not satisfactory**	22 (44.9)	12 (24.5)	15 (30.6)
32. From what I hear about the nursing staff of other hospitals, our pay is fair in this hospital*	32 (65.3)	7 (14.3)	10 (20.4)
44. In this hospital, a salary readjustment is required for nursing staff##	33 (67.3)	10 (20.4)	6 (12.2)

*Positive statements; **negative statements.

(61.2%), although they identify that most people understand the importance of assistance to hospitalized patients (75.5%). Nurses have no doubt that their work is important (95.9%), they feel proud when they talk to other people about their work (95.9%) and, if they had to choose a career again, they would choose nursing (81.6%). They disagree that their work does not require specific skills or knowledge (98.0%).

In the case of satisfaction with work requirements, most items were evaluated negatively. The nurses agree that they have a lot of administrative and paperwork tasks (87.8%) and that they could work better if they did not have so much to do (61.2%) and if they had more time with each patient (83.7%). On the other hand, they are satisfied with the activities they perform (98.0%).

Satisfaction in the organizational standards component showed more homogeneous distribution. Two items presented a higher prevalence of responses: nurses disagree that there are no opportunities for staff promotion in the hospital (69.4%) and agree that management consults the team on problems and procedures (61.2%).

Regarding the satisfaction with the remuneration component, most nurses agree that the salary is satisfactory (69.4%), considering what is expected from the nursing function (67.3%), and that remuneration is fair in comparison with other hospitals (65.3%), but most say that a salary adjustment is necessary (67.3%).

Job satisfaction index: part A — results of paired comparisons of factors

By calculating the component weighting coefficient, the values of each component were obtained, and the higher the coefficient, the greater the importance attributed by nurses. The most

important component was interaction (2.92), and the least important was professional *status* (1.82). The autonomy, remuneration, organizational standards and work requirements components obtained coefficients of 2.84; 2.61; 2.43 and 2.39, respectively.

Job satisfaction index: part B — Attitude scale results

Table 2 describes the total and average scores of the components and the professional satisfaction scale. The highest average score among the components was professional *status* (5.75), and the lowest in satisfaction was work requirements (3.49). The total score was 197.67, and the average score was 4.49, indicating a trend towards low professional satisfaction.

Job satisfaction index: parts A and B

Table 3 shows the scores calculated based on the responses provided by nurses in PSI pairwise comparisons (Part A) and PSI attitude scale (Part B).

Table 2. Total and average scores of the scale and components of the Professional Satisfaction Index (PSI) by order of importance in the sample of nurses (n=49).

Component	Number of items	Range of scores	Total score of the component	Average score of the component
Professional <i>status</i>	6	6 to 42	40.22	5.75
Autonomy	7	7 to 49	38.14	4.77
Interaction	8	8 to 56	44.12	4.41
Compensation	7	7 to 49	25.41	4.23
Organizational rules	6	6 to 42	28.82	4.12
Work requirements	10	10 to 70	20.96	3.49
			Total score of the scale	Average score of the scale
Scale	44	44 to 308	197.67	4.49

Table 3. Calculated scores for the Professional Satisfaction Index (PSI) in the sample of nurses (n=49).

Component	Weighting coefficient of the component (Part A)	Average score of the component (Part B)	Adjusted score of the component
Autonomy	2.836	4.77	13.52
Interaction	2.924	4.41	12.90
Professional <i>status</i>	1.817	5.75	10.44
Work requirements	2.385	3.49	8.33
Organizational rules	2.427	4.12	9.99
Compensation	2.611	4.23	11.06
Scale			PSI
			11.04

For all PSI components, the adjusted scores were below 13.52, and the general PSI was 11.04. Considering the overall PSI components, the result was low professional satisfaction of the participating nurses.

Comparison of job satisfaction index by sections of the surgical block

There was no evidence of difference between the mean scores adjusted for the remuneration ($p=0.244$), professional *status* ($p=0.663$), autonomy ($p=0.334$), organizational standards ($p=0.433$) and work requirements ($p=0.161$) components and between the means of PSI ($p=0.850$) for nurses working in OR and PARR compared to those working in MSC, but there is evidence of difference between the means of the adjusted score of the interaction component ($p=0.003$). The average score of OR and PARR nurses is higher than that of MSC nurses (difference=2.25; 95% confidence interval — 95%CI 0.79–3.71; $p=0.003$), indicating that OR and PARR nurses are more satisfied with the interaction component than MSC nurses.

DISCUSSION

The objective of this investigation was to understand professional satisfaction in the hospital environment, aiming the study at nurses who work in the SB. The profile of the nurses in the sample is of adult and young women who live with their partners, have concluded postgraduate courses and have experience in the field.

Autonomy was one of the most important components and with highest professional satisfaction. The items in this component indicate that nurses feel confident in performing their duties and making decisions, supported by management. When the autonomy component is considered important and has good satisfaction, a good prognosis of organizational climate, productivity and quality of assistance is obtained¹. Autonomy can be perceived as a relevant component in the development of the profession and in achieving satisfactory results, since it contributes to the professional feeling competent to make decisions with freedom, independence and common sense¹⁰.

The interaction component was evaluated as the most important and the third in satisfaction. Responses suggest that the item that influenced nurses' dissatisfaction was the desire for doctors to show more respect for the nursing team's skills

and knowledge. The professional relationship between doctors and nurses may present dissatisfactions due to the hierarchical position in which doctors are placed in society. In a field such as the SB, where technical-scientific knowledge is well marked, with clear specificities between medical and nursing knowledge, this hierarchical relationship may become more evident and cause discomfort among professionals if there is no recognition and respect for each other's knowledge. Nurses who work in this field have a very close relationship with doctors-surgeons and anesthesiologists, which can be one of the factors that generate conflicts, differences, dissatisfactions and stress. A study with nurses in an OR identified interpersonal relationships and communication among professionals as the greatest difficulties they faced¹¹.

In other studies, conducted with nurses of Family Health Units (FHU)¹² who worked in home care¹³, teamwork was identified as one of the main reasons for professional satisfaction. In contexts where nurses work primarily as a team, interaction is an important component of job satisfaction. The relevance given to the interaction component reveals that nurses value the harmony of teamwork, mutual help and respect from doctors and co-workers. The dynamics of the SB requires a high degree of interaction and teamwork. Therefore, it can be inferred that nurses value interaction, cooperation and teamwork, which is reflected in their attitudes in practice, contributing to a work environment where they are satisfied with the results of these actions. Interaction and autonomy were also the components that presented the highest scores in other studies with nurses working in the hematology and hemotherapy fields¹³.

The professional *status* component was evaluated as less important and the one of greater professional satisfaction for the nurses of the SB. This is because nurses agree that nursing is not widely recognized as an important profession (61.2%). Still, internally, they recognize the importance of the profession, are proud of it and value their practice as holders of specific skills. This result was also found with nurses working in home care¹³. Historically, the nursing profession faces difficulties regarding recognition and appreciation, as well as low pay, which may reflect on the little importance that nurses gives to professional *status*, regardless of the work context¹³. In contrast, a survey of OR nurses in a public hospital indicated dissatisfaction related to their function's *status*⁷.

The work requirements component is the penultimate in order of importance and the last in professional satisfaction. The nurses do not assess satisfactorily the type of work they perform, when associated with administrative and

paperwork-related tasks, the volume of work and the time they must perform all tasks with quality and timely. In this sense, staff sizing can impact not only on the quality of care, but also on professional satisfaction and the level of work-related stress. In a prospective study carried out in Sweden¹⁴, reduction of personnel, high demands, low autonomy and lack of support at work were identified as important predictors for work overload. In nursing, dissatisfaction at work is more often associated with the elements the institution offers the worker in relation to his expectations^{7,15}.

The organizational standards and remuneration components remained in intermediate positions in terms of importance and satisfaction. Both, in general terms, refer to the hospital to which the nurses are related, which shows that in the private health institution in which these nurses operate, there are favorable conditions for good work performance. Nevertheless, there are points for improvement, such as remuneration, where most agree that a salary readjustment for the nursing staff is necessary.

For all PSI components, the adjusted scores and the overall PSI, the result was low professional satisfaction of nurses participating in the survey and working in SB, with no statistically significant difference in any of the components between the OR and PARR nurses and those of the MSC. There was an exception in the difference between the means of the adjusted score of the interaction component ($p=0.003$), demonstrating that the nurses of the OR and PARR are more satisfied than the nurses of the MSC. This result can be understood by the peculiarity of MSC, a closed section, isolated from the others due to the work process related to the handling of sterile materials, which requires lower circulation of people¹⁶.

A survey of 45 professionals from the MSC nursing team at a private hospital identified that all professionals believe that their work directly interferes with the quality of care provided to the patient. The nurses highlighted teamwork, respect, commitment, interaction, leadership and professional development as factors that facilitate their work. On the other

hand, the lack of initiative in decision making and planning, as well as the lack of materials in the area, hampers its performance and causes stress in the workplace¹⁷.

Thus, satisfaction can be related to the feelings and determined by the perceptions and needs of professionals, according to the importance they give to each of the components of the PSI. Satisfaction and dissatisfaction are two extremes of an ongoing process, which acts by influencing a worker's health and quality of life, as well as their professional performance¹⁵.

It is believed that the subjectivity and the involvement of the nurses' feelings in answering the questionnaire may have sensitized them regarding their job satisfaction.

The limitation of the study lies in the fact that it was conducted in only one private institution. Relevant results can be achieved if there are comparisons between nurses from more than one institution and/or between public and private institutions.

CONCLUSION

The results led to the conclusion that the professional satisfaction of the nurses participating in the study, who worked in the SB of a private hospital evaluated by the PSI, was low. As for the components of importance, interaction was the most relevant, and professional *status* was the least relevant. Regarding professional satisfaction, nurses were more satisfied with professional *status* and less satisfied with work requirements.

When comparing the level of professional satisfaction by the area of the SB nurses (OR and PARR with MSC), no significant difference was found in the overall analysis of the PSI or each component, except in the interaction component, where the MSC nurses had lower satisfaction than the OR and PARR nurses.

It is important to know the factors that influence professional satisfaction, because satisfaction directly interferes in the quality of care and prevents occupational diseases, besides being an indicator of results in the work process that involves the activities of nurses.

REFERENCES

1. Siqueira VT, Kurcgant P. Satisfação no trabalho: indicador de qualidade no gerenciamento de recursos humanos em enfermagem. *Rev Esc Enferm USP*. 2012;46(1):151-7. <http://dx.doi.org/10.1590/S0080-62342012000100021>
2. Chaves LD, Ramos LH, Figueiredo EN. Satisfação profissional de enfermeiros do trabalho no Brasil. *Acta Paul Enferm*. 2011;24(4):507-13. <http://dx.doi.org/10.1590/S0103-21002011000400010>

3. Korompeli A, Muurlink O, Tzavara C, Velonakis E, Lemonidou C, Sourtzi P. Influence of shiftwork on greek nursing personnel. *Saf Health Work* [Internet]. 2014 [acessado em 1º ago. 2018];5:73-9. Disponível em: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4147231/pdf/main.pdf>. <http://dx.doi.org/10.1016/j.shaw.2014.03.003>
4. Navarro VL, Padilha V. Dilemas do trabalho no capitalismo contemporâneo. *Psicol Soc.* 2007;19(N. Esp.):14-20. <http://dx.doi.org/10.1590/S0102-71822007000400004>
5. Veiga KC, Fernandes JD, Paiva MS. Análise fatorial de correspondência das representações sociais sobre o trabalho noturno da enfermeira. *Rev Bras Enferm.* 2013;66(1):18-24. <http://dx.doi.org/10.1590/S0034-71672013000100003>
6. Barbosa LR. Relações entre liderança, motivação e qualidade na assistência de enfermagem: revisão integrativa da literatura [dissertação]. Ribeirão Preto: Universidade de São Paulo, Escola de Enfermagem de Ribeirão Preto; 2007. 139 p.
7. Ferreira EM, Possari JF, Moderno AMB. Fatores de satisfação e profissional do enfermeiro d de um hospital universitário insatisfação e centro cirúrgico de grande porte. *Rev SOBECC.* 2006;11(2):15-23.
8. Lino MM. Satisfação profissional entre enfermeiras de UTI [dissertação]. São Paulo: Universidade de São Paulo, Escola de Enfermagem; 1999. 236 p.
9. Campos RM. Satisfação da equipe de enfermagem do serviço de atendimento móvel às urgências (SAMU) no ambiente de trabalho [dissertação]. Natal: Universidade Federal do Rio Grande do Norte, Centro de Ciência da Saúde; 2005. 193 p.
10. Monteiro AL, dos Santos AD, de Macedo IP, Gurgel PK, Cavalcante JM. A expressão da autonomia do enfermeiro no acompanhamento do crescimento e desenvolvimento da criança. *Rev Enferm UERJ.* 2011;19(3):426-31.
11. Stumm EM, Macalai RT, Kirchner RM. Dificuldades enfrentadas por enfermeiros em um centro cirúrgico. *Texto Contexto Enferm.* 2006;15(3):464-71. <http://dx.doi.org/10.1590/S0104-07072006000300011>
12. Lima L, Pires DEP, Forte ECN, Medeiros F. Satisfação e insatisfação no trabalho de profissionais de saúde da atenção básica. *Rev Esc Anna Nery.* 2014;18(1):17-24. <http://dx.doi.org/10.5935/1414-8145.20140003>
13. Paiva FF, de Mattia Rocha A, Cardoso LD. Satisfação profissional entre enfermeiros que atuam na assistência domiciliar. *Rev Esc Enferm USP.* 2011;45(6):1452-8. <http://dx.doi.org/10.1590/S0080-62342011000600025>
14. Hanson LLM, Theorell T, Oxenstierna G, Hyde M, Westerlund H. Demand, control and social climate as predictors of emotional exhaustion symptoms in working Swedish men and women. *Scand J Public Health.* 2008;36(7):737-43. <https://doi.org/10.1177/1403494808090164>
15. Sartoreto IS, Kurcgant P. Satisfação e insatisfação no trabalho do enfermeiro. *Rev Bras Ciênc Saúde.* 2017;21(2):181-8. <https://doi.org/10.4034/RBCS.2017.21.02.12>
16. Lopes DFM, Silva A, Garanhani ML, Merighi MAB. Ser trabalhador de enfermagem da Unidade de Centro de Material: uma abordagem fenomenológica. *Rev Esc Enferm USP.* 2007;41(4):675-82. <http://dx.doi.org/10.1590/S0080-62342007000400019>
17. Silva Florêncio ACU, Carvalho R, Sousa Barbosa G. O impacto do trabalho do centro de materiais na qualidade da assistência. *Rev SOBECC.* 2011;16(1):31-9.

EDUCATIONAL STRATEGY WITH NURSING PROFESSIONALS ON MALIGNANT HYPERTERMIA IN A CARDIOVASCULAR SURGICAL CENTER

Estratégia educativa com profissionais de enfermagem sobre hipertermia maligna em um centro cirúrgico cardiovascular

Estrategia educativa con profesionales de enfermería en hipertermia maligna en un centro quirúrgico cardiovascular

Elisabete Silvana de Oliveira Sene^{1*} , Tatiana Garcia Viana² , Keren Agra Catunda Bettero Valle³ , Eliana Bittar⁴ 

ABSTRACT: Objectives: To evaluate the knowledge of the nursing staff of the surgical center (SC) about malignant hyperthermia (MH), before and after lecture, and to implant a kit for the treatment of MH with anesthesiologists. **Method:** Quasi-experimental before and after study. Data collection with 43 professionals (three nurses, seven technicians and 33 assistants) from the SC of a cardiology hospital in São Paulo. Five questions were applied before and after lecture, and McNemar and Fisher's exact tests were used. After analyzing the literature and industry materials and meeting with the medical team, a treatment kit was prepared. **Results:** There was a significant difference ($p < 0.05$) regarding the team's knowledge about MH; After class, progress was seen in the three categories (assistants 89.42%, technicians 90%, and nurses 100%). The questions with percentage above 90% after class were: definition of MH, triggering agents, and treatment. A treatment kit was developed and implemented. **Conclusion:** The knowledge of the nursing staff about MH before and after the lecture was evaluated, and a treatment kit was implemented. The knowledge of the team was satisfactory after the taught class. **Keywords:** Nursing, team. Malignant hyperthermia. Operating room nursing. Perioperative nursing.

RESUMO: Objetivos: Avaliar o conhecimento da equipe de enfermagem do centro cirúrgico (CC) sobre hipertermia maligna (HM), antes e depois de aula expositiva, e implantar *kit* para tratamento da HM com os anestesiológicos. **Método:** Estudo quase experimental do tipo antes e depois. Coleta de dados com 43 profissionais (três enfermeiros, sete técnicos e 33 auxiliares) do CC de um hospital de cardiologia de São Paulo. Aplicaram-se cinco questões antes e depois de aula expositiva, e utilizaram-se teste exato de Fisher e teste de McNemar. Após análise da literatura e dos materiais do setor e reunião com equipe médica, elaborou-se um *kit* de tratamento. **Resultados:** Houve diferença significativa ($p < 0,05$) em relação ao conhecimento da equipe sobre HM; após a aula, viu-se progresso nas três categorias (auxiliares 89,42%, técnicos 90% e enfermeiros 100%). As questões com porcentagem acima de 90%, após a aula, foram: definição de HM, agentes desencadeantes e tratamento. Foi elaborado e implantado um *kit* de tratamento. **Conclusão:** Avaliou-se o conhecimento da equipe de enfermagem sobre HM, antes e depois da aula expositiva, e implantou-se *kit* de tratamento. O conhecimento da equipe foi satisfatório após a aula ministrada. **Palavras-chave:** Equipe de enfermagem. Hipertermia maligna. Enfermagem de centro cirúrgico. Enfermagem perioperatória.

RESUMEN: Objetivos: Evaluar el conocimiento del personal de enfermería del quirófano (CQ) sobre la hipertermia maligna (HM), antes y después de la conferencia, e implantar un *kit* para el tratamiento de HM con anesestesiólogos. **Método:** Cuasi-experimental antes y después del estudio. Recopilación de datos con 43 profesionales (tres enfermeras, siete técnicos y 33 asistentes) del CQ de un hospital de cardiología en São Paulo. Se aplicaron cinco preguntas

¹Nurse; specialist in Surgical Center, Anesthetic Recovery and Material and Sterilization Center (Centro Cirúrgico, Recuperação Anestésica e Centro de Materiais e Esterilização – CC/RA/CME) by Faculdade Israelita de Ciências em Saúde Albert Einstein (FICSAE) – São Paulo (SP), Brazil.

²Nurse; specialist in Cardiology by Universidade Federal de São Paulo (UNIFESP) – São Paulo (SP), Brazil.

³Nurse; specialist in CC/RA/CME by FICSAE – São Paulo (SP), Brazil.

⁴Nurse; PhD in Management Practices in Nursing and Health by Universidade de São Paulo (USP). Technical Director of the Health Service of Instituto Dante Pazzanese de Cardiologia – São Paulo (SP), Brazil.

*Corresponding author: bete_sene@hotmail.com

Received: 04/19/2019 – Approved: 11/24/2019

DOI: 10.5327/Z1414-4425202000010007

antes y después de la conferencia, y se utilizaron la prueba exacta de Fisher y la prueba de McNemar. Después de analizar la literatura y los materiales de la industria y de reunirse con el equipo médico, se preparó un *kit* de tratamiento. **Resultados:** Hubo una diferencia significativa ($p < 0.05$) con respecto al conocimiento del equipo sobre MH; Después de la clase, se observó progreso en las tres categorías (auxiliares 89.42%, técnicos 90% y enfermeras 100%). Las preguntas con un porcentaje superior al 90% después de la clase fueron: definición de MH, agentes desencadenantes y tratamiento. Se desarrolló e implementó un *kit* de tratamiento. **Conclusión:** Se evaluó el conocimiento del personal de enfermería sobre MH antes y después de la conferencia, y se implementó un *kit* de tratamiento. El conocimiento del equipo fue satisfactorio después de la clase impartida.

Palabras clave: Grupo de enfermería. Hipertermia maligna. Enfermería de quirófano. Enfermería perioperatoria.

INTRODUCTION

Malignant hyperthermia (MH) is a disease manifested as a hypermetabolic crisis by exposing an individual to inhaled anesthetic agents such as those of the halogenated group or succinylcholine. Reactions occur most often in men, and clinical manifestations vary. The most consistent signs are hypercarbia, sinus tachycardia, generalized or masseter muscle rigidity¹. In a MH crisis, mutation of the ryanodine receptor gene and exposure to halogenates and depolarizing muscle relaxants lead to excessive calcium release in the muscle fiber cytoplasm, leading to a set of biochemical events resulting in clinical and laboratory signs of MH. Excessive heat production occurs from rigid skeletal muscles, anaerobic glycolysis, increased carbon dioxide and lactic acid, adenosine triphosphate (ATP) hydrolysis, and muscle fiber disruption². MH was described in the 1960s and occurs in 1:10,000 general anesthesia in children and 1:50,000 general anesthesia in adults, thus affecting mainly children³.

In Brazil, the Hotline service has been in existence since 1991 to monitor by telephone (+55-11-5575-9873) the progression of MH episodes and provide assistance. An investigation of its activity was published in 2009, when 77 annual crises were estimated⁴. In an analysis of the notification forms of patients with personal or family suspicion of MH between 1997 and 2010, susceptibility was confirmed in 79.4% of the 92 relatives investigated with an *in vitro* muscle contracture test⁵.

MH is an anesthetic emergency and there are protocols with explicit functions for each team member, which should be standardized and oriented to resolute care. Its treatment consists in recognizing and removing the triggers and administering Dantrolene. The occurrence of this syndrome intraoperatively characterizes emergency situation and requires immediate treatment⁶.

In 2004, the World Health Organization (WHO) launched the World Alliance on Patient Safety to reduce harm and to set safety standards⁷.

Therefore, the knowledge of the nursing staff about the pathophysiology, complications, and form of care in the MH crisis is fundamental to patient care with competence and quality⁸.

Thus, upon questioning about the knowledge of the nursing staff on MH, it was decided to conduct an educational activity in service and explain the theme, highlighting the actions of the team. The lecture was chosen because of its potential to strengthen teaching, based on the understanding that methodological strategies should develop knowledge and skills and stick to the patient in a state of urgency and emergency⁹.

Items for the treatment of MH crisis by the Malignant Hyperthermia Association of the United States (MHAUS) were listed¹⁰. In addition, the American Association of Nurse Anesthetists (AANA) states that the institution should adopt a MH treatment kit inspection process, with due regard to the expiration date of the items¹¹. Therefore, it is believed that the design and implementation of a MH kit will optimize treatment. This kit is a crucial tool for the treatment of patients facing a MH crisis, facilitating the immediate treatment of the occurrence by the health professionals involved.

OBJECTIVES

- To evaluate the knowledge of the operating room nursing staff about MH, before and after lecture;
- To implement a standardized kit for treating malignant hyperthermia with anesthesiologists.

METHOD

This is a quasi-experimental before and after study, in which a systematic search was performed on the knowledge of

nurses, technicians and nursing assistants working in the surgical center (SC) of a reference teaching hospital in the city of São Paulo.

The institution has three buildings, with a total of 378 beds, and is considered a large hospital. The research data collection site has nine operating rooms, one of them being hybrid, and four beds for anesthetic recovery (AR). 3,725 surgical procedures were performed in 2016.

The nursing staff consists of five nurses, seven technicians and 34 nursing assistants. Of this amount, two nurses were excluded because they were principal researchers. One helper has been deleted due to work leave. Based on the sample calculation with alpha error of 0.05%, from the 46 professionals, 43 (93% of the active team) were included in the study.

The inclusion criterion included nursing professionals working directly in the care provided in the SC. Professionals who did not wish to participate and those who were on vacation, sick leave, maternity leave or bonus leave during data collection were excluded.

The project received approval from the Research Ethics Committee of the host institution via Plataforma Brasil Ethical Appreciation Presentation Certificate (CAAE) No. 55069316.6.0000.5462, on January 31st, 2016. Participants signed the Informed Consent Form prior to data collection, respecting the ethical precepts of Resolution No. 466/2012 of the National Health Council.

Data collection took place between September and October 2016, using an instrument built by the authors, based on the practices recommended by the Association of periOperative Registered Nurses (AORN)¹². The instrument was validated by two SC nurses and subjected to reliability analysis using Cronbach's alpha test. It covered the variables of the sociodemographic profile (age, gender, time of professional formation and time working in SC) and contemplated five questions with five objective alternatives each, of which only one was the correct one.

The questions involved knowledge about the etiology of the disease, triggering factors, crisis suggestive signs, medication for treatment and nursing practice. Cronbach's alpha coefficient of the questionnaire was 1, indicating the reliability of the instrument, which was applied by two nurses.

Each correct response was assigned one point, and the total score for the knowledge test was the sum of the correct answers. Scores above 70% were considered knowledge on the subject. The questionnaire was answered individually, during working hours, and immediately returned to the researchers, ensuring anonymity. Then, the participants attended the

lecture given by the authors, lasting 30 minutes, using the Microsoft Office PowerPoint 2010[®] software. The concepts of MH, pathophysiology and epidemiology, the history, Decree No. 46601 of March 12th, 2002¹³, Resolution No. 1.802/2006 of the Federal Council of Medicine¹⁴, classifications, clinical manifestations, treatment and preventive measures were addressed. After one week, the employees answered the same questionnaire again to measure their learning.

After collection, data were tabulated in a spreadsheet of Microsoft Office Excel 2010[®]. The analysis was systematized and took into account the scores of three professional categories (nurses, technicians, and nursing assistants), not the isolated scores of each subject. For sample calculation of variables related to sociodemographic characteristics, the test answers were summarized, presented descriptively and tabulated by frequency, and absolute and mean values. For statistical analysis, Fisher's exact test, which compared the means before and after each category, and McNemar's test were used to evaluate the means of each question. The significance level adopted was 95% ($p < 0.05$).

A treatment kit for MH was prepared according to Decree No. 46.601 of March 12th, 2002¹³. The process of building the kit took place in phases:

- Searching for evidence in the literature;
- Communication between nurses and doctors;
- Requesting to assemble the kit to the pharmacy;
- Completion of the kit.

As criteria for the composition of the MH treatment kit, the materials in the surgical and anesthesia kit were evaluated. It was found that the amount of compresses of the surgical kit met the demand for the patient in an episode of MH; therefore, no compresses were included in the MH kit. Cooled saline was excluded because of the impossibility to cool it — the pharmacy industry provides 50 units of 500 mL of cooled saline. As for the anesthesia equipment circuit, according to MHAUS¹⁵, there are four management possibilities, including the replacement of the circuit ahead of the crisis. Due to the volume, this material was excluded, and there was a reserve in the guard room for inhaled material.

The formulation of the kit was validated by the professionals: chief physician of the anesthesiology section, chief physician of the surgery section, pharmacist, chief nurse of the sector, and authors of the research. There was a formal record of this meeting, which lasted 60 minutes, aiming to standardize information and update the MH care protocol.

RESULTS

Forty-three employees (93% of the active team) participated in the research, being three nurses, seven technicians and 33 nursing assistants. Mean age was 45 ± 10.3 years, and females prevailed in the three categories. As for the time of training, the mean was 18 ± 8.6 years, and the experience in the area of practice in SC had a mean of 13 ± 8.5 years. Sociodemographic characteristics are presented in Table 1.

Table 2 shows the level of knowledge of professionals before and after the lecture.

Table 2 shows the statistical difference of knowledge after lecture on MH in the three categories. In the nursing assistants category, the average of pre-test hits was 14 (44.1%), to 30.4 (89.4%) in the post-test, reaching a score higher than 70% of correct answers only in the post-test. In the nursing technicians category, the mean pre-test hits was 1.2 (20%), to 5.4 (90%) in the post-test, reaching a score above 70% of correct answers in the post-test only. In the nurses category, the average of pre-test hits was 2.8 (93%) to 3 (100%) in the post-test, reaching a score above 70% in both the pre- and post-tests.

Regarding the statistical values ($p < 0.05$), there was significance in the general knowledge of professionals in the pre- (value of 0.2) and post-tests (value of 0.8) phases.

Table 3 shows the general comparison of correct answers before and after the lecture.

Table 3 shows a percentage difference above 90% in three of the five knowledge items after the lecture: crisis triggering agents (95.3% — 41 correct answers), MH treatment (93% — 40 correct answers) and definition of MH (90.7% — 39 correct answers).

As scientifically recommended, Dantrolene medication, indicated to treat MH, was made available in the amount established for immediate care. Among the kit's organizing committee, a 100% agreement was reached regarding its composition. The inputs were listed and deposited in a box (Chart 1) and the kit available at the pharmacy.

Table 1. Sociodemographic characteristics of the study participants (n = 43).

Variables	N	%
Age range (years)		
21–30	1	2.3
31–40	14	32.6
41–50	13	30.2
51–60	10	23.3
61–70	5	11.6
Gender		
Female	32	74.4
Male	11	25.6
Training time (years)		
<5	1	2.3
6 to 10	5	11.6
11 to 20	21	48.8
>20	16	37.2
Time in the operating room (years)		
1 to 4	8	18.6
5 to 10	13	30.2
11 to 15	7	16.3
> 15	15	34.9
Total	43	100.0

Table 2. Level of knowledge of employees pre- and post-test, according to professional category.

Variables	Nursing assistants				Nursing Technicians				Nurses				p*	
	Pre		Post		Pre		Post		Pre		Post		Pre	Post
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Malignant hyperthermia definition	15	44.1	30	88.2	2	33.3	6	100	3	100	3	100	0.1	1
Triggering agents of the crisis	18	52.9	32	94.1	1	16.7	6	100	3	100	3	100	0.4	1
Initial clinical manifestations	15	44.1	31	91.2	2	33.3	4	66.7	3	100	3	100	0.1	0.1
Malignant hyperthermia treatment	13	38.2	31	91.2	0	0	6	100	3	100	3	100	0.0	1
Nursing team performance	9	26.5	28	82.4	1	16.7	5	83.3	2	66.7	3	100	0.3	1
Mean	14	44.1	30.4	89.4	1.2	20.0	5.4	90	2.8	93.3	3	100	0.2	0.8

*Fisher's exact test.

Table 3. Comparison of means of knowledge correct answers according to pre- and post-test evaluation items of the educational activity. São Paulo, SP, 2019.

Variables	Knowledge				
	Pre-test		Post-test		p*
	N	%	N	%	N
Malignant hyperthermia definition	20	46.5	39	90.7	0
Triggering agents of the crisis	22	51.2	41	95.3	0
Initial clinical manifestations	20	46.5	38	88.4	0.6
Malignant hyperthermia treatment	16	37.2	40	93	0
Nursing team performance	12	27.9	36	83.7	0.1
Mean	18	39.8	38.8	90.2	0.1

*McNemar test.

Chart 1. Kit for Malignant Hyperthermia (MH) treatment

Quantity	Medications and supplies
36	Dantrolene
01	500 ml bottle of distilled water
01	250 ml bottle of 8.4% sodium bicarbonate
05	20 ml 50% glucose ampoules
03	10 ml 10% calcium chloride ampoules
01	Mannitol flask 20%
10	Furosemide ampoules 20 mg
01	0.9% saline bottle – 100 ml
01	Regular insulin bottle (in the pharmacy fridge)
01	Urethral bladder catheters No. 6, 8, 10, 12, 16
01	Nasogastric probes No. 6, 8, 10, 12, 16, 18
01	Blood transfusion device
02	Infusion pump equipment
02	Intravenous catheters No. 14, 16, 18, 20, 22, 24
01	Invasive pressure monitoring kit
05	Blood gas syringes
01	Adult and pediatric central venous catheter

DISCUSSION

The qualification of the nursing professional enables better chances of success in the care and recovery of the patient under a MH crisis. The combination of multiple knowledge and practice is fundamental for the reframing of knowledge, in view of the constant change in the teaching-learning process, seeking for professionals who are more critical, creative, competent, and prepared for life and work¹⁶.

The continuous education of the team through lecture helped to increase the level of knowledge of the SC nursing professionals, as education is a broad process that sees the professional from all angles in a humanized, permanent and consistent way, which is attentive to the real needs of employees and the work environment¹².

The literature reports growing interest in improving the quality and safety of hospitalized patients. To this end, there is a need for progress in the review of security mechanisms in order to identify prevention opportunities and life-threatening events in order to optimize crisis response¹⁷.

The results in the pre-test of the research showed insufficient knowledge of the technicians and nursing assistants about MH, which obtained a score below 70%. For nurses, the correct score was 90%, demonstrating greater knowledge of care about MH.

A study conducted in the United States pointed to the lack of nursing knowledge about the management of MH crisis. It also emphasized that quality nursing care adds essential components for quality improvement and error reduction, with preparation of the nursing team, efficient communication, and participation of family members¹⁸.

In the present research, after the lecture class, there was a considerable average percentage of correct answers in the knowledge test, evidencing the effectiveness of the presented content. In the nurses category, a pre-test statistical mean was obtained from 2.8 (93.3%) to 3 (100%) in the post-test. There was not, therefore, a low score, which suggests greater knowledge on the subject due to higher education. The nursing technicians category obtained a pre-test mean from 1.2 (20%) to 5.4 (90%) in

the post-test, and the nursing assistants category mean in the pre-test from 14 (44.1%) to 30.4 (89.4%) in the post-test. Considering the questionnaire designed for a technical professional audience, pre-test knowledge of MH below 70% was seen as unsatisfactory, demonstrating lack of information of these professionals on the subject. However, these results were positively modified after the educational class: 89.4% correct answers for assistants and 90% correct answers for technicians, which corresponded to the goal set by the researchers.

In the analysis of the items that make up the questionnaire, there was a significant difference in three of the five elements after the educational activity: definition of MH, with a pre-test mean of 20 (46.5%) to 39 (90.7%) in the post-test; crisis-triggering agents, with a pre-test mean of 22 (51.2%) to 41 (95.3%) in the post-test; and MH treatment, with a pre-test mean of 16 (37.2%) to 40 (93%) in the post-test.

The literature points out that the educational process is an individual commitment that occurs through changes in attitude as a result of the experiences lived in social and professional interpersonal relationships and that aims to transform the qualification of professionals, so that they act more safely and quickly in patient care. Personal development that should be enhanced characterizes continuing education, involving specific technical training and the acquisition of new knowledge, concepts, and attitudes. Thus, continuing education is essential in hospital practice and indispensable to the training of workers in order to offer quality, considering the lives of patients¹⁹.

It is pertinent to emphasize that MH is classified as an immediate compulsory notification disease, regulated by the Resolution of the State Secretariat of Health SS-20 and instituted by the state of São Paulo on February 22nd, 2006. According to this document, the healthcare professional has a duty to complete the Compulsory Adverse Event Notification Form and refer it to their state's pharmacovigilance²⁰.

In the search for national literature on nursing knowledge focused on this theme, there was a shortage of specific material that could be compared with the findings, denoting the lack of national studies. Given this, the need for training and expansion of knowledge of health professionals for recognition and management of patients in crisis of MH in the perioperative period is a fact.

Given the complexity of the MH treatment, the literature suggests the development of training days, associated

with the simulation of MH crisis incidents at least once a year, with the nursing staff²¹. However, AORN recommends that training encompasses all operating room staff, focusing on the skills applicable to the roles required to manage a HM crisis²². These exercises not only keep the team up to date and alert, but increase collaboration among its members. The AANA directs all certified anesthesiologist nurses to maintain their competence through continuing education regarding the management of MH. MHAUS stresses the availability of Dantrolene medication in all healthcare facilities performing anesthetic-surgical procedures¹¹.

The elaboration and availability of the kit in the SC pharmacy with all the necessary items to assist the patient in a MH crisis made it possible to standardize the essential materials in the kit, as well as to update and make the care protocol available to the surgical ward entire team. Standardization is an important management tool and gives uniformity to actions, reducing dispersion and making it possible to perform services in a targeted and safe manner²³. The nurse, in his competence, faces many challenges in order to ensure patient safety. Thus, the four pillars of nurses' performance (research, teaching, care and management) are essential in the commitment and training of professionals²⁴.

The availability of Dantrolene for MH treatment in healthcare facilities where anesthetic-surgical procedures are performed is insufficient to initiate immediate treatment, and in some places it is nonexistent. Such conduct goes against constitutional principles, and the institution may be penalized for the irregularity of exposing the patient to imminent risk. The existence of the MH kit and specific care protocol supports accurate and immediate patient care, and all operating room professionals are protagonists of their actions²⁵.

A study conducted in a private institution in São Paulo²⁶, which aimed to evaluate the knowledge and the correctness rate of the nursing staff working in the SC and in anesthetic recovery, identified weaknesses in the nursing team's knowledge about the diagnosis and treatment of MH and pointed out that such weaknesses may hinder the correct action in reversing the crisis, facilitating errors that may bring harm to patients.

Given the above, it is vital to have training and teamwork in order to ensure the quality of care provided to patients in MH crisis, with constant assessment of this quality, ensuring the patient's rights, safety and well-being.

As a limitation of the research, the results of a local population, which cannot be generalized are mentioned. The scarcity of research prevents a comparison of the results of this study with a similar population. Thus, it is encouraged to conduct scientific research on MH that examine the performance of the nursing staff, in order to expand the theme, alert and train professionals to serve these patients with excellence.

CONCLUSION

The MH crisis is a serious event that requires a team prepared and able to act and requires diagnosis, treatment and immediate assistance to reverse the picture and the risk of death. As it is an extremely relevant disease, there was concern regarding the knowledge of the nursing staff about the disease and the availability of a kit in the institution for treatment, as recommended by the Ministry of Health.

The lecture showed effectiveness and added knowledge to nurses, technicians and assistants of the operating room staff, which was measured by the results, directing professionals to act safely. The existence of a MH crisis kit is essential to ensure patient care. The team's knowledge about the availability of the kit and the acknowledgment of its members' actions in the face of the crisis favored the standardization of the acts assigned to each professional. It should be emphasized that a team training with realistic simulation will add expertise in dealing in the care of patients in a mh crisis.

It is essential for nurses, as leaders, to update themselves scientifically for a practice with excellence and to expand the knowledge of their staff, with the aim of increasing the competence of employees. The performance of the nursing team, whether in care or management, in line with other members of the surgical and anesthetic team, is an indispensable factor when assisting in the recognition and clinical manifestations of a MH crisis and initiating the necessary actions to safe and effective care.

REFERENCES

1. Litman RS. Malignant hyperthermia: diagnosis and management of acute crisis [Internet]. Oxford: UpToDate Database; 2019 [acessado em 26 jul. 2019]. Disponível em: https://www.uptodate.com/contents/malignant-hyperthermia-clinical-diagnosis-and-management-of-acute-crisis?search=Malignant%20hyperthermia:%20clinical%20diagnosis%20and%20management%20of%20acute%20crisis%20&source=search_result&selectedTitle=1~150&usage_type=default&display_rank=1
2. Silva HCA. Fisiopatologia e genética. Rev Neurociênc [Internet]. 2014 [acessado em 26 jul. 2019];22(4):475-97. Disponível em: http://www.revistaneurociencias.com.br/edicoes/2014/2204/VI_curso_HIPERTERMIA%20VOL%2022%2004%202014.pdf
3. Haluka J. Malignant hyperthermia. [Internet]. ACLS Training Center; 2018 [acessado em 3 jan. 2019]. Disponível em: <https://www.acls.net/malignant-hyperthermia.htm>
4. Silva HCA, Almeida CS, Brandão JCM, Silva CAN, Lorenzo MEP, Ferreira CBND, et al. Malignant hyperthermia in Brazil: analysis of hotline activity in 2009. Rev Bras Anesthesiol [Internet]. 2013 [acessado em 21 jul. 2016];63(1):13-26. Disponível em: <http://doi.org/10.1590/S0034-70942013000100002>
5. Silva HCA, Ferreira G, Rodrigues G, dos Santos JM, Andrade PV, Hortense A, et al. Profile of malignant hyperthermia susceptibility reports confirmed with muscular contracture test in Brazil. Braz J Anesthesiol [Internet]. 2019 [acessado em 25 jul. 2019];69(2):152-9. Disponível em: <http://doi.org/10.1016/j.bjan.2018.09.007>
6. Sousa CS, Bispo DM, Cunha ALM, Siqueira ILCP. Educational intervention on malignant hyperthermia with nursing professionals of the operating room. Rev Esc Enferm USP. 2015;49(2):290-5. <http://doi.org/10.1590/S0080-623420150000200015>
7. Pancieri PA, Carvalho R, Braga ME. Applying the safe surgery checklist: experience report. Rev SOBECC. 2014;19(1):26-33. <http://doi.org/10.4322/sobecc.2014.006>
8. Denholm BG. Using a vulnerability theoretical model to assess the malignant hyperthermia susceptible population: implications for advanced practice emergency nurses. Adv Emerg Nurs J [Internet]. 2015 [acessado em 21 mar. 2019];37(3):209-22. <http://doi.org/10.1097/TME.000000000000073>
9. Morais Filho LA, Gue Martini J, Lazzari DD, Vargas MA, Backes VMS, Farias GM. Strategies used for teaching urgency/emergency in a nursing undergraduate course. Texto & Contexto Enferm. 2018;27(4):e3210016. <http://doi.org/10.1590/0104-07072018003210016>
10. Malignant Hyperthermia Association of the United States. What should be on an MH cart? [Internet]. 1981 [acessado em 26 jul. 2019]. Disponível em: <https://www.mhaus.org/healthcare-professionals/be-prepared/what-should-be-on-an-mh-cart/>
11. American Association of Nurse Anesthetists. Malignant hyperthermia crisis preparedness and treatment. [Internet]. American Association of Nurse Anesthetists [acessado em 26 jul. 2019]. Disponível em: [https://www.aana.com/docs/default-source/practice-aana-com-web-documents-\(all\)/malignant-hyperthermia-crisis-preparedness-and-treatment.pdf?sfvrsn=630049b1_8](https://www.aana.com/docs/default-source/practice-aana-com-web-documents-(all)/malignant-hyperthermia-crisis-preparedness-and-treatment.pdf?sfvrsn=630049b1_8)

12. Cain CL, Riess ML, Gettrust L, Novalija J. Malignant hyperthermia crisis: optimizing patient outcomes through simulation and interdisciplinary collaboration. *AORN J*. 2014;99(2):301-11. <http://doi.org/10.1016/j.aorn.2013.06.012>
13. São Paulo (Estado). Secretaria de Saúde do Estado de São Paulo. Resolução SS nº 23, de 27 de fevereiro de 2004. Aprova a norma técnica relativa às diretrizes para o diagnóstico, tratamento, prevenção, notificação e investigação epidemiológica dos casos de hipertermia maligna. [Internet]. São Paulo; 2004 [acessado em 28 maio 2017]. Disponível em: <http://tc-legis2.bvs.br/leisref/public/showAct.php?id=69&word=>
14. Conselho Federal de Medicina. Resolução CFM nº 1.802/2006. Dispõe sobre a prática do ato anestésico [Internet]. Brasília: Conselho Federal de Medicina; 2006 [acessado em 31 jul. 2019]. Disponível em: http://www.portalmedico.org.br/resolucoes/cfm/2006/1802_2006.htm
15. Malignant Hyperthermia Association of the United States. Table of contents. [Internet]. Malignant Hyperthermia Association of the United States; 2012 [acessado em 29 jul. 2019]. Disponível em: [https://www.mhaus.org/mhau001/assets/File/Recommendations%20with%20Table%20of%20Contents\(1\).pdf](https://www.mhaus.org/mhau001/assets/File/Recommendations%20with%20Table%20of%20Contents(1).pdf)
16. Gottens LBD, Alvarez AM, Almeida LMWS. Nursing education: quality, innovation and accountability. *Rev Bras Enferm*. 2014;67(4):501-2. <http://dx.doi.org/10.1590/0034-7167.2014670401>
17. Taguti PS, Dotti AZ, Araujo KP, Pariz PS, Dias GF, Kauss IA, et al. The performance of a rapid response team in the management of code yellow events at a university hospital. *Rev Bras Ter Intensiva* [Internet]. 2013 [acessado em 5 set. 2017];25(2):99-105. Disponível em: <https://doi.org/10.5935/0103-507X.20130020>
18. Denholm GB. Using informatics to improve the care of patients susceptible to malignant hyperthermia. *AORN J*. 2016;103(4):364-74. <http://doi.org/10.1016/j.aorn.2016.02.001>
19. Pinto JR, Ferreira GSM, Gomes AMA, Ferreira FIS, Aragão AEA, Gomes FMA. Permanent education: reflection in practice nursing hospital. *Tempus (Brasília)* [Internet]. 2015 [acessado em 29 set. 2017];9(1):155-65. Disponível em: <http://www.tempusactas.unb.br/index.php/tempus/article/download/1699/1409>
20. São Paulo (Estado). Secretaria de Saúde do Estado de São Paulo. Resolução SS nº 20, de 22 de fevereiro de 2006: atualiza a lista de doenças de notificação compulsória no estado de São Paulo. [Internet]. São Paulo; 2006 [acessado em 10 out. 2019]. Disponível em: <http://fehosp.com.br/app/webroot/files/circulares/2b257b09784b0963399612d26cc914fc.doc>
21. Theofanis F. Malignant hyperthermia: nursing implications for care. *Br J Anaesth Recovery Nurs* [Internet]. 2015 [acessado em 12 out. 2017];15(4):15-7. Disponível em: <http://eprints.brighton.ac.uk/14549/1/Malignant.pdf>
22. Seifert PC, Wahr JA, Pace M, Cochrane AB, Bagnola AJ. Crisis management of malignant hyperthermia in the OR. *AORN J*. 2014;100(2):189-202. <http://doi.org/10.1016/j.aorn.2014.06.014>
23. Sene ESO, Jardim DP. Nursing practice in minimally invasive video-assisted cardiac surgery. *Rev SOBECC*. 2016;21(3):170-7. <http://doi.org/10.5327/Z1414-4425201600030008>
24. Lima GF, Rinaldi PA, Catunda KA, Bittar E, Bianchi ERF. The role of nurses in the structuring and implementation of a hybrid surgical room. *Rev SOBECC*. 2014;19(2):110-8. <http://doi.org/10.4322/sobecc.2014.017>
25. Sousa CS, Diniz TRZ, Cunha ALSM. Malignant hyperthermia: proposing a care protocol for surgical centers. *J Nurs UFPE On line* [Internet]. 2013 [acessado em 29 out. 2017];7(esp.):6714-8. Disponível em: <http://doi.org/10.5205/reuol.5058-41233-3-SM.0711esp201320>
26. Titato MMS, Carvalho R. Malignant hyperthermia in the operating room: can the nursing team recognize it and intervene? *Rev SOBECC*. 2017;22(2):82-9. <http://doi.org/10.5327/Z1414-4425201700020005>

NURSING CARE SYSTEMATIZATION IN THE PERIOPERATIVE PERIOD: ANALYSIS OF RECORDS

Sistematização da assistência de enfermagem no período perioperatório: análise de registros

Sistematización de la asistencia de enfermería en el período perioperativo: análisis de registros

Franciele Cristine Fengler¹ , Cássia Regina Gotler Medeiros^{2*} 

ABSTRACT: Objective: To analyze records on the perioperative nursing care systematization (PNCS) according to recommendations of the Brazilian Society of Surgical, Anesthesia Recovery, Sterilization and Material Center Nurses (SOBECC). **Method:** Descriptive, documentary, and quantitative study developed in August 2018 on a hospital in the state of Rio Grande do Sul. The sample consisted of 50 medical records of patients who underwent anesthetic-surgical procedures, randomly selected from a surgical inpatient unit. Using the research instrument, we collected data on ten attributes, subdivided into perioperative phases, according to the practices recommended by SOBECC. The results are expressed as absolute and relative frequencies. The study was approved by the Research Ethics Committee of the institution. **Results:** The highest percentage of records was fully complied with (61.40%). However, 25.79% of records were not followed, especially those related to nursing care. **Conclusion:** According to SOBECC's recommendations, records and adherence to PNCS were inadequate.

Keywords: Nursing care. Perioperative nursing. Quality of health care.

RESUMO: Objetivo: Analisar os registros da sistematização da assistência de enfermagem perioperatória (SAEP) conforme recomendações da Associação Brasileira de Enfermeiros de Centro Cirúrgico, Recuperação Anestésica e Centro de Material e Esterilização (SOBECC). **Método:** Estudo descritivo, documental e quantitativo desenvolvido em agosto de 2018 em um hospital do Rio Grande do Sul. A amostra foi composta por 50 prontuários de pacientes submetidos a procedimentos anestésico-cirúrgicos, selecionados aleatoriamente em uma unidade de internação cirúrgica. O instrumento de pesquisa coletou dados referentes a 10 atributos, subdivididos entre as fases do perioperatório, conforme as práticas recomendadas pela SOBECC. Os resultados estão apresentados por frequências absolutas e relativas. O estudo foi aprovado pelo Comitê de Ética em Pesquisa da instituição. **Resultados:** O maior percentual de registros foi totalmente atingido (61,40%). Porém verificou-se que 25,79% dos registros não foram realizados, principalmente aqueles relacionados aos cuidados da enfermagem. **Conclusão:** Conforme as recomendações da SOBECC, observou-se deficiência nos registros e na adesão à SAEP. **Palavras-chave:** Assistência de enfermagem. Enfermagem perioperatória. Qualidade da assistência à saúde.

RESUMEN: Objetivo: Analizar los registros de la sistematización de la atención de enfermería perioperatoria (SAEP) según lo recomendado por la Asociación Brasileña de Enfermeras del Centro Quirúrgico, Centro de Recuperación Anestésica y Material y Esterilización (SOBECC). **Método:** Estudio descriptivo, documental y cuantitativo desarrollado en agosto de 2018 en un hospital de Rio Grande do Sul. La muestra consistió en 50 registros médicos de pacientes sometidos a procedimientos anestésico-quirúrgicos, seleccionados al azar en una unidad de pacientes internados quirúrgicos. El instrumento de investigación recolectó datos referentes a 10 atributos, subdivididos entre las fases perioperatorias, de acuerdo con las prácticas recomendadas por SOBECC. Los resultados se presentan por frecuencias absolutas y relativas. El estudio fue aprobado por el Comité de Ética en Investigación de la institución. **Resultados:** El porcentaje más alto de registros se logró completamente (61,40%). Sin embargo, se encontró que el 25,79% de los registros no se hicieron, especialmente aquellos relacionados con la atención de enfermería. **Conclusión:** De acuerdo con las recomendaciones de SOBECC, hubo una deficiencia en los registros y el cumplimiento de SAEP.

Palabras clave: Atención de enfermería. Enfermería perioperatoria. Calidad de la atención de salud.

¹Nursing Degree. Autonomous nursing care service provider – Venâncio Aires (RS), Brazil.

²PhD in Nursing from Universidade Federal do Rio Grande do Sul (UFRGS). Full professor at Univas – Lajeado (RS), Brazil.

*Corresponding author: cgotlermedeiros@gmail.com

Received: 02/12/2019 – Approved: 11/20/2019

DOI: 10.5327/Z1414-4425202000010008

INTRODUCTION

In patient care, the nursing staff follows a methodological instrument called nursing process (NP). This systematic and humanized instrument is used to guide nursing care¹. The operationalization of the NP occurs when the nursing care systematization (NCS) is implemented, making the work process more efficient. In the perioperative period, which involves the whole surgical experience of the patient, NP is called the perioperative nursing care systematization (PNCS)².

NP is deemed a methodological instrument that guides nursing care and the documentation of the professional practice, improving the quality of care and increasing professional visibility and recognition. This instrument has five stages: nursing history/data collection, nursing diagnosis, nursing care prescription/planning, implementation of nursing care and nursing evolution/evaluation¹.

PNCS is a model that promotes the interaction of care between the pre-, intra-, and postoperative periods, enabling planning and control in each phase of the operative care development. It supports nursing actions within the surgical center (SC) aiming at integrally assisting patients and their relatives, and at providing a quality nursing care¹. In addition, it promotes an adequate, planned, and founded intervention, focused on the problems of each patient in the perioperative period as well as on the evaluation of results³.

The perioperative period, according to the Brazilian Society of Surgical, Anesthesia Recovery, Sterilization and Material Center Nurses (SOBECC)¹, can be defined as the time interval that comprises activities developed in each surgical period. It is divided into:

- Mediate preoperative: it begins at the time of surgery definition and extends up to 24 hours before the procedure;
- Immediate preoperative: it begins 24 hours prior to the surgical procedure until patient's admission to the SC;
- Intraoperative: encompasses the period from the moment the patient is welcomed in the SC until they leave the operating room;
- Transoperative: it is inserted in the perioperative period, beginning with the anesthetic-surgical procedure and extending up to its end;
- Postoperative: it comprises the entire period after the anesthetic-surgical procedure, being subdivided

into three moments — anesthetic recovery, from the patient's arrival at the post-anesthesia care unit (PACU) to their discharge to the unit of origin; immediate postoperative period, from the end of the anesthetic-surgical procedure up to 24 hours later; and mediate postoperative, after the first 24 hours of the anesthetic-surgical procedure until hospital discharge or the patient's return to their home.

The evaluation of perioperative nursing care should be performed at the end of each period of surgical development, considering patients' satisfaction, activities performed by the nurse, and the team performance, according to the care model defined by both the team and the institution⁴.

Most professionals believe that PNCS is indispensable in providing a quality care to patients; however, they face difficulties in implementing it. Such difficulties are related to lack of time, work overload, and the administrative staff, which sometimes does not understand the importance of nurses' performance in patient care over the perioperative period, deviating the professional from their care function to management-related functions^{2,5,6}.

Authors of studies indicate that the quality of nursing care in the perioperative period interferes with the outcome of the anesthetic-surgical procedure. Thus, we seek to understand the role of nursing in a surgical hospitalization unit, highlighting its relevance to the quality of health care².

In Brazil, even with recommendations by SOBECC and the Association of Perioperative Registered Nurses (AORN) regarding the adoption of a care model to guide the nurses' actions in the SC, authorities of most hospitals have not adopted a formal model yet. The planning based on surgery schedule is used, according to which nurses manage material and human resources for predicting and providing the anesthetic-surgical procedure; nevertheless, the major criticism against this model is the lack of records, impairing the planning of individualized care and the adequacy of human and material resources to perform the anesthetic-surgical procedure. Moreover, the lack of records delegitimizes the work developed by the nursing team and does not support nurses in case of legal incidents⁴.

Researchers show that, even though the legislation emphasizes the importance of nursing records to document and support the profession, even though these professionals are

aware of such condition, they do not keep quality records, neither consider them as a work instrument, thus hindering its operationalization⁷.

According to researchers, there are few studies related to the evaluation of patients and the perioperative care provided, of instruments for records, and of the patients' perception⁶. Thus, we raise the following question: how is NCS being used in the perioperative period?

OBJECTIVE

To analyze records of NCS performed in the perioperative period considering SOBECC's recommendations.

METHOD

This is a descriptive, documentary, and quantitative study that was developed in 2018 based on the analysis of nursing data found in medical records of patients who underwent several anesthetic-surgical procedures at a hospital in the countryside of the state of Rio Grande do Sul, Brazil. This is a philanthropic institution with 138 beds, assisting 70% of its patients via the Brazilian Unified Health System (SUS).

Medical records were randomly selected from a surgical hospitalization unit after patients' hospital discharge. At this institution, 259 surgeries are performed per month on average, and 8 surgeries are performed per day. Thus, for the study, 20% of the medical records of surgeries performed in August 2018 were selected, composing a sample of 50 medical records. We included medical records of patients aging over 20 years of both sexes who underwent several anesthetic-surgical

procedures, being medium or high-complexity surgical procedures. We excluded outpatient procedures.

Data were collected through an instrument prepared by the researchers themselves. It consists of ten attributes, subdivided in perioperative phases, according to the practices recommended by SOBECC guidelines¹.

Attributes were sorted into four categories: fully complied with (FC), partially complied with (PC), not complied with (NC), and not applicable (NA). The NA category was used only in cases with no need for performing the respective procedure. Since this is a documentary study, we considered as FC only what had been recorded. Absolute and relative frequencies of attributes were analyzed in Microsoft Office Excel 2013 spreadsheets, which we present as tables.

The study was developed after authorization by the authorities of the research site, through a letter of consent, and approval by the Research Ethics Committee, under Certificate of Presentation for Ethical Consideration (CAAE) no. 93498218.1.0000.5310, in accordance with the National Health Council Resolution no. 466/2012, which regulates research involving human beings⁸. Ethical aspects regarding the confidentiality of the institution's and the patients' identification were respected due to dissemination of the study results.

RESULTS

The preoperative period comprises four attributes. Although the highest frequency in all attributes was for FC, records on the nursing history and diagnoses were fulfilled in over 50% of medical records, according to Table 1. The attribute recorded with the highest frequency was physical examination (88%), while

Table 1. Frequency of records on attributes in the preoperative period.

Procedures	FC		PC		NC		NA	
	N	%	N	%	N	%	N	%
1. History	26	52	3	6	21	42	0	0
2. Physical examination	44	88	6	12	0	0	0	0
3. Identification of nursing diagnoses	26	52	0	0	24	48	0	0
4. Nursing prescription for preoperative and intraoperative periods	31	62	0	0	19	38	0	0
Total	127	63.5	9	4.5	64	32	0	0

FC: fully complied with; PC: partially complied with; NC: not complied with; NA: not applicable.

the total number of attributes recorded in this period accounted for 63.50%.

The intraoperative period is composed of attributes no. 5 with 9 procedures; no. 6 with 15 procedures; and no. 7 with 1 procedure. FC records were found in 57.44% of the medical records, as seen in Table 2. In attribute no. 5, all procedures (100%) were recorded.

Attribute no. 6, which refers to nursing evolution, accounted for the lowest frequency of record, 47.06%. For this attribute, procedures with NC records in over 80% of the medical records were: positioning of the patient during anesthesia and surgery, use of protection pads, type of heating used, and sites for monitoring and placing of electrocautery plate. We found that the highest-frequency records (100%) accounted for procedures of greater interest for physicians and the institution, such as: type of anesthesia, start and end times of anesthetic-surgical procedure, record of materials and equipment used during the anesthetic-surgical procedure, among others.

The record of attribute no. 7, beginning of postoperative nursing prescription at the end of surgery, was NC in 100% of medical records.

The postoperative period comprises attributes no. 8 (with 1 procedure), no. 9 (with 6 procedures), and no. 10 (with 1 procedure), as listed in Table 3. In this period, 72.75% of the records were FC; however, attribute no. 10 was 100% NC.

Although for attribute no. 7 in the intraoperative period, concerning the beginning of postoperative nursing prescription at the end of surgery, the records were NC in 100% of the cases, we considered, for attribute no. 8, records related to the postoperative nursing prescription, even though they were not a continuity of the same prescription.

Considering the entire perioperative period, the highest percentage in the medical records analyzed accounted for FC (61.40%), according to Table 4. Nevertheless, 25.79% of the records were not followed, especially those related to specific nursing care.

Table 2. Frequency of records on attributes in the intraoperative period.

Procedures	FC		PC		NC		NA	
	N	%	N	%	N	%	N	%
5. Care implementation								
Patients' welcoming and identification at the SC	50	100	0	0	0	0	0	0
Measurement of vital signs	50	100	0	0	0	0	0	0
Conducting simplified physical examination	50	100	0	0	0	0	0	0
Producing a checklist	50	100	0	0	0	0	0	0
Placing of electrocautery plate in appropriate site	50	100	0	0	0	0	0	0
Control of blood loss, diuresis, and stomach secretion, when the patient's NGT is open during the surgery	50	100	0	0	0	0	0	0
Urinary catheterization when necessary	10	20	0	0	0	0	40	80
Identification and referral of anatomicopathological sample	5	10	0	0	0	0	45	90
Record of all nursing care provided to the patient	50	100	0	0	0	0	0	0
Total	365	81.11	0	0	0	0	85	18.89
6. The nursing evolution must comprise								
Identification of the patient, the surgical team, circulating nurses, and the nurse	3	6	33	66	14	28	0	0
Start and end times of anesthetic-surgical procedure	50	100	0	0	0	0	0	0
Surgery name	37	74	0	0	13	26	0	0
Type of anesthesia	50	100	0	0	0	0	0	0

Continue...

Table 2. Continuation.

Procedures	FC		PC		NC		NA	
	N	%	N	%	N	%	N	%
Positioning of the patient during anesthesia and surgery	10	20	0	0	40	80	0	0
Use of protection pads	1	2	0	0	49	98	0	0
Type of heating used	0	0	0	0	50	100	0	0
Sites for monitoring and placing the electrocautery plate	4	8	0	0	46	92	0	0
Sites for venous and arterial punctures, drainage, catheter, and type of probes	50	100	0	0	0	0	0	0
Referral of samples and examinations to the laboratory	7	14	0	0	0	0	43	86
Recurrences, whenever the case	8	16	0	0	0	0	42	84
Blood loss and transfusions	8	16	0	0	0	0	42	84
In the very form of the institution, there must be multi-parametric indicators ensuring that the used material was sterilized	50	100	0	0	0	0	0	0
In case of implants, in the form, there must be codes regarding the inserted materials and their expiration date	25	50	0	0	0	0	25	50
Records of materials and equipment used during the anesthetic-surgical procedure	50	100	0	0	0	0	0	0
Total	353	47.06	33	4.40	212	28.27	152	20.27
7. Beginning of postoperative nursing prescription at the end of the surgery	0	0	0	0	50	100	0	0
Overall total	718	57.44	33	2.64	262	20.96	237	18.96

FC: fully complied with; PC: partially complied with; NC: not complied with; NA: not applicable; SC: surgical center; NGT: nasogastric tube.

Table 3. Frequency of records on attributes in the postoperative period.

Procedures	FC		PC		NC		NA	
	N	%	N	%	N	%	N	%
8. Continuity of postoperative nursing prescription	24	48	0	0	26	52	0	0
9. Verification of the patient's clinical conditions				0			0	0
Interview	29	58	0	0	21	42	0	0
Physical examination	38	76	0	0	12	24	0	0
Measurement of vital signs	50	100	0	0	0	0	0	0
Verification of dressing conditions, venous access, and probes or catheters	50	100	0	0	0	0	0	0
Control of water and food intake	50	100	0	0	0	0	0	0
Observation of bladder and intestinal eliminations	50	100	0	0	0	0	0	0
10. Evaluating the provided care, verifying the need for or improvement in any conduct, and the PNCS performance	0	0	0	0	50	100	00	00
Total	291	72.75	0	0	109	27.25	0	0

FC: fully complied with; PC: partially complied with; NC: not complied with; NA: not applicable; PNCS: perioperative nursing care systematization.

Table 4. Frequency of records on the attributes of the perioperative period.

Perioperative Period	FC (%)	PC (%)	NC (%)	NA (%)	N
Total	61.40	2.27	23.52	12.81	50

FC: fully complied with; PC: partially complied with; NC: not complied with; NA: not applicable.

DISCUSSION

Results showed that in the preoperative period, although the percentage of FC attributes have occurred more frequently, there was great inadequacy and need for improvement in nursing care records, since this period refers to the beginning of the perioperative period, which involves the welcoming of patient and relatives, the establishment of bonds, and the preparation for the anesthetic-surgical procedure.

The nursing preoperative visit is the basis of PNCS, and contributes to satisfying the physical and emotional needs of the patient, besides helping decrease levels of stress and anxiety, assisting in overcoming the surgical trauma in recovery, and in resuming well-being. In addition, it helps establishing a bond between professional, patient, and family, enabling a systematized and continuous care directed at each individual in an integral and individualized way, respecting values, experiences, and expectations⁹. In the intraoperative period, care initiatives should be developed by the entire nursing team, meeting the patients' activities and expectations, conveying support and attention, respecting their beliefs, values, fears, and needs with safety, dexterity, and efficacy¹.

Results point to inadequacy of nursing records in general, especially in the following attributes: positioning and protection of the patient on the operating table, heating and temperature maintenance, sites for monitoring and placing electrocautery plate, and identification of the patient and the team. Furthermore, the lack of postoperative nursing prescription at the end of the anesthetic-surgical procedure was evident. These procedures are key for covering a successful and safe surgical period and are the responsibility of all team members. To this end, professionals should be aware, identify risks, and maintain patients' safety, protecting them from trauma and possible adverse events¹.

The whole team involved in the care of a surgical patient is responsible for adopting prevention measures to avoid the aforementioned events. Nurses should be aware of

complications, identifying patients at greater risk in the preoperative nursing evaluation, since prevention measures can reduce the risk of associated complications, which involve surgical site infection, bleeding during surgery due to coagulation disorders, cardiovascular diseases, skin lesions, burns, among others¹⁰⁻¹².

Hence, the use of protection resources, such as air mattresses, pads or cushions on the operating table promotes pressure relief, in addition to avoiding friction and preventing skin lesions, neuromuscular compressions or distensions, burns, among other injuries^{11,12}.

The nursing prescription consists in a set of actions or interventions determined by nurses in order to achieve the expected results for patients to prevent, protect, promote, recover, and maintain their health¹. Thus, its importance in nursing care and in the PNCS development is clear, regardless of the patient's perioperative period.

Nursing records are key for developing the quality of nursing care, validating the care provided by the team, considering the continuity of care in an individualized and planned manner as well as the safety of patients and the team assisting them. Some studies report that, although records are the only way to analyze professional care, confirm and validate the practice of the nursing team, there is inadequacy in the nursing practice evidenced by notes or records, as well as in the quality of these records, which often contain incomplete notes, thus getting in the way of the nursing audit analysis^{7,13}.

In the postoperative period, we point out the inadequacy of records concerning the nursing prescription and an evaluation of the care provided. Therefore, we clearly perceived the professionals' major focus on the record of care related to medical procedures rather than care measures for patients' comfort, thus impairing the continuity and quality of care and NP. Likewise, the record on equipment and materials used was also prioritized. According to a study conducted by narrative review, nursing records are performed with abbreviations, in a reduced and incomplete manner, and comprising contents that favor biomedical knowledge¹⁴.

At the SC, based on nursing notes and the prescribed care measures, the use of equipment, materials, and medications is justified. Debts should be recorded in expense notes. Therefore, errors in collections are related to failures in the records by both nursing and medical teams. Hence, nursing notes in medical records are very important for the institution, and are used in audit processes so

one can pinpoint inadequacies in services, raise invoicing, and review disallowances^{13,15}.

In the postoperative period, based on nursing prescription, the nursing team should provide intensive and semi-intensive care to patients, directed to the recovery of consciousness, stabilization of vital signs, motility, and homeostasis¹. The nursing postoperative visit is the stage that completes the NP in the SC, the moment when failures and the success of the care provided in the preoperative and intraoperative periods are evaluated, that is, the care evaluation. Thus, the visit outstands as a method for evaluating the provided care, aiming at following the quality requirements according to patient's or the technical objectives established⁴.

Previous studies have reported nurses' difficulties regarding NCS implementation being justified by work overload, deviation of function, lack of understanding and knowledge by the professionals themselves, or institutional reasons^{16,17}. According to researchers², low adherence to PNCS may be related to the professionals' low demand for updating on the subject, and demotivation and lack of stimulus by the institution. Moreover, the same authors demonstrated that only one stage of PNCS had been performed, which was the preoperative visit.

We highlight the importance of nurses' awareness regarding the need for nursing records and the NCS implementation. Nurses should avoid activities that are not part of their functions and commit to better working conditions, which enables fulfilling nursing records, making systematization active¹⁶.

Within this context, professionals need to constantly update themselves, aiming at the qualification of clinical and critical reasoning, essential to implementing the NP, ensuring a safe and quality care. It is important that the nursing professionals working at the SC propose the NP implementation daily and adequately, since, in some cases,

this instrument is applied in a fragmented way, disconnected from reality¹⁸.

It is noteworthy that the NCS and PNCS implementation is a requirement of the Federal Nursing Council, and that "the records support the nursing care provided to the patient in the SC"¹. According to Law No. 8.078¹⁹, the professional and/or the institution are responsible for confirming the performance of adequate patient care, free of risks and damages.

CONCLUSION

According to SOBECC's recommendations for nurses in the perioperative period, based on the analysis of nursing records, there was inadequacy in the records and adherence to PNCS, considering the high technology available in the market nowadays and legislation requirements.

It was evident that care measures related to medical procedures were the most recorded, at the expense of the record of care concerning patients' comfort. Similarly, records on equipment and materials were also found to be prioritized.

As a limitation of this study, we highlight that it is based on records only instead of direct observations. Therefore, it is impossible to conclude whether the procedure was not completed or if its fulfilling was not accurate.

Thus, we emphasize the completion of nursing records, as well as the need for professional qualification, considering the legal support of nurses' work, the professional satisfaction and recognition, contributing to the better quality of nursing care provided to patients and their relatives.

The need for nurses to prioritize the development of care provided to patients and family members over other specific nursing functions is noteworthy, rejecting activities that are not part of their functions, considering NP validation and NCS implementation.

REFERENCES

1. Associação Brasileira de Enfermeiros de Centro Cirúrgico, Recuperação Anestésica e Centro de Material e Esterilização (SOBECC). Diretrizes de práticas em enfermagem cirúrgica e processamento de produtos para a saúde. 7ª ed. São Paulo: SOBECC; Barueri: Manole; 2017.
2. Ribeiro E, Ferraz KMC, Duran ECM. Atitudes dos enfermeiros de centro cirúrgico diante da sistematização da assistência de enfermagem perioperatória. Rev SOBECC. 2017;22(4):201-7. <http://doi.org/10.5327/Z1414-4425201700040005>

3. Sena AC, Nascimento ERP, Maia ARCR, Santos JLG. Construção coletiva de um instrumento de cuidados de enfermagem a pacientes no pré-operatório imediato. *Rev Baiana Enferm.* 2017;31(1):e20506. <http://doi.org/10.18471/rbe.v31i1.20506>
4. Carvalho R, Bianchi ERF. *Enfermagem em Centro Cirúrgico e Recuperação Anestésica.* 2ª ed. São Paulo: Manole; 2016.
5. Adamy EK, Tosatti M. Sistematização da Assistência de Enfermagem no período perioperatório: visão da equipe de enfermagem. *Rev Enferm UFSM [Internet].* 2012 [acessado em 10 maio 2018];2(2):300-10. Disponível em: <https://periodicos.ufsm.br/reufsm/article/view/5054/3754>
6. Fonseca RMP, Peniche ACG. Enfermagem em centro cirúrgico: trinta anos após criação do Sistema de Assistência de Enfermagem Perioperatório. *Acta Paul Enferm.* 2009;22(4):428-33. <http://dx.doi.org/10.1590/S0103-21002009000400013>
7. Azevedo LMN, Oliveira AG, Malveira FAS, Valença CN, Costa EO, Germano RM. A visão da equipe de enfermagem sobre seus registros. *Rev Rene.* 2012;13(1):64-73.
8. Brasil. Ministério da Saúde. Conselho Nacional de Saúde. Resolução nº 466, de 12 de dezembro de 2012. Diretrizes e normas regulamentadoras de pesquisas envolvendo seres humanos [Internet]. Brasil: Ministério da Saúde; 2013 [acessado em 10 maio 2018]. Disponível em: http://bvsms.saude.gov.br/bvs/saudelegis/cns/2013/res0466_12_12_2012.html
9. Freiberger MF, Mudrey ES. A importância da visita pré-operatória para sistematização da assistência de enfermagem perioperatória. *Rev Ciên Fac Edu Mei Amb.* 2011;2(2):1-26. <https://doi.org/10.31072/rcf.v2i2.96>
10. Danczuk RFT, Nascimento ERP, Silveira NR, Hermida PMV, Rasía MA. Métodos de aquecimento na prevenção da hipotermia no intraoperatório de cirurgia abdominal eletiva. *Esc Anna Nery Rev Enferm.* 2015;19(4):578-84. <http://doi.org/10.5935/1414-8145.20150077>
11. Miranda AB, Fogaça AR, Rizzetto M, Lopes LCC. Posicionamento cirúrgico: cuidados de enfermagem no transoperatório. *Rev SOBECC.* 2016;21(1):52-8. <http://doi.org/10.5327/Z1414-4425201600010008>
12. Bisinotto FMB, Dezena RA, Martins LB, Galvão MC, Martins Sobrinho J, Calçado MS. Queimaduras relacionadas à eletrocirurgia: relato de dois casos. *Rev Bras Anesthesiol.* 2017;67(5):527-34. <http://doi.org/10.1016/j.j.bjan.2016.03.003>
13. Oliveira DR, Jacinto SM, Siqueira CL. Auditoria de enfermagem em centro cirúrgico. RAS [Internet]. 2013 [acessado em 10 maio 2018];15(61):151-8. Disponível em: http://www.cqh.org.br/portal/pag/anexos/baixar.php?p_ndoc=1021&p_nanexo=506
14. Araujo MM, Diniz SOS, Silva PS. Registros de enfermagem: reflexões sobre o cotidiano do cuidar. *ABCS Health Sci.* 2017;42(3):161-5. <http://doi.org/10.7322/abcshs.v42i3.920>
15. Setz VG, D'Innocenzo M. Avaliação da qualidade dos registros de enfermagem no prontuário por meio da auditoria. *Acta Paul Enferm.* 2009;22(3):313-7. <http://dx.doi.org/10.1590/S0103-21002009000300012>
16. Melo DFF, Nunes TAS, Viana MRP. Percepção do enfermeiro sobre a implantação da sistematização da assistência de enfermagem no centro cirúrgico. *Rev Interd [Internet].* 2014 [acessado em 6 jun. 2018];7(2):36-44. Disponível em: https://revistainterdisciplinar.uninovafapi.edu.br/index.php/revinter/article/view/425/pdf_126
17. Botelho J, Veloso GBL, Favero L. Sistematização da assistência de enfermagem: o conhecimento da equipe de enfermagem de um centro cirúrgico. *Enferm Foco.* 2013;4(3-4):198-201. <http://doi.org/10.21675/2357-707X.2013.v4.n3/4.552>
18. Riegel F, Oliveira Jr. NJ. Processo de enfermagem: implicações para a segurança do paciente em centro cirúrgico. *Cogitare Enferm.* 2017;22(1):1-5. <http://doi.org/10.5380/ce.v22i1.45577>
19. Brasil. Lei nº 8.078, de 11 de setembro de 1990. Dispõe sobre a proteção do consumidor e dá outras providências. *Diário Oficial da União [Internet].* 2017 [acessado em 7 jun. 2018];Seção 1 (Supl.). Disponível em: <http://www2.camara.leg.br/legin/fed/lei/1990/lei-8078-11-setembro-1990-365086-publicacaooriginal-1-pl.html>

VALIDATION OF DAILY MEDICAL DEVICE CLEANING IN THE STERILE PROCESSING DEPARTMENT

*Validação da limpeza de produtos para saúde no
cotidiano do centro de material e esterilização*

*Validación de la limpieza de productos de salud
en todos los días del centro de material y esterilización*

Rafael Queiroz de Souza^{1*} , Ana Tércia Bariján² , Jeane Aparecida Gonzalez Bronzatti³ ,
Paulo Roberto Laranjeira⁴ , Kazuko Uchikawa Graziano⁵ 

ABSTRACT: Objective: To discuss the aspects that should be considered in the concurrent cleaning validation at Sterile Processing Department (SPD). **Method:** Narrative review of scientific literature, legislation, and pertinent normalizations. **Results:** The routine cleaning validation should consider the product design, definition, and feasibility of standard operating procedures (SOP); SPD structure; staff sizing; selection and training; and the recording and interpretation of results obtained by routine chemical tests. **Conclusion:** The concurrent cleaning validation of health products at SPD points out the value of this stage to all employees in the sector such that cleaning becomes a core function of health service product processing. **Keywords:** Operating Room Nursing. Perioperative Nursing. Consumer Product Safety. Quality Assurance, Health Care. Quality Control.

RESUMO: Objetivo: Discutir os aspectos que devem ser considerados na validação concorrente da limpeza no Centro de Materiais e Esterilização (CME). **Método:** Revisão narrativa da literatura científica, legislação e normatização pertinentes. **Resultados:** A validação da limpeza na rotina deve considerar: o *design* dos produtos, a definição e a exequibilidade dos procedimentos operacionais padrão, além da estrutura do CME, dimensionamento, seleção e treinamento de pessoal, registro e interpretação dos resultados obtidos pelos testes químicos na rotina. **Conclusão:** A validação concorrente da limpeza dos produtos para saúde no CME imprime a cultura da valorização dessa etapa do processamento entre todos os colaboradores do setor, de tal forma que a limpeza passa a ser, de fato, o núcleo central do processamento. **Palavras-chave:** Enfermagem de centro cirúrgico. Enfermagem perioperatória. Segurança de produtos ao consumidor. Garantia da qualidade dos cuidados de saúde. Controle de qualidade.

RESUMEN: Objetivo: Discutir los aspectos que deben considerarse en la validación concurrente de limpieza en el Centro de Materiales y Esterilización (CME). **Método:** revisión narrativa de la literatura científica relevante, legislación y normas. **Resultados:** La validación de la limpieza en la rutina debe considerar: el diseño de los productos, la definición y la viabilidad de los procedimientos operativos estándar, además de la estructura del CME, dimensionamiento, selección y capacitación del personal, registro e interpretación de los resultados obtenidos por las pruebas químicas en el rutina **Conclusión:** La validación concurrente de la limpieza de productos de salud en CME impresiona la cultura de valorar esta etapa de procesamiento entre todos los empleados del sector, de tal manera que la limpieza se convierta, de hecho, en el núcleo central del procesamiento. **Palabras clave:** Enfermería de quirófano. Enfermería perioperatoria. Seguridad de productos para el consumidor. Garantía de la calidad de atención de salud. Control de calidad.

¹Nursing degree; post-doctorate in sciences. Researcher and professor of lato and stricto sensu graduate courses; hired speaker for product processing companies on patient health and safety - São Paulo (SP), Brazil.

²Nursing degree; Master's in Sciences. Specialization in scientific and educational matters at the Medical Solutions Division of 3M do Brasil - Sumaré (SP), Brazil

³Nursing degree; PhD in Sciences through the School of Nursing at the Universidade de São Paulo (USP). Researcher and professor of graduate courses lato sensu in Brazil and stricto sensu in Peru through the Universidad Alcalá. Technical Health Consultant; speaker hired by companies to address issues in the areas of surgical assistance and health product processing - São Paulo (SP), Brazil.

⁴Electrical engineering degree; doctorate in sciences. Sterilization Guarantee Manager at Cardinal Health. 3M speaker; member of the Association for the Advancement of Medical Instrumentation - United States.

⁵Nursing degree. Senior Professor, Department of Medical-Surgical Nursing, School of Nursing, Universidade de São Paulo; pedagogical coordinator of the MBA/CSSD course, from the Faculdade CEAT - São Paulo (SP), Brazil.

*Corresponding author: rafaelqsouza@hotmail.com

Received: 10/12/2019 - Approved: 01/19/2020

DOI: 10.5327/Z1414-4425202000010009

INTRODUCTION

The validation of standard operating procedures (SOP) has been a recurring theme in discussions involving safety in the processing of medical devices (MD). The growing concern with this topic is justified mainly by the complexity of products destined for less invasive procedures, which has imposed increasing challenges to Sterile Processing Department (SPD), such as clamps for robotic surgery and digestive endoscopes with inaccessible channels.

In the given context, cleaning stands out as a fundamental procedure, as it makes products safe to handle and prepares them for disinfection or sterilization¹. In the United States, the Food and Drug Administration (FDA) has published its own guidelines for the validation of instructions for use (IFU) while processing health services products². In Brazil, there have been similar initiatives, such as the translation of the ISO 17664³ standard, which establishes information on processing that must be provided by the manufacturer to users, as well as the Resolution of the Collegiate Directorate of the National Health Surveillance Agency (ANVISA) number 15¹, which requires that each stage of processing follow a SOP based on updated scientific references and pertinent standardization.

For SOP to be validated, sophisticated laboratory methods are invariably used for the detection of organic waste, with high sensitivity and standardized procedures such as those published by the *International Organization for Standardization (ISO)*, *Association for the Advancement of Medical Instrumentation (AAMI)*, *FDA* and *pharmacopoeias*. Although necessary in prospective validations, these methods are often not routinely usable, and professionals often ask: *how can we ensure that the results “validated” (our emphasis) by the manufacturer are being achieved in practice?* Additionally, owing to the lack of clear direction from regulatory agencies and standardization of the validation process, manufacturers may provide IFU inconsistent with good practices, without proof of validation, validated under conditions that do not simulate a SPD, and which are sometimes impossible to follow, causing distrust about their applicability.

To answer this question, the concept of validation, which includes producing objective evidence such that the specific requirements for a certain purpose can be consistently fulfilled, needs to be reexamined⁴. In studies involving the validation of cleaning processes, consistent results can be obtained by

elaborating and fulfilling a SOP, which aims at standardizing and reducing the variability of results.

Consistent results in a laboratory scenario are facilitated by the control of variables; however, in the cleaning area, many SOP compromising factors may be present, whether structural (undersized physical area), technological (obsolete and faulty equipment), materials (consumables, such as detergents) and human (variations in individual characteristics of staff members such as physical strength, ability, and familiarity with SOP), among others². Thus, besides SOP, another procedure that is necessary to ensure quality is monitoring, which can be carried out by inspections through magnifying glasses and chemical tests for use at SPD¹, both of which are easy to incorporate into the routine.

Based on the information presented, this study will discuss the aspects that should be considered in the concurrent validation of cleaning at SPD. It should be noted that this study is not intended to replace methods described in the relevant standards, which should be used by manufacturers in the prospective validation of IFU; its purpose is to support professionals in the validation of cleaning SOP in SPD's daily routine.

OBJECTIVE

Discuss what aspects should be considered in the concurrent validation of the cleaning of health products at SPD.

METHOD

A narrative review of the scientific literature, and legal and regulatory documents that underpin validation procedures and how they tie in with SPD's day-to-day cleaning of MD.

RESULTS AND DISCUSSION

Characteristics of the MD that can be processed

The MD that can be processed allow for repeated cleaning, preparation, and disinfection or sterilization processes¹. However, several characteristics can influence cleaning, such as being dismountable to favor the cleaning of areas with

difficult access; being transparent to allow the visualization of dirt; having a solid structure to avoid the accumulation of dirt; having an internal structure that allows the entry and exit of water, which facilitates the removal of dirt by the mechanical action of water⁵; and the quality of the finish of the internal surfaces.

In practice, it is noted that the design of the products does not always favor cleaning, and the difficulty of removing dirt is increased by the type of organic matter (e.g., blood, bone, or fat) contained in it. Additionally, scientific literature has shown that products routinely processed by SPD, such as flexible intramedullary reamers, are not cleanable owing to conformation⁶. Therefore, a careful analysis of the cleanability of each product is necessary, considering not only the technical capacity, but also the accessibility of the design.

Structure for the implementation of SOP

The concurrent validation of cleaning SOP is necessary owing to the variety of inputs and equipment at SPD. Although the instructions for use (IFU) contain all the information needed for cleaning³, in practice, it is noted that the market offers different equipment, solutions, and artifacts for cleaning, such as brushes, sponges, and PULL THRU™ cleaning devices, among others. There are services where manual processes predominate, while in others, automated processes do, but SPD can only process MD compatible with their technical operational capacity and infrastructure classification¹.

In order to ensure consistency in cleaning results, the equipment used must be subject to installation, operating, and performance qualifications at least once a year¹. The equipment must be qualified within the standardized interval of 12 months or each time it undergoes maintenance, change of location, and suspected failures^{1,7}. These procedures must be in accordance with the change assessment, which consists of a protocol that establishes the critical operating points of the equipment and the routine, determining which qualification must be redone to ensure that the equipment remains qualified and the process validated⁷.

These procedures aim to ensure that the equipment has been delivered and installed according to its specifications, operates within the original manufacturing parameters, and has consistent performance, with identical parameters, using the most challenging load defined by

SPD¹. According to the manufacturers, the equipment may require verification procedures at each use: daily, quarterly, annually, or in accordance with the change control established in partnership with the clinical engineering service⁸. However, there is equipment, such as ultrasonic washers and fluent steam cleaning systems, which does not yet have technical construction and qualification standards, and it is recommended that the IFU of the respective manufacturers be followed. In general, for the conservation and operation of cleaning equipment, the manufacturers also recommend the criteria established in the ABNT NBR ISO 17665-2:2013⁹ standard regarding the quality of the water that is supplied to the equipment.

As for cleaning solutions, special attention should be given to IFU, including information on dilution, water quality for preparation, immersion time, temperature range, and pH. In addition, a SPD should have brushes compatible with the length, diameter, and IFU of the MD, with soft bristles so as not to damage the internal surfaces, and with a sufficient length of bristles to promote friction on the surface¹⁰.

Finally, the validation of cleaning procedures is conditioned not only by the structure available at a SPD, such as equipment and consumables, but also by the documented evidence that they are in the right condition for use through periodic verifications.

Definition of SOP

In general terms, the SOP is an official document that describes each critical and sequential step that should be taken by the operator to guarantee the expected result of a task¹¹ and should be widely disseminated and elaborated on the basis of scientific literature and related standards¹. As SOP is a standardized sequence for performing a given procedure, it is closely linked to the training of professionals working in the cleaning area.

The MD IFU includes all or some of the activities – point-of-use preparation, preparation, cleaning, disinfection, drying, inspection, maintenance, testing, packaging, sterilization, and storage – and is therefore the basis for defining a MD processing SOP in the SPD³. Any activities related to processing should be in accordance with the relevant national regulations and evidence-based recommendations from renowned national or international organizations.

However, the evaluation of the IFU provided by the manufacturer requires thorough analysis, especially in Brazil,

where they can be provided without validation. The literature has reported inconsistent recommendations, serious conceptual errors, and mistaken procedures in IFU¹². Only the MD manufacturer can provide the IFU. If the IFU is translated by the distributor, it must be an official translation or the user may request the original manufacturer to verify the content. Additional care should be taken regarding translation errors.

Any procedures must have their steps clearly described and be technically feasible for SPD staff to implement. SOP with excessively long execution times and many manual cleaning steps can lead to the normalization of deviations and inconsistencies, constituting a major challenge for SPD, as well as seriously compromising the effectiveness of cleaning, especially in services with little infrastructure and/or high demand⁶.

The total execution time of a given SOP can also be compromised by the logistics for receiving loaner sets (consigned MD) from SPD. The delivery of these MD outside the timeframe defined by SPD is a reality and can be a potential factor for non-compliance with SOP.

Sizing and training of personnel

In Brazil, historically, the operational activities developed at SPD have largely been carried out by technicians and nursing auxiliaries, while the technical and administrative management has been carried out by nurses. Despite the fundamental role that SPD plays in the quality of the assistance process, it is noted that it often has insufficient or inadequately qualified staff³.

All steps of MD processing must be performed by professionals for whom these activities are regulated by their class councils¹. In view of this situation, the Federal Nursing Council (COFEN) published the COFEN Resolution n.424/2012, which regulates the duties of nursing professionals at the SPD and MD processing companies¹⁴.

Recently, considering the need to review and update parameters that subsidized the planning, control, regulation, and evaluation of nursing care activities, COFEN established Resolution n. 0543/2017¹⁵. Currently, the staff needs to consider issues such as mission, vision, size, staff policy, material and financial resources; organizational and physical structure; types of services and/or programs; technology and complexity of services and/or programs; and attributions and competencies specific to the members of the different services¹⁵.

Technical–scientific and administrative aspects should also be considered, such as the dynamics of the units' operations in different shifts, managerial model, work methods, working hours, weekly workload, professional performance standards, technical safety index, proportion of senior and mid-level nursing professionals, and quality indicators¹⁵.

Even after making adjustments for the number of professionals at SPD, it is necessary to establish the minimum competence an individual should have to perform the activities in this sector. As this is a service in which tasks involve very specific procedures, in addition to technical competence, improvement and development must be valued through ongoing education.

Professionals working at SPD should receive initial guidance on how to address all tasks performed for MD, including those related to policies and procedures for infection prevention and control, safety, clothing, personal hygiene, state and federal legislation, and regulations¹⁶.

It is recommended that a continual education program be conducted at SPD at regular intervals, with the objective of reviewing and updating knowledge and skills (thus maintaining professional competence) and providing additional training whenever new products, equipment, and procedures are introduced¹⁶. The work associated with education and training provides workers with essential information to responsibly perform the activities assigned to them, reduce the risks of operational errors, and ensure that professionals are familiar with the techniques used¹⁶.

The professionals who work at SPD and at processing companies must receive specific and periodic training in the following topics: MD classification; basic microbiology concepts; transportation of contaminated products; cleaning processes; disinfection, preparation, inspection, packaging, sterilization, and operation of existing equipment; monitoring of processes by chemical, biological, and physical indicators; traceability, storage, and distribution of MD; and the maintenance of product sterility¹. Specific training for the use of personal protective equipment appropriate to the activities developed at SPD¹ should also be included.

Although SPD managers recognize the need for and importance of ongoing training for employees, the pace of work imposed on the sector rarely allows professionals to take leave from their jobs to receive the minimum training required by ANVISA or training on new procedures. To validate cleaning processes, in addition to having in place all the

standardized steps, it is essential to have committed professionals prepared to perform the SOP.

Chemical tests

A report of 234 events related to surgical MD associated 34% of the causes with inadequate cleaning and the dirt MD were detected in the operating room¹⁷. These data showed that there was a failure in inspection and monitoring, which are important tools for quality assurance at SPD¹⁶.

Cleaning monitoring evaluates the presence of organic and inorganic residues in the instruments, such as blood, biofilm, fats, tissue fragments, body secretions such as feces, respiratory secretions, microorganisms, bone cements, viscoelastic, and salts, among others¹⁶. This procedure should be performed through visual inspection, with the aid of image intensifier lenses, and complemented, when indicated, by chemical tests available in the market¹. Currently, some SPD already have higher resolution image amplification technologies, which are an excellent resource for monitoring as well as for the inspection of functionality, detecting fatigue and the onset of corrosion in small structures.

Some markers can assist in monitoring cleanliness, such as protein, hemoglobin, microbial load, and adenosine triphosphate¹⁶. Other tests are not yet routinely possible for carbohydrates, endotoxins, fats, and sodium; however, they can be performed in laboratories. Routine tests can be used to evaluate employee performance, effectiveness of cleaning SOP, and equipment functionality¹⁶.

Chemical tests provide quantitative information such as the relative light units for Adenosine TriPhosphate (ATP) detection. The cut-off values can be determined based on scientific reference or, when not available, by trend analysis of the historical series; it is therefore essential that the values obtained are stored. Another example is semi-quantitative tests, which change color when a certain type of dirt is above pre-established reference values. Before determining the choice of test, one must take into consideration the IFU, indications, and limitations of each technology.

Ideally, the cleaning verification should include inspection results and chemical tests, including internal (lumens) and external surfaces, effectiveness tests of the equipment used in the process (specific tests offered by various manufacturers), and monitoring of critical process parameters such

as temperature used (usually obtained from the forms and records made by the equipment itself)¹⁶.

SPD technical managers and managers shall establish appropriate quality levels for the products and services they produce and ensure that these levels are consistently maintained¹⁸. Therefore, more important than the choice of one or more tests is the management of the information provided for SPD quality control.

The concept of quality refers to the degree of excellence of a product or service, and one of the ways of evaluating it is by means of indicators. The results of the indicators can indicate inconsistencies in the process, which can be resolved by carrying out a cause analysis, identifying the problem, and then proposing changes to resolve them^{16,18}. Therefore, the implementation of any chemical tests should be accompanied by quality tools, such as the Pareto diagram, PDCA cycle (*Plan, Do, Check, Act*), *check* sheet, dispersion diagram, and cause-and-effect diagram.

In SPD's routine, it is noted that test results are recorded according to defined periodicity, but unsatisfactory results are often found and there is no action or contingency plan. In addition, professionals often make improper adaptations to monitoring technologies, for example, a product that was developed for monitoring thermosdisinfectors is used in ultrasonic washers.

Sampling and comparative controls in concurrent validation

In the concurrent validation of cleaning, criteria must be established to select the MD to be examined, either by the visual magnified method or by commercially available chemical tests¹, as it is impossible and unnecessary to legitimize the cleaning of all MD processed on a daily basis by SPD. This procedure, characterized as sampling¹⁹, should follow deliberately defined criteria, for example, the complexity of MD conformation from the perspective that "the more complex the MD, the more difficult it is to remove the retained dirt." In this sense, MD that have lumens should no doubt go through all the controls not only because of the assessment of the cleanliness of internal spaces but also if the lumens are patent passing rigid stems in search of, for example, solid residues such as bone remains in cannulated orthopedic instruments⁶. Another example is the evaluation of the presence of residues of viscoelastic solution solidified in hydrodissection cannulas. The rate of materials

found dirty, divided by the total number of units examined, will be the indicator of the quality of the cleaning that will signal problems that must be solved. These can be related to human resources performing the cleaning, the products and inputs used, equipment performance, and work overload in the cleaning sector. Other rational criteria suggested for sampling may be monitoring the cleaning quality of the employees starting the activity; monitoring the performance of recently acquired, obsolete, or after-maintenance cleaners; and monitoring the cleaning of complex MD, among others.

It should be emphasized that the competing validation of clean MD cleaning by automated methods should not be underestimated. The equipment may have different performances according to its history and origin, scheduled preventive maintenance, and time of use, and even those considered “excellent” in performance qualification may unexpectedly fail in a cycle owing to, for example, the “shadow area,” where the mechanical action of the jet under pressure or ultrasound is smaller

or even absent. That said, AAMI recommends the daily testing of equipment¹⁶.

Besides this case, the problem may also be related to human failure in loading the machines, an aspect that is more difficult to control but no less important.

FINAL CONSIDERATIONS

Through this study, it was demonstrated that the concurrent validation is beyond the simple compliance of the SOP, as it contemplates aspects related to the design of the products, feasibility of the SOP, SPD structure, sizing and training of personnel, and selection, documentation, and interpretation of the results obtained by the chemical tests.

The practice of concurrent validation of MD cleaning at SPD points out the value of this stage of processing to all professionals working in this section such that cleaning becomes a core function of processing.

REFERENCES

- 1 Brasil. Ministério da Saúde. Resolução da diretoria colegiada nº 15, de 15 de março de 2012. Dispõe sobre requisitos de boas práticas para o processamento de produtos para saúde e dá outras providências. Brasília, 2012.
- 2 U.S. Food and Drug Administration. Reprocessing medical devices in health care settings: validation methods and labeling. Guidance for industry and food and drug administration staff. 2015 [cited 2018 May 30]. Available at <https://www.fda.gov/downloads/medicaldevices/deviceregulationandguidance/guidancedocuments/ucm253010.pdf>
- 3 Associação Brasileira de Normas Técnicas (ABNT). NBR ISO 17664:2015: Esterilização de produtos para saúde — Informação a ser fornecida pelo fabricante para o processamento de produto para saúde reesterilizável. Rio de Janeiro, 2015.
- 4 U.S. Food and Drug Administration. Code of Federal Regulations Title 21 Part 820. Quality system regulation [cited 2018 May 30]. Available at <https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfcfr/CFRSearch.cfm?CFRPart=820>
- 5 Graziano KU, Bálsamo AC, Lopes CLBC, Zotelli MFM, Couto AT, Paschoal MLH. Criteria for evaluating difficulties in cleaning single-use articles. *Rev. Latino-Am. Enfermagem*. 2006; 14(1):70-76. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S010411692006000100010&lng=en. <http://dx.doi.org/10.1590/S0104-11692006000100010>.
- 6 Souza R, Bronzatti J, Laranjeira P, Mimica L, Silva C, Cruz A, Graziano K. Safety assessment of reprocessing of flexible intramedullary bone reamers for orthopedic surgery. *Revista SOBECC [Internet]*. 2017 Abr 4; [Citado em 2018 Jun 21]; 22(1): 17-22. Disponível em: <https://revista.sobecc.org.br/sobecc/article/view/137>
- 7 Associação Brasileira de Normas Técnicas (ABNT). NBR ISO 17665-1, Esterilização de produtos para saúde - Vapor - Parte 1: Requisitos para o desenvolvimento, validação e controle de rotina nos processos de esterilização de produtos para saúde. Rio de Janeiro: ABNT; 2010.
- 8 Laranjeira P, Bronzatti J, Souza R, Graziano K. Bases for safe use of thermal washer disinfectors emphasizing the release for use after technical intervention. *Revista SOBECC [Internet]*. 2016 Dez 2; [Cited 2018 May 11]; 21(3): 178-184. Available in: <https://revista.sobecc.org.br/sobecc/article/view/129>
- 9 Associação Brasileira de Normas Técnicas (ABNT). NBR ISO 17665-2, Esterilização de produtos para saúde - Vapor - Parte 2: Guia de aplicação da ABNT NBR ISO 17665-1. Rio de Janeiro: ABNT; 2013.
- 10 Bajolet O, Ciocan D, Vallet C, De Champs C, Vernet-Garnier V, Guillard T. et al. Gastroscopy-associated transmission of extended-spectrum beta-lactamase-producing *Pseudomonas aeruginosa*. *J Hosp Infect*. 2013 Apr;83(4):341-3.

- 11 Nogueira LCL. Gerenciando pela qualidade total na saúde. 3ª ed. Nova Lima: INDG Tecnologia e serviços LTDA, 2008.
- 12 Bruna C, Souza R, Almeida A, Suzuki K, Turrini R, Graziano K. Laryngoscope handles reprocessing: integrative review. *Revista SOBECC* [Internet]. 2016 Jun 8; [cited 2018 May 11]; 21(1): 37-45. Available in: <https://revista.sobecc.org.br/sobecc/article/view/40>
- 13 Costa JA, Fugulin FMT. Nursing activities in central supply and sterilization: a contribution to personnel design. *Acta Paul Enferm*. 2011; 24(2):249-56. Disponível em: www.scielo.br/pdf/appe/v24n2/15.pdf
- 14 Conselho Federal de Enfermagem – COFEN. Resolução COFEN n. 424/2012: Normatiza as atribuições dos profissionais de enfermagem em Centro de Material e Esterilização (CME) e em empresas processadoras de produtos para saúde. Disponível em: www.cofen.gov.br/resoluco-cofen-n-4242012_8990.html
- 15 Conselho Federal de Enfermagem – COFEN. Resolução COFEN n. 0543/2017: Atualiza e estabelece parâmetros para o dimensionamento do quadro de profissionais de enfermagem nos serviços/locais em que são realizadas atividades de enfermagem. Disponível em: www.cofen.gov.br/wp-content/.../RESOLUÇÃO-COFEN-Nº-543-2017-completa.pdf
- 16 American National Standard/Advancing Safety in Healthcare Technology – ANSI/AAMI ST79: 2017. Comprehensive guide to steam sterilization and sterility assurance in health care facilities. Arlington, VA, 2017.
- 17 Event Reporting & Analysis - Alerts. (2017). If It's Not Clean, It's Not Sterile: Reprocessing Contaminated Instruments. Institute, ECRI. Retrieved from <https://www.ecri.org/components/PSOCore/Pages/e-lert041117.aspx?PF=1?source=print>
- 18 International Association of Healthcare Central Service Material Management – IAHCSCMM. Quality Assurance. Chicago-IL, 2016.
- 19 Silva NN. Amostragem Probabilística: Um Curso Introdutório. São Paulo: EDUSP – Editora da Universidade de São Paulo, 2001.