QUALITY MEASUREMENT IN THE OPERATING ROOM: WHICH INDICATORS DO WE USE?

Medição da qualidade em centro cirúrgico: quais indicadores utilizamos?

Medida de calidad en centro quirúrgico: ¿qué indicadores usamos?

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ABSTRACT: **Objective:** To identify the indicators used by nurses working in the operating room and how they are managed. **Method:** Descriptive, cross-sectional, and quantitative study, carried out from October 2018 to February 2019. The sample was a convenience sample, with nurses from Brazilian operating rooms who answered a questionnaire with 53 questions. Data analysis was performed using descriptive statistics and χ^2 statistical test with a significance level of 5%. **Results:** The indicators most managed by nurses were: number of surgeries canceled (81.6%), infection rate of the surgical site (78.5%), and occupation of operating rooms per month (69.6%). There was a significant difference in the management of indicators between hospitals with and without external quality assessment, in terms of training (p=0.000) and sharing the results with the teams (p=0.000), which proved to be equal for the difficulty in using the tool (p=0.803). **Conclusion:** Although the indicators are monitored by nurses and hospitals with external assessment show better results in some items of management and use of indicators, institutions still need to invest in the improvement of professionals and the management of the tool.
Keywords: Nursing. Operating rooms. Management indicators. Quality management. Patient safety.

RESUMO: **Objetivo:** Identificar quais são e como são gerenciados os indicadores utilizados pelos enfermeiros que atuam em centro cirúrgico. **Método:** Estudo descritivo, transversal e quantitativo, realizado no período de outubro de 2018 a fevereiro de 2019. A amostra foi composta de conveniência, com enfermeiros de centros cirúrgicos brasileiros que responderam a um questionário com 53 questões. A análise de dados foi realizada por meio de estatística descritiva e teste estatístico χ^2, com nível de significância de 5%. **Resultados:** Os indicadores mais gerenciados pelos enfermeiros foram: quantidade de cirurgias canceladas (81,6%), taxa de infecção do sítio cirúrgico (78,5%) e ocupação de salas cirúrgicas por mês (69,6%). Observou-se diferença significante da gestão dos indicadores entre hospitais com e sem avaliação externa de qualidade, nos quesitos treinamentos (p=0,000) e compartilhamento dos resultados com as equipes (p=0,000), que se mostraram iguais para dificuldade em utilizar a ferramenta (p=0,803). **Conclusão:** Apesar de os indicadores serem monitorados pelos enfermeiros e os hospitais com avaliação externa apresentarem melhores resultados em alguns itens de gerenciamento e uso de indicadores, as instituições ainda precisam investir no aprimoramento dos profissionais e na gestão da ferramenta.
Palavras-chave: Enfermagem. Centros cirúrgicos. Indicadores de gestão. Gestão da qualidade. Segurança do paciente.

RESUMEN: **Objetivo:** identificar los indicadores utilizados por las enfermeras que trabajan en el quirófano y cómo se gestionan. **Método:** Estudio descriptivo, transversal y cuantitativo, realizado entre octubre de 2018 y febrero de 2019. La muestra fue por conveniencia, compuesta por enfermeras de centros quirúrgicos brasileños que respondieron un cuestionario con 53 preguntas. El análisis de los datos se realizó mediante estadística descriptiva y prueba estadística de χ^2, con un nivel de significación del 5%. **Resultados:** Los indicadores más manejados por las enfermeras fueron: número de cirugías canceladas (81,6%), tasa de infección del sitio quirúrgico (78,5%) y ocupación de quirófanos por mes (69,6%). Hubo una diferencia significativa en el manejo de los indicadores entre hospitales con y sin evaluación de calidad externa, en términos de capacitación (p=0,000) y el intercambio de resultados con los equipos (p=0,000), mostrando lo mismo para la dificultad en el uso de la herramienta (p=0,803). **Conclusión:** Aunque los indicadores son monitoreados por enfermeras y hospitales con evaluación externa, muestran mejores resultados en algunos ítems de gestión y uso de indicadores, las instituciones aún necesitan invertir en la mejora de los profesionales y en el manejo de la herramienta.
Palabras clave: Enfermería. Centros quirúrgicos. Indicadores de gestión. Gestión de la calidad. Seguridad del paciente.

INTRODUCTION

With the advancement of health and the systematization of care, the creation of evidence-based, reliable, and quality technical measures for measuring data was essential to efficiently cover all areas that involve health[1].

Indicators are tools used to analyze, acquire, identify, and measure actions or information related to the quality of care, illness, epidemiology, and health of the contexts covered, serving to synthesize them through numerical concepts. Its elaboration depends on what one wants to investigate, according to the individual needs of each situation. The quality of the information used will result in its effectiveness and reliability[1,2].

The different care processes, the logistical implications, and the vulnerability of the patient demand monitoring of standardized and structured measurements over time, so that the performance assessment and structural adequacy provide conditions of comfort and safety for both the patient and the team. The indicators can signal deviations and allow the problem to be reviewed, preventing these situations from becoming routine[3,4].

When using the indicators, those who can adapt to the characteristics and singularities of the sector must be considered. The operating room (OR) is a complex unit, with demand for spontaneous and emergency assistance and specificities, which needs control over its functioning to provide quality care. The use of indicators provides nurses with guidance for the management of the sector, enables the control of processes, guarantees the quality of services, besides managing their historical series, assessing the improvement processes implemented[3,5].

In this way, risks and negative consequences can be avoided within the OR if the use of quality indicators and the monitoring of management are efficient[3]. Institutions that have continuous assessment processes, such as certification or accreditation programs, are better prepared to provide qualified service and deal more easily with the management of their indicators, managing to maintain their results with greater invariability[6,7].

Different indicators are proposed to manage an OR, such as the occurrence of injury due to positioning, skin injury, falls, electric scalpel burn, maintenance of normothermia in patients, and turnover time in the operating rooms, among others, depending on the institution, the involvement of professionals and demands from top management[3-5]. This research was carried out considering that not all establishments use indicators to manage the OR and that there is also no consensus on which are necessary to monitor the quality of this service. Thus, based on the results found, the authors propose to answer the following question: which indicators are used by nurses to manage an OR?

OBJECTIVE

Identify what the indicators used by nurses working in OR are and how they are managed.

METHODS

A descriptive, cross-sectional study with a quantitative approach, carried out from October 10, 2018, to February 10, 2019. The sample was defined by convenience, with a population of professionals associated with the Brazilian Society of Operating Room Nurses, Anesthetic Recovery and Material and Sterilization Center (SOBECC), who can be nurses, nursing technicians, nursing assistants, students, surgical technicians, or other interested parties.

A structured instrument was developed based on scientific publications on indicators and managed by the online software Research Electronic Data Capture (REDCap). The instrument was composed of two parts: the first with nine questions for the sociodemographic and professional characterization of the participants and the second with 42 closed questions on indicators and management, with the options for answering yes or no, besides two open questions. As part of the questions, 33 indicators mentioned in the scientific literature were listed as possible to be used[2,7]. A pre-test of the instrument was carried out with four volunteers working in the OR area, who pointed out improvements in its structure, requested clarification on ambiguous questions, and suggested the addition of indicators, which were accepted. With the pre-test, it was possible to estimate the time of 20 min to complete the questionnaire.

The Society's guidelines regarding the distribution of the questionnaire were obeyed, whose messages to professionals registered at the national level were managed by the SOBECC secretariat, through an access link, preceded by the Free and Informed Consent Form. Three reminder messages were sent to members during the data collection period. The exclusion criterion adopted was that of professionals who were not

nurses, since there are partners from other professional categories in the society, as previously mentioned.

The data obtained were organized in an Excel® spreadsheet and analyzed using descriptive statistics and the χ^2 statistical test using a significance level of 5% (p <0.05).

The study was approved by the Research Ethics Committee of Universidade Federal de São Paulo, under the Certificate of Presentation for Ethical Appreciation (CAAE) No. 68023617.0.0000.5505, and by the SOBECC board of directors.

RESULTS

One hundred sixty-two people answered the questionnaire, and four were excluded because they were not nurses. Thus, the sample was composed of 158 nurses, 94 (59.5%) of whom were specialists in several areas such as OR, Urgency and Emergency, and Health Management; 81 (51.3%) in assistance positions and 77 (48.7%) in managerial positions; 58 (36.7%) with an average performance over ten years, with the average time of all participants being 10.3 years; 57 (36.1%) from the state of São Paulo, 21 (13.3%) from Rio de Janeiro, and 17 (10.8%) from Rio Grande do Sul; 66 (41.8%) worked in private hospitals and, of these, 70 (44.3%) in specialized hospitals; 53 (33.5%) nurses worked in large hospitals (with more than 300 beds) and 81 (47.5%) in hospitals with external quality assessment certification.

Thirty-three indicators were presented, and the participants indicated their use in the service. All indicators are measured more or less frequently, and 10 of them were managed by more than 50% of the professionals. Among the citations considered less recurrent, indicators managed by less than 25% were evidenced, as can be seen in Table 1.

When asked if they managed other indicators that were not covered by the questionnaire, 27 (17.1%) nurses answered yes and highlighted: number of robotic surgeries per month, turnover time in the operating room, medical delay, monitoring the time when the operating room (OR) stood waiting for the medical team to arrive, number of surgeries that exceeded the scheduled time, injury due to the use of a pneumatic tourniquet, and the effective rate of the safe surgery checklist.

Participants were asked if they would implement other indicators besides those presented and 46 (29.1%) said yes, highlighting: wrong or incorrect surgical schedule, number of surgeries per professional, patient's length of stay in the OR before referral to OR, pre-anesthetic visit, nursing

Table 1. Indicators used by nurses in operating rooms in Brazilian hospitals.

Indicators	n	%
Number of surgeries canceled	129	81.6
Surgical site infection	124	78.5
Occupation of operating rooms per month	110	69.6
Compliance to the safe surgery checklist	103	65.2
Patients with antibiotic prophylaxis at the appropriate time	96	60.7
Occupational accidents of nursing professionals	95	60.1
Falls	94	59.5
Lack of nursing professionals	88	55.7
Skin injuries	86	54.4
Number of surgeries performed without prior scheduling	82	51.9
Training of nursing professionals	78	49.4
Number of surgeries performed per day	72	45.6
Availability of equipment to perform surgery	70	44.3
Systematization of perioperative nursing care	68	43.0
Medication administration errors	66	41.8
Average length of stay in post-anesthetic recovery	66	41.8
Injury due to surgical positioning	65	41.1
Completion of medical records	65	41.1
Average length of stay in the operating room	65	41.1
Surgeries in the wrong place	64	40.5
Electric scalpel skin burn	64	40.5
Turnover of nursing professionals	59	37.4
Service availability (laboratory, radiology, others)	58	36.7
Surgeries on the wrong patient	57	36.0
Surgery delay	56	35.5
Complications following sedation	55	34.8
Risk-adjusted in-hospital surgical mortality	55	34.8
Unscheduled return to the operating room	51	32.3
Presence of the nurse throughout the period of operation	51	32.3
Patients with normothermia maintenance	44	27.8
Patients with fasting abbreviation	33	20.9
Nurses with a specialist degree	33	20.9
Participation of nurses in scientific events	30	19.0

visit, adverse reaction in blood transfusions, and counting of instruments (provided versus returned to the Material and Sterilization Center).

Table 2 shows the comparison between the indicators managed by more than 50% of the participants, according to the hospitals that have or do not have continuous assessment processes. The results show that, out of 10 indicators, eight have a significant difference, so there is more monitoring of indicators in institutions working on their quality management, undergoing external assessment processes.

As for the management of the indicators, most participants reported that they express the reality experienced (120/80.5%), are analyzed by managers/responsible person

(128/85.9%), the results are discussed with the nursing team (90/60.4%), improvement processes are implemented based on results (105/70.5%), and there is a historical series of indicators (97/65.1%). However, the majority responded negatively to the questions about the collection of indicators being a simple process (92/61.7%), the results being discussed with the multiprofessional team (77/51.7%), the results being compared with those of other institutions (108/72.5%), and training to manage them (97/65.1%), as shown in Table 3.

Table 4 shows the comparison between the management of indicators between hospitals that have or do not have continuous assessment processes. Even though there is no significant difference, professionals from both hospitals

Table 2. Comparison between the indicators managed by more than 50% of the participants, according to the hospitals that have or not continuous assessment processes.

Indicadores	With assessment n=71		No assessment n=84		p*
Number of surgeries canceled	63	88.7	64	76.2	0.043
Surgical site infection	65	91.5	57	67.8	0.000
Occupation of operating rooms per month	59	83.0	51	60.7	0.002
Compliance to the safe surgery checklist	59	83.0	44	52.4	0.000
Patients who received antibiotic prophylaxis at the appropriate time	56	78.9	38	45.2	0.000
Occupational accident of nursing professionals	47	66.2	47	55.9	0.193
Fall	52	73.2	40	47.6	0.001
Lack of nursing professionals	44	62.0	43	51.2	0.177
Skin injury	48	67.6	38	45.2	0.005
Number of surgeries performed without prior scheduling	44	62.0	37	44.0	0.03

*χ² test (0.05).

Table 3. Items related to the management of indicators.

Management items	Yes		No		Total
	n	%	n	%	
Do the indicators you use express the institutional reality you work on?	120	80.5	26	17.5	146
Do you think collecting indicators is a simple process?	54	36.2	92	61.7	146
Do the managers/responsible persons analyze the indicators?	128	85.9	19	12.7	147
Are the results discussed with the nursing team?	90	60.4	57	38.2	147
Are the results discussed with the multiprofessional team?	67	45.0	77	51.7	144
Are improvement processes implemented based on indicators?	105	70.5	40	26.8	145
Is there a historical series of indicators that provide a view of the results over time?	97	65.1	46	30.9	143
Are the results compared with those of other institutions?	39	26.2	108	72.5	147
Did you have the training to manage the indicators?	51	34.2	97	65.1	148

n<158 due to lack of response.

Table 4. Comparison of management items with "yes" answers for hospitals with and without external assessment.

Management items	With assessment n=71		No assessment n=84		p-value*
Do the indicators you use express the institutional reality you work on?	59	83.1	61	72.6	0.12
Do you think collecting indicators is a simple process?	24	33.8	30	35.7	0.803
Do the managers/responsible persons analyze the indicators?	63	88.7	65	77.4	0.63
Are the results discussed with the nursing team?	52	73.2	38	45.2	0.000
Are the results discussed with the multiprofessional team?	41	57.7	26	30.9	0.000
Are improvement processes implemented based on indicators?	54	76.0	51	60.7	0.041
Is there a historical series of indicators that provide a view of the results over time?	56	78.9	41	48.8	0.000
Are the results compared with those of other institutions?	22	31.0	17	20.2	0.124
Did you have the training to manage the indicators?	33	46.5	18	21.4	0.000

*x^2 test (<0.05).

believe that the process of collecting indicators is not simple (p=0.803). What is verified is the low investment in the training of nurses in both types of institutions, but those who have assessment processes still have it more frequently than those who do not have it (p=0.000).

Among these questions, there are still four others that showed a significant difference, pointing out that there is more involvement of the nursing and multiprofessional teams in the discussion of the results (p=0.000 and p=0.000, respectively), analysis of the tool over time (p=0.000) and greater concern with improvements based on indicators (p=0.041) in institutions subjected to external assessment processes.

DISCUSSION

The research allowed to know the nurses working in OR and their institutions, as well as what are the indicators used. One of the data that stands out is that most professionals have the title of specialist and occupy an assistance position, which allows identifying a group of professionals prepared to act on behalf of the patient in a sector with such complexity. A study carried out in seven public and private hospitals in two Brazilian cities to assess the perception of nurses about their importance in relation to work and the management of the sector pointed out a population of participants mostly of specialists (80%). This fact makes us reflect on the differentiation in professional training to work in the area[8]. However, our research showed that

having a specialist title is not an indicator that is frequently monitored by institutions.

Another national study, carried out in a philanthropic hospital in Minas Gerais to understand the perception of nursing professionals regarding the obstacles present during care in the intraoperative period, presented an organizational structure with nurse managers, supervisors, and mostly assistants, revealing the performance differentiated from their work compared to the body of nursing technicians[9].

The group of professionals in this research pointed to the monitoring of a range of indicators, as observed in the results. However, studies suggest that the indicators should not be closed and can be modified based on the needs of the patient or services. In a literature review, the authors cited as important indicators for monitoring injuries, falls, electric scalpel burns, injuries due to positioning, and infection of the surgical site[3]. Another publication suggested indicators such as operative time, the first surgery of the day, and non-operative time, related to the time management of surgeries, the availability of materials, and the OR preparation[10].

However, these same indicators stand out, which should be monitored in their entirety, for example, that of infection related to health care. According to Ordinance No. 2,616/1998, from the Ministry of Health, it is mandatory for all institutions to prevent and monitor indicators related to infection rates, so that there is no harm to patients[11].

Another indicator is compliance with the safe surgery list and the use of antibiotic prophylaxis as part of the safe

surgery checklist. Since 2013, the National Patient Safety Program has presented numerous initiatives for the implementation and proper management of this protocol, with specific indicators. However, there are still difficulties in the institutions, such as failure in the filling process, lack of compliance by the entire team, and problems with the reported information[12]. On the other hand, there is a commitment to try to improve compliance with this protocol by changing the institutional culture, continuing education, training, and internal audits[13].

One of the less frequent indicators found in this research is the fasting abbreviation. Its importance is because it provides a better sensation during the preoperative period and helps in post-surgical recovery, because the longer the fasting period, the greater the metabolic response, increasing the hormonal response related to the inflammatory process and influencing the healing process[14]. A study highlights the importance of building a pleasant service environment in times of discomfort, in addition to forecasting more efficient recovery for the patient[14].

The indicators cited in the literature and considered classics, such as falls, injuries caused by surgical positioning, electric scalpel burns, and injuries are fundamental. However, their monitoring is low in the studied group, revealing a worrying result. Studies mention the need for the nurse's commitment to ensure that damages are not caused to patients during their stay in the OR, to avoid aggravations in their conditions, and to provide adequate recovery, not prolonging their time in the hospital environment[3,15].

The research showed the dynamism of monitoring indicators based on the needs of each service, the reason why they must be continuously assessed. This idea became evident when the participants mentioned other indicators not covered by the research, such as, for example, the use of robotic surgery in the surgical environment. It is expected that this indicator will be monitored in a few hospitals since it is a different technology. This brings challenges in the development of nurses' skills concerning this type of surgery. To be able to manage this indicator, one must be aware of how the procedure works, what are the needs of the patient, the team, materials, and physical space, as well as the operation of the nursing team[16].

Although they are not a majority, there was a large contingent of professionals working in hospitals with quality certification. Institutions that undergo these processes manage the indicators more than those that do not. This statement is corroborated by an Arab study that presents results in relation to the monitoring of indicators, impacting the improvement of care and the results to the patient before and after accreditation[17].

This research brought the importance of managing the indicators and their knowledge by all those involved. It is evident that using the tool correctly and discussing its results with the teams generates greater commitment and understanding of the assistance and the processes to be instituted to improve the assistance. Through management and proper understanding of the tool, nurses will be able to maintain better-structured control of activities by pointing the aspects to be improved and the positive points of their service, which will make them clearer and more efficient[15].

Sharing these results with the teams is essential, since they are all part of the patient care process, with the nurse responsible for managing the OR so that the activities performed are effective[18].

Hospitals that have this feature have better environments to work on concerning patient care and the provision of professionals. There are constant incentives to carry out notifications of adverse events so that improvements can be made to the service. Also, there is a significant change in records since there is an understanding of the importance of proper registration[19].

Organizational learning involves continually reviewing processes and developing leadership committed to patient safety, as it provides ongoing support for improvement efforts and initiatives at different hierarchical levels. The hospital culture proposes a process for reporting adverse events and non-punitive actions for errors, to encourage professionals to identify failures, communicate them and learn from them instead of blaming themselves, in addition to encouraging teamwork, which, according to the study, it is presented as an issue highlighted by nurses as extremely important to provide care. Furthermore, the accreditation process can help in the development of institutional learning, as it influences the improvement and management of processes by the team and the commitment to comply with what is recommended regarding the patient safety culture[12,20].

However, further research on the use of indicators in OR and its management can be proposed, addressing the information systems of the institutions, the process of event reporting, and the analysis of the root cause, essential conditions for the continuous improvement of assistance[21].

The limitations of the study refer to the fact that information was presented with significant differences about

nurses who work in hospitals with assessment processes. However, there is no way to know the number of hospitals represented by them, which may be a bias in the present study. As a methodological option, the indicators were presented by their title and not by their formula, which may have generated different understandings in the participants and influenced their responses.

CONCLUSION

This study allowed us to verify what the indicators are and how nurses manage them in the OR, with all indicators being managed in a greater or lesser number. The number of surgeries canceled, the infection rate of the surgical site, occupation of operating rooms per month, compliance to the safe surgery checklist, and patients who received antibiotic prophylaxis at the appropriate time are among the most monitored indicators. In contrast, patients with a fasting abbreviation, specialist nurses, and nurses' participation in scientific events are the least monitored indicators.

It is noted that nurses understand the need for the tool, since other indicators, such as robotic surgery, are cited as part of their care reality.

The management of the indicators is present, but it is still considered a difficult process by most professionals, with no significant difference between institutions with and without external quality assessment for this item. There is a lack of training in both types of hospitals, but with a significant difference, since accredited institutions have more training to manage the tool, besides discussing their results with the nursing and multiprofessional team.

It is noticed that the institutions assessed have significantly better results with some indicators and management items. From this, it can be inferred that they are better prepared for care, to create improvements based on their results, and closer to achieving excellence in care, since the indicators allow avoiding financial and material waste and provide a broad view of care, therefore reducing risks and injuries to patients.

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