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RESEARCH ARTICLE (ORIGINAL)

Nurses' perceptions of the quality of perioperative care

Perceção dos enfermeiros sobre a qualidade em saúde no bloco operatório

Percepción de los enfermeros sobre la calidad de la salud en el quirófano

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Abstract

Background: Quality in health is an emergent concern, particularly in surgical settings, and is associated with the investment of each profession, including nurses.
Objective: To evaluate nurses' perceptions of the quality in health in the operating room as regards structure, process, and outcome.
Methodology: A descriptive study was conducted in a sample of 478 nurses working for at least 2 years in an operating room. An electronic questionnaire was applied, including the scales - Structure Indicators in the Operating Room (IEBO), Quality Care Processes in the Operating Room (PQABO), and Quality Outcomes in the Operating Room (RQBO).
Results: The highest evaluations occurred in outcomes. However, the structure dimensions, namely Circuits in the operating room, Continuity in nursing care, and Specificities of professional groups, had the lowest ratings.
Conclusion: The evaluation of quality is essential because of the important role that nurses can play in these settings, namely in planning corrections and improvements for the quality and safety of care.

Keywords: health evaluation; operating rooms; quality of health care; nursing

Resumo

Enquadramento: A qualidade em saúde é uma responsabilidade crescente, designadamente no bloco operatório, e está associada ao investimento de cada profissão, entre eles os enfermeiros.
Objetivo: Avaliar a perceção dos enfermeiros sobre a qualidade em saúde, no bloco operatório, no âmbito da estrutura, processo e resultado.
Metodologia: Estudo descritivo, com uma amostra de 748 enfermeiros com pelo menos 2 anos de atividade no bloco operatório. Através de um questionário eletrónico foram aplicadas as escalas - Indicadores de Estrutura no Bloco Operatório (IEBO), Processos de Qualidade Assistencial no Bloco Operatório (PQABO) e Resultados de Qualidade no Bloco Operatório (RQBO).
Resultados: As melhores avaliações recaem sobre o resultado, em oposição, as avaliações mais baixas recaem sobre as dimensões da estrutura designadamente Circuitos no bloco operatório, Continuidade na assistência de enfermagem e Especificidades dos grupos profissionais.
Conclusão: A avaliação da qualidade do bloco operatório assume real importância pelo papel preponderante que o enfermeiro pode desempenhar a este nível, designadamente planeando ações de correção e melhoria para a qualidade e segurança dos cuidados.

Palavras-chave: avaliação em saúde; salas cirúrgicas; qualidade da assistência à saúde; enfermagem

Resumen

Marco contextual: La calidad en la salud es una responsabilidad creciente, sobre todo en el quirófano, y está asociada a la inversión de cada profesión, incluido el personal de enfermería.
Objetivo: Evaluar la percepción de los enfermeros sobre la calidad de la salud en el quirófano, en el ámbito de la estructura, el proceso y el resultado.
Metodología: Estudio descriptivo, con una muestra de 748 enfermeros con, por lo menos, 2 años de actividad en el quirófano. A través de un cuestionario electrónico se aplicaron las escalas - Indicadores de Estructura en el Quirófano (IEBO en portugués), Procesos de Calidad Asistencial en el Quirófano (PQABO) y Resultados de la Calidad en el Quirófano (RQBO).
Resultados: Las mejores evaluaciones se refieren al resultado, mientras que las evaluaciones más bajas se refieren a las dimensiones de la estructura, a saber, los Circuitos en el quirófano, la Continuidad en los cuidados de enfermería y las Especificidades de los grupos profesionales.
Conclusión: La evaluación de la calidad del quirófano tiene una importancia real debido al papel preponderante que puede desempeñar el enfermero en este nivel, en concreto, la planificación de acciones de corrección y mejora de la calidad y la seguridad de los cuidados.

Palabras clave: evaluación en salud; quirófanos; calidad de la atención de salud; enfermería

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Introduction

The object of this study spans several thematic areas, in particular, nursing care in the operating room, healthcare unit management and quality, aiming at responding to the following pressing issue: "What is the nurses' perception of the quality of care in the operating room?".

The operating room is an organic-functional unit that consists of an integrated set of human, physical, and technical resources for the delivery of surgical treatment or completion of exams that require high-level quality (Ministério do Saúde, 2015). The environment of the operating room should be as perfect as possible to ensure the best quality in care delivery. Health care is continually changing, and health systems should focus on improving effectiveness to meet the growing needs of health services with high quality and low cost (Gómez-Ríos, Abad-Gurumeta, Casans-Francés, & Calvo-Vecino, 2019).

Operating rooms are incredibly complex systems, meaning that their evaluation requires the use of interdisciplinary and multi-sector structure, process, and outcome approaches. Quality assessment in these contexts needs a more comprehensive observation not only of the environmental factors of the environment, but also of roles of different members of the team, the tasks they perform, the processes occurring during a procedure and a myriad of other variables (Joseph, Bayramzadeh, Zamani, & Rostenberg, 2018).

Because quality in health is an increasingly pressing matter and is associated with the investment of each profession, especially nurses, this study aims to assess the perception of nurses about quality in health in the operating room as regards its structure, processes, and outcomes.

Background

This context of care is considered the most complex in the health field, so teams should be highly trained and qualified, working in a complementary manner and interacting with advanced technology in high-risk situations, committing to respond to the needs of the patient undergoing surgery (Ministério da Saúde, 2015). The operating room is a complex and often unpredictable environment, where multiple factors may generate inefficiency (Lee, Ding, & Guzzo, 2019) and errors (Pinheiro & Sousa, 2016). The environmental characteristics of these situations increase the risk of occurrence of errors and adverse events, and the most significant number of errors occur in this context (Ministério da Saúde, 2015).

Over the last few decades, major changes occurred in health, including significant advances in technological development which led to major concerns about patient safety. It should be noted that operating rooms are critical financial hubs for hospital systems, representing approximately one-third of all expenditures on health care (Lee et al., 2019). The operating room is one of the major sources of revenue and one of the largest areas of expenditure. Thus, the adequate management of these settings is a critical key to success (Gómez-Ríos et al., 2019). In this sense, health systems should focus on improving efficiency to meet the growing needs for high-quality and low-cost health care. For these services to be adequately efficient, it is essential to use valid indicators to measure and improve the quality of care. However, the majority of indicators focus on effectiveness and safety, with exact metrics (Chazapis et al., 2018). Berwick and Fox (2016) stress that quality measurement should not be focused solely on the final results but on the interaction between structure, process, and outcome.

In a review study on surgical indicators, Chazapis et al. (2018) reported that the majority of indicators identified nowadays are clinical, reflecting a growing concern for legal reporting and benchmarking. Berwick and Fox (2016) stated that the organization of the structure, process, and outcome concepts, proposed by Avedis Donabedian, remains vital to measure and improve quality. The contributions of Donabedian remain suitable for measuring the performance of health care (Ayanian & Markel, 2016; Berwick & Fox, 2016).

Despite the emergent literature on surgical safety (Graafland, Schraagen, Boermeester, Bemelman, & Schijven, 2015; Joseph et al., 2018), few studies are directed to the production of systemic indicators of care delivery (Gómez-Ríos et al., 2019; Lee et al., 2019), and even less by nurses (Fernandes & Peniche, 2015; Wu et al., 2017). The nurses who work in the operating room are involved in various activities, sometimes providing direct care, despite the difficulties of a complex and specific context (Santos, Silva, & Gomes, 2014). According to Wu et al. (2017), the quality of nursing care in the operating room consists of the effectiveness, safety, and crisis management, from a systemic perspective of continuous interdisciplinarity.

Research question

What is the perception of nurses about the quality in the operating room?

Methodology

A descriptive study was conducted from January to May 2018. A convenience sample was composed of 748 nurses working in the operating room. The inclusion criteria were nurses working directly in the operating room in Portugal for at least 2 years. The data collection was carried out with an electronic questionnaire on Google Forms, and each participant received by email the link to the survey. The form included a description of the study's purpose, the data collection instruments, and the informed consent for voluntary and anonymous participation. A first part consisted of sociodemographic questions, and the second part applied three scales relating to the evaluation of the structure, process and outcome (Structure Indicators in the Operating Room - IEBO, Quality Care Processes in the Operating Room – PQABO, and Quality Outcomes in the Operating Room - RQBO).

The IEBO, created by Gomes, Martins, Tronchin, and Fernandes (2018b) is composed of 28 items grouped into seven dimensions: Environment and equipment (5 items), Resources for quality and safety (7 items), Circuits in the operating room (4 items), Facilities and operational requirements (6 items), Training and practice in the operating room (3 items), Nursing care follow-up (2 items), and Specificities of professional groups (1 item).

The PQABO, validated by Gomes, Martins, Tronchin, and Fernandes (2018a), is composed of 17 items grouped into four factors: communication flows (7 items), strategies to support care processes (6 items), safety control (2 items), and teamwork (2 items).

The RQBO, created by Gomes et al. (2019), is composed of 13 items grouped into three dimensions: Evaluation of quality of care (6 items), Evaluation of processes (4 items), Control systems (3 items). The scales are presented in Table 1, with its different dimensions and corresponding ratings, to facilitate their understanding.

Table 1
Dimensions and evaluation of scales

Scales	Dimensions	MIN_MAX	QUALITY LEVEL	SCORES
IEBO	Environment and equipment	5-25	Low quality	5 to 14
			Medium quality	15 to 19
			High quality	20 to 25
	Resources for quality and safety	7-35	Low quality	7 to 20
			Medium quality	21 to 27
			High quality	28 to 35
	Circuits in the operating room	4-20	Low quality	4 to 11
			Medium quality	12 to 15
			High quality	16 to 20
	Facilities and operational requirements	6-30	Low quality	6 to 17
			Medium quality	18 to 23
			High quality	24 to 30
	Training and practice in the operating room	3-15	Low quality	3 to 8
			Medium quality	9 to 11
			High quality	12 to 15
	Continuity in nursing care and Specificities of professional groups	2-10	Low quality	2 to 5
			Medium quality	6 to 7
			High quality	8 to 10
	Specificities of professional groups	1-5	Low quality	1 to 2
			Medium quality	3
			High quality	4 to 5
PQABO	Communication flows	7-35	Low quality	7 to 20
			Medium quality	21 to 27
			High quality	28 to 35
	Strategies to support care processes	6-30	Low quality	6 to 17
			Medium quality	18 to 23
			High quality	24 to 30
	Safety control	2-10	Low quality	2 to 5
			Medium quality	6 to 7
			High quality	8 to 10
	Workteam	2-10	Low quality	2 to 5
			Medium quality	6 to 7
			High quality	8 to 10

RQBO	Evaluation of quality of care	6-30	Low quality	6 to 17
			Medium quality	18 to 23
			High quality	24 to 30
	Evaluation of processes	4-20	Low quality	4 to 11
			Medium quality	12 to 25
			High quality	16 to 20
	Control systems	3-15	Low quality	3 to 8
			Medium quality	9 to11
			High quality	12 to 15

The Ethics Committee approved the form used (opinion no. CES246-16). All ethical procedures provided for in research with human beings as required by the Declaration of Helsinki were ensured throughout the study. The anonymity of participants and the confidentiality of data were ensured by encoding the data from the questionnaires. For data treatment purposes, the IBM SPSS Statistics program, version 24.0) was used. Descriptive statistics were performed for data analysis.

Results

The 748 participants were mostly female (436 professionals or 58.6%), aged between 24 and 64 years (mean age is 42.9 years). The marital status of the majority was married (640 professionals or 64.2%), and the time of professional activity ranged between 2 and 44 years, with a mean of 19.4 years. Table 2 describes participants by specialty, type of hospital, type of activity in the operating room, and country region. The majority of participants had no specialty (72.9%), and according to the different areas of specialty, the most reported specialty was medical-surgical (16.7%). The majority works in the public sector (84.9%) in central operating theaters (84.9%).

Table 2
Characterization of the participants

Variables	N	%
Specialty		
Community Nursing	15	2
Medical-Surgical Nursing	125	16.7
Rehabilitation Nursing	30	4
Child Health and Pediatric Nursing	19	2.5
Maternal Health and Obstetric Nursing	7	0.8
Mental Health and Psychiatric Nursing	8	1.1
No specialty	544	72.9
Type of Hospital		
Private	66	8.8
Misericórdia	16	2.1
Military	3	0.4
Public	635	84.9
Other	28	3.6
Activity in the Operating Room		
Central	635	84.9
Emergency	16	2.2
Outpatient (OSS and ASC)	54	7.2
Orthopedics	18	2.4
Others	25	3.3

Region		
North	297	39.7
Center	178	23.8
Lisboa and Vale do Tejo	158	21.1
Alentejo	38	5.1
Algarve	3	.4
R. A. Madeira	3	.4
R. A. Azores	19	2.5
Other	52	7.0

Table 3 shows that, as regards the structure, the evaluation carried out by the nurses concluded a generally high quality only in the Facilities and operational requirements dimension. Medium quality was the evaluation for the Environment and equipment, Resources for the quality and safety, and Training and practice in the operating room dimensions. The Circuits in the operating room, Continuity in nursing care, and Specificities of professional groups dimensions obtained a low-quality evaluation. Differences among the professional categories only occurred in the Circuits in the operating room dimension, to which nurse specialist provided a higher quality evaluation.

As regards the process, the evaluation performed by nurses considered high quality in the Communication flows, Safety control, and Teamwork dimensions. A medium quality in the Strategies to support care processes dimension was concluded. Differences among the professional categories were only observed in the Communication flows dimension, being considered of higher quality by nurse specialists. Finally, as regards the results, the evaluation performed by nurses considered a medium quality for the Evaluation of quality of care and Control systems dimensions. The Evaluation of processes dimension received a low-quality evaluation. The mean ratings per professional category were considered higher by nurse specialists in the Evaluation of quality of care and Evaluation of processes dimensions.

Table 3
Characterization of the nurse's perception per category

Descriptive Measures						
Dimensions	Min	Max	Mean	Standard deviation	Quality level	Scale References
Structure_IEBO Scale						
Environment and equipment						
All nurses	5	25	18.3	4.6	Medium	Low quality: 5 to 14
Nurse Specialist	6	25	19.4	4.2	Medium	Medium quality: 15 to 19
Nurse without specialty	5	25	17.9	4.6	Medium	High quality: 20 to 25
Resources for quality and safety						
All nurses	9	35	25	5.5	Medium	Low quality: 7 to 20
Nurse Specialist	13	35	26.5	4.9	Medium	Medium quality: 21 to 27
Nurse without specialty	9	35	24.4	5.6	Medium	High quality: 28 to 35
Circuits in the operating room						
All nurses	4	20	11.7	4.8	Low	Low quality: 4 to 11
Nurse Specialist	4	20	12.1	4.8	Medium	Medium quality: 12 to 15
Nurse without specialty	4	20	11.5	4.7	Low	High quality: 16 to 20
Facilities and operational requirements						
All nurses	7	30	20.1	5.8	High	Low quality: 6 to 17
Nurse Specialist	8	30	21	5.7	High	Medium quality: 18 to 23
Nurse without specialty	7	30	19.7	5.8	High	High quality: 24 to 30
Training and practice in the operating room						
All nurses	3	15	11.3	2.8	Medium	Low quality: 3 to 8
Nurse Specialist	3	15	11.6	2.7	Medium	Medium quality: 9 to 11
Nurse without specialty	3	15	11.2	2.8	Medium	High quality: 12 to 15

Continuity in nursing care						
All nurses	2	10	3.9	2.7	Low	Low quality: 2 to 5
Nurse Specialist	2	10	4.2	2.9	Low	Medium quality: 6 to 7
Nurse without specialty	2	10	3.8	2.6	Low	High quality: 8 to 10
Specificities of professional groups						
All nurses	1	5	3.9	1.1	Low	Low quality: 1 to 2
Nurse Specialist	1	5	4.0	1.1	Low	Medium quality: 3
Nurse without specialty	1	5	3.9	1.1	Low	High quality: 4 to 5
Process_PQABO Scale						
Communication flows						
All nurses	8	35	28.2	4.6	High	Low quality: 7 to 20
Nurse Specialist	14	35	29.1	4.0	High	Medium quality: 21 to 27
Nurse without specialty	8	35	27.9	4.8	Medium	High quality: 28 to 35
Strategies to support care processes						
All nurses	8	30	20.4	5.2	Medium	Low quality: 6 to 17
Nurse Specialist	6	30	21.2	5.2	Medium	Medium quality: 18 to 23
Nurse without specialty	6	30	20.2	5.2	Medium	High quality: 24 to 30
Safety control						
All nurses	2	10	9.3	1.5	High	Low quality: 2 to 5
Nurse Specialist	2	10	9.3	1.4	High	Medium quality: 6 to 7
Nurse without specialty	2	10	9.2	1.5	High	High quality: 8 to 10
Teamwork						
All nurses	2	10	8.7	1.4	High	Low quality: 2 to 5
Nurse Specialist	5	10	8.9	1.2	High	Medium quality: 6 to 7
Nurse without specialty	2	10	8.7	1.5	High	High quality: 8 to 10
Outcome_PQABO Scale						
Evaluation of quality of care						
All nurses	6	30	18.1	6.6	Medium	Low quality: 6 to 17
Nurse Specialist	6	30	18.8	7.0	Medium	Medium quality: 18 to 23
Nurse without specialty	6	30	17.9	6.4	Low	High quality: 24 to 30
Evaluation of processes						
All nurses	4	20	11.9	4.2	Low	Low quality: 4 to 11
Nurse Specialist	4	20	12.5	4.2	Medium	Medium quality: 12 to 15
Nurse without specialty	4	20	11.7	4.2	Low	High quality: 16 to 20
Control systems						
All nurses	3	15	10.4	3.3	Medium	Low quality: 3 to 8
Nurse Specialist	3	15	10.1	3.2	Medium	Medium quality: 9 to 11
Nurse without specialty	3	15	9.3	3.2	Medium	High quality: 12 to 15

Table 4 presents the nurses' perception of quality by type of operating room. The ratings are low in emergency rooms, and the outpatient and orthopedics services have the highest. As regards nursing care follow-up, the quality was considered low in all types of operating room. Contrary to Specificities of professional groups, Safety control, and Teamwork dimensions, the quality was considered high in all types of operating room.

Table 4
Characterization of the nurse's perception per type of operating room

Dimensions	Descriptive Measures					
	Min	Max	Mean	Standard deviation	Quality level	Scale References
Structure_IEBO Scale						
Environment and equipment						
Central	5	25	18.3	4.5	Medium	Low quality: 5 to 14 Medium quality: 15 to 19 High quality: 20 to 25
Emergency	6	16	12.4	3.2	Low	
Outpatient	9	25	19.5	4.4	High	
Orthopedics	17	25	21.3	4.1	High	
Others	9	23	15.1	6.2	Medium	
Resources for quality and safety						
Central	9	35	24.8	5.4	Medium	Low quality: 7 to 20 Medium quality: 21 to 27 High quality: 28 to 35
Emergency	13	26	18.9	4.4	Low	
Outpatient	12	35	27.3	5.4	Medium	
Orthopedics	16	35	28.9	5.1	High	
Others	12	33	25.3	5.3	Medium	
Circuits in the operating room						
Central	4	20	11.7	4.7	Medium	Low quality: 4 to 11 Medium quality: 12 to 15 High quality: 16 to 20
Emergency	4	15	9.3	3.6	Low	
Outpatient	4	20	14.0	4.5	Medium	
Orthopedics	6	20	13.9	4.6	Medium	
Others	4	19	6.8	3.7	Low	
Facilities and operational requirements						
Central	7	30	20.1	5.6	Medium	Low quality: 6 to 17 Medium quality: 18 to 23 High quality: 24 to 30
Emergency	7	22	13.6	4.3	Low	
Outpatient	9	29	22.3	5.2	Medium	
Orthopedics	8	30	24.6	7.2	High	
Others	7	29	15.8	5.5	Low	
Training and practice in the operating room						
Central	3	15	11.4	2.7	Medium	Low quality: 3 to 8 Medium quality: 9 to 11 High quality: 12 to 15
Emergency	3	12	6.9	3.1	Low	
Outpatient	5	15	11.9	2.2	Medium	
Orthopedics	8	15	12.3	2.5	High	
Others	3	15	10.1	3.0	Medium	
Continuity in nursing care						
Central	2	10	3.8	2.6	Low	Low quality: 2 to 5 Medium quality: 6 to 7 High quality: 8 to 10
Emergency	2	8	2.7	1.7	Low	
Outpatient	2	10	5.4	2.9	Low	
Orthopedics	2	10	4.7	2.5	Low	
Others	2	10	3.7	2.6	Low	
Specificities of professional groups						
Central	1	5	3.9	1.1	High	Low quality: 1 to 2 Medium quality: 3 High quality: 4 to 5
Emergency	2	5	4.2	0.9	High	
Outpatient	1	5	3.8	1.1	High	
Orthopedics	1	5	3.6	1.5	High	
Others	1	5	3.8	1.1	High	
Process_PQABO Scale						
Communication flows						
Central	8	35	28.2	4.6	High	Low quality: 7 to 20 Medium quality: 21 to 27 High quality: 28 to 35
Emergency	14	35	24.2	5.5	Medium	
Outpatient	15	35	28.9	4.6	High	
Orthopedics	21	35	31.3	3.4	High	
Others	17	35	27.3	4.2	Medium	

Strategies to support care processes						
Central	6	30	20.3	5.1	Medium	Low quality: 6 to 17 Medium quality: 18 to 23 High quality: 24 to 30
Emergency	10	29	16.5	5.9	Low	
Outpatient	12	30	23.2	4.9	Medium	
Orthopedics	8	30	24.1	5.6	High	
Others	7	29	18.4	5.01	Medium	
Safety control						
Central	2	10	9.3	1.4	High	Low quality: 2 to 5 Medium quality: 6 to 7 High quality: 8 to 10
Emergency	8	10	9.6	0.6	High	
Outpatient	6	10	9.3	1.2	High	
Orthopedics	4	10	8.6	1.9	High	
Others	2	10	8.2	2.6	High	
Teamwork						
Central	3	10	8.7	1.4	High	Low quality: 2 to 5 Medium quality: 6 to 7 High quality: 8 to 10
Emergency	5	10	8.2	1.6	High	
Outpatient	6	10	9.1	1.1	High	
Orthopedics	3	10	8.3	2.1	High	
Others	2	10	8.5	1.6	High	
Outcome_PQABO Scale						
Evaluation of quality of care						
Central	6	30	17.9	6	Medium	Low quality: 6 to 17 Medium quality: 18 to 23 High quality: 24 to 30
Emergency	6	27	12.8	6	Low	
Outpatient	8	30	21.4	8	Medium	
Orthopedics	7	29	22.3	7	Medium	
Others	6	26	15.2	6	Low	
Evaluation of processes						
Central	20	4	11.8	4.1	Medium	Low quality: 4 to 11 Medium quality: 12 to 15 High quality: 16 to 20
Emergency	18	4	9.6	3.8	Low	
Outpatient	20	4	13.7	3.9	Medium	
Orthopedics	20	5	14.7	4.0	Medium	
Others	19	4	10.0	3.4	Low	
Control systems						
Central	15	3	10.3	3.2	Medium	Low quality: 3 to 8 Medium quality: 9 to 11 High quality: 12 to 15
Emergency	13	3	6.2	2.8	Low	
Outpatient	15	3	11.9	3.2	High	
Orthopedics	15	4	12.1	2.9	High	
Others	15	3	9.4	3.3	Medium	

Table 5 presents the result of comparisons between dimensions and categories of the scales per type of hospital. As regards structure, the evaluation carried out by the nurses concluded a higher quality in the *misericórdias* and private hospitals. The evaluations relating to process and outcomes did not vary significantly. The variations per country region were not presented because there were no relevant differences between regions.

Table 5
Characterization of the nurse's perception per type of hospital

Descriptive Measures						
Dimensions	Min	Max	Mean	Standard deviation	Quality level	Scale References
Structure_IEBO Scale						
Environment and equipment						
Public	5	25	17.9	4.5	Medium	Low quality: 5 to 14 Medium quality: 15 to 19 High quality: 20 to 25
Private	10	25	20.4	3.8	High	
Misericórdia	19	25	22.6	2.1	High	
Military	8	22	14.7	7.0	Medium	
Other	8	25	20.2	4.7	High	

Resources for quality and safety						
Public	9	35	24.7	5.4	Medium	Low quality: 7 to 20 Medium quality: 21 to 27 High quality: 28 to 35
Private	12	35	26.1	5.7	Medium	
Misericórdia	19	35	29.6	5.5	High	
Military	22	29	25.0	3.6	Medium	
Other	13	35	25.9	6.5	Medium	
Circuits in the operating room						
Public	4	20	11.5	4.8	Medium	Low quality: 4 to 11 Medium quality: 12 to 15 High quality: 16 to 20
Private	4	20	12.2	4.4	Medium	
Misericórdia	4	20	16.2	4.3	High	
Military	5	13	10.3	4.6	Low	
Other	4	20	12.6	4.8	Medium	
Facilities and operational requirements						
Public	7	30	19.8	5.8	Medium	Low quality: 6 to 17 Medium quality: 18 to 23 High quality: 24 to 30
Private	10	30	21.4	5.6	Medium	
Misericórdia	16	29	24.6	3.2	High	
Military	10	25	20.0	8.6	Medium	
Other	11	30	21.2	5.6	Medium	
Training and practice in the operating room						
Public	3	15	11.4	2.8	Medium	Low quality: 3 to 8 Medium quality: 9 to 11 High quality: 12 to 15
Private	4	15	10.8	2.7	Medium	
Misericórdia	3	15	11.1	3.1	Medium	
Military	10	13	11.7	1.5	Medium	
Other	5	15	11.0	2.8	Medium	
Continuity in nursing care						
Public	2	10	3.9	2.7	Low	Low quality: 2 to 5 Medium quality: 6 to 7 High quality: 8 to 10
Private	2	10	3.1	2.2	Low	
Misericórdia	2	8	5.0	2.8	Low	
Military	2	4	2.7	1.2	Low	
Other	2	10	4.0	2.4	Low	
Specificities of professional groups						
Public	1	5	3.9	1.1	High	Low quality: 1 to 2 Medium quality: 3 High quality: 4 to 5
Private	1	5	3.9	1.1	High	
Misericórdia	1	5	3.4	1.5	Medium	
Military	4	5	4.3	0.6	High	
Other	1	5	3.4	1.3	Medium	
Process_PQABO Scale						
Communication flows						
Public	8	35	27.9	4.6	High	Low quality: 7 to 20 Medium quality: 21 to 27 High quality: 28 to 35
Private	20	35	29.8	3.8	High	
Misericórdia	26	35	31.8	3.3	High	
Military	16	33	25.3	8.6	Medium	
Other	14	35	29.3	5.1	High	
Strategies to support care processes						
Public	6	30	20.3	5.3	Medium	Low quality: 6 to 17 Medium quality: 18 to 23 High quality: 24 to 30
Private	8	30	20.5	5.2	Medium	
Misericórdia	15	30	23.6	4.9	Medium	
Military	17	21	19	2.0	Medium	
Other	9	30	22.4	4.5	Medium	
Safety control						
Public	2	10	9.3	1.4	High	Low quality: 2 to 5 Medium quality: 6 to 7 High quality: 8 to 10
Private	2	10	8.7	1.8	High	
Misericórdia	7	10	9.7	0.7	High	
Military	5	10	8.3	2.9	High	
Other	3	10	9.1	1.8	High	
Teamwork						
Public	2	10	8.8	1.4	High	Low quality: 2 to 5 Medium quality: 6 to 7 High quality: 8 to 10
Private	3	10	8.3	1.8	High	
Misericórdia	5	10	9.1	1.6	High	
Military	7	10	8.3	1.5	High	
Other	4	10	8.4	1.5	High	

Outcome_PQABO Scale						
Evaluation of quality of care						
Public	6	30	17.7	6.5	Medium	
Privado	7	30	19.8	6.4	Medium	Low quality: 6 to 17
Misericórdia	6	29	22.1	7.2	Medium	Medium quality: 18 to 23
Military	16	20	18.3	2.1	Medium	High quality: 24 to 30
Other	6	30	21.2	6.5	Medium	
Evaluation of processes						
Public	4	20	11.7	4.1	Medium	
Privado	4	20	12.8	4.1	Medium	Low quality: 4 to 11
Misericórdia	7	20	14.6	4.1	Medium	Medium quality: 12 to 15
Military	8	10	9.3	1.2	Low	High quality: 16 to 20
Other	4	20	13.2	3.8	Low	
Control systems						
Public	3	15	10.2	3.4	Medium	Low quality: 3 to 8
Privado	6	15	11.7	2.6	High	Medium quality: 9 to 11
Misericórdia	3	15	11.7	3.4	High	High quality: 12 to 15
Military	6	11	9.3	2.9	Medium	
Other	3	15	11.6	3. 1	High	

Discussion

The services provided in an operating room to the patient undergoing surgery require an adequate organization of health professionals and equipment, supported by comprehensive and documented procedures that reflect a high-quality practice (Caspe Healthcare Knowledge System, 2016).

The operating room constitutes one of the most expensive hospital resources. It is essential to ensure that this resource is designed and used efficiently for quality of care and financial productivity (Perkins, Chiang, Ruiz, & Prager, 2014). Nurses are one of the key components of promoting efficiency and quality of care. The performance in an operating room is a specificity-laden challenge. Isolation, bureaucratic burden, close interprofessional relationship, and subtlety of anesthesia and surgery intertwine, creating the professional scenario of the nurse (Wu et al., 2017), in the different roles that the nurse plays, namely, scrub nurse, circulating nurse, nurse anesthetist, and nurse manager. This study was developed to identify the nurses' perception of the quality of health care in the operating room regarding its structure, process, and outcome.

Structure

The structure corresponds to how the organization presents itself according to its resources, standards, and organizational structure. These are the relatively stable and necessary characteristics of the care process (Fernandes & Peniche, 2015). The evaluation of these aspects was considered a medium in most dimensions. However, the Circuits in the operating room, Continuity in nursing care, and Specificities of professional groups dimensions received a low-quality evaluation, and the Facilities and operational requirements dimension a high-quality evaluation. The structural characteristics are an essential aspect of ensuring the quality of care provided. As regards the type of hospital, the evaluation of the structure was higher in *misericórdias* and private hospitals, which may also be associated with low investment in public establishments. As regards the type of operating room, the ratings are lower in emergency rooms and higher in outpatient and orthopedics services. The highest results obtained by the outpatient services may be related to the substantial investment provided by the Portuguese National Health System to the development of outpatient surgery.

These results reflect the data integrated into the Assessment of the National Situation of Operating Theaters, which states that "There is a great diversity of operating room models in Portugal due to historical developments of the institutions and structural characteristics affected by their origins. Many of them have changed over the years, not always at the structural level" (Ministério da Saúde, 2015, p. 181). It is beneficial and detrimental to use the structure to evaluate the quality of an operating room. On the one hand, the structural elements can be measured objectively, allowing easy comparisons across hospital facilities. On the other hand, few accurate structural measures are associated with known results for the patient.

Moreover, even if the benefits were associated, few hospitals have the capacity or resources to review their operating rooms or build new (Brownlee, Whitson, & Ibrahim, 2019). The "circuits in the operating room" dimension incorporates items such as "the operating room has a room of anesthetic induction" to increase its efficiency, "has a waiting room for the patient" before entering the operating room, "the circuit of the clean and dirty circuit is clearly separated is visibly separated," and "the circuit of surgical staff, patients, and instruments is properly separated" (Gomes et al., 2018b). The planning and general configuration of the operating room around the circuits of clean and dirty equipment can reduce confusion and delay during the procedures because a large part of the work of cleaning and preparing an operating room for the next case requires the ability to navigate between multiple devices. An intervention in the structure can help to minimize equipment on the floor, allowing faster floor cleaning and superior maneuverability (Brownlee, Whitson, & Ibrahim, 2019). The "specificities of professional groups" dimension includes

the specific characteristics (schedule, roles, and such.) of some professional groups that impact the functioning of the operating room (Gomes et al., 2018b). Planning the surgery is a highly complex task because it requires the coordination of different professionals, sometimes with conflicting interests, to maximize effectiveness and reach common goals (Gómez-Ríos et al., 2019). As regards the "continuity in nursing care" dimensions, it reflects the importance of pre and post-operative visits by operating nurses. It should be noted that the person-centered approaches relating to communication and education as an integral part of the activity of surgical nurses need to be reinforced (Pettersson, Öhlén, Friberg, Hydén, & Carlsson, 2017). The performance of the nurse in the operating room should include encouraging discussions and reflections and disseminating knowledge about nursing care within this context, addressing the technical and human dimensions, and suggesting the change of the current biomedical model (Santos et al., 2014).

The evaluation of the structure corroborates the data obtained in the study by Fernandes and Peniche (2015) on the perception of the surgical nursing team about hospital accreditation, which states that the dimension with the worst evaluation was structure.

Process

The evaluation of processes in the operating room is complex and related to countless variables that impact the quality and safety of care (Gomes et al., 2018a). The process indicators promote the commitment to improve quality because they often define goals that should be achieved (Chazapis et al., 2018).

As regards the process, the evaluation performed by the nurses considered high quality in most dimensions, and medium in the "strategies to support care processes" dimension. This dimension comprehends issues relating to the existence of a quality guide as a strategy for quality assurance, protocols, conducting a briefing and debriefing, using the checklist, and reporting non-conformities as the primary strategy for continuous improvement (Gomes et al., 2018a). This rating should be higher because of the substantial national and international investment in surgical safety (Pinheiro & Sousa, 2016), including the safety inspection checklist. The Surgical Safety Inspection Checklist proposed by the World Health Organization ensures that the surgeries occur without problems and also helps to avoid complications (Wu et al., 2017). Despite the efforts to work on the causes of surgical complications through specific tools, like the surgical safety inspection checklist, there has been little progress in the development of instruments to improve the processes globally (Gomes et al., 2018a; Joseph et al., 2018).

In the evaluation performed by type of operating room, the ratings were higher in the outpatient service, and more differences occur in the "communication flows" and "strategies to support care processes" dimensions. Outpatient surgery is a common practice that has been growing recently, reflected by the development of systems to ensure quality, improve processes, and minimize risks (Nunes, Gomes, Povo, & Alves, 2018). As regards the type of hospital, the differences were not relevant.

According to the 2015 report conducted by the Ministry of Health, "a constant and permanent evaluation of existing processes and a reflection are recommended to ensure greater accessibility, increased efficiency, improved quality of care, and less expense" (Ministério da Saúde, 2015, p. 211).

Outcomes

The outcomes correspond to the consequences of activities carried out in the health services, or by professionals involved (Fernandes & Peniche, 2015), and constitute the final result of care delivery (Brownlee, et al. 2019). Nowadays, there is a substantial concern with the identification of outcome indicators, especially, that should go beyond those traditionally used in service delivery (Gomes et al., 2019). As regards the outcomes, the quality in the "evaluation of processes" dimension was considered low by the nurses, which corresponds to the results presented previously. As regards the type of hospital, significant differences were not found between the institutions; better results were obtained regarding the type of operating room. The accurate monitoring and interpretation of quality of outpatient surgery indicators allow that the activities carried out in these settings improve gradually in various indicators, demonstrating how to sustain the continued progress in the quality of these centers (Nunes et al., 2018). The evaluation of the significant outcomes may vary according to the priorities but may contain several elements, like transfer rate, mortality rate, surgical site infection rate, time of room exchange, and patient satisfaction rate. Using outcomes for health evaluation is widely accepted because the majority believes it to be the result of assessing care delivery. As results are specific and deemed necessary, they have a high capacity to influence policies or become the basis for different interventions (Brownlee et al., 2019). The work of health professionals should not be limited to health care delivery, like in the past, they should participate in the management and take on the joint responsibility for the outcomes of effectiveness and efficiency (Gómez-Ríos et al., 2019).

Although this study has used instruments individually to measure structure, process, and outcome, as a significant source of reputation of Donabedian (Berwick & Fox, 2016), it is essential to emphasize that measuring quality may not focus solely on the final results, but rather on a continuous interaction between structure, process, and outcome (Berwick & Fox, 2016).

Conclusion

This study will constitute a contribution to practice because in health services the sole focus should not be on each profession or specialty individually and instead converge in the organization as a whole. Everyone should commit to improving the quality of healthcare services provided to patients and their families. The interdisciplinary approach in nursing should be emphasized to bring together the goals and the crucial parts of the many

professions involved in health care, hence the pertinence and relevance of this study. It addresses the context of nursing, focusing not only on the different roles that nurses play in the operating room (scrub nurse, circulating nurse, nurse anesthetist) but also on their influence as nurse managers in the operating room to evaluate the quality of the operating room. The results obtained in this study allow noting that the evaluations with a higher percentage of agreement are related to the outcome scale (RQBO), and the evaluations with the worst percentage of agreement are related to the structure scale (IEBO). Despite the high number of participants, this study is limited due to the size of the sample per region. Also, this quantitative approach should be complemented by a qualitative study to understand the reasons for no quality. Future research should replicate these instruments to monitor and promote the improvement of care.

Author contribution

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