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REVIEW ARTICLE

Nursing performance in the material and sterilization center: disinfection process of material for robotic surgery

Actuación de enfermería en el centro de material y esterilización: proceso de desinfección de material de cirugía robótica

Atuação da enfermagem no centro de material e esterilização: processo de desinfecção do material para cirurgia robótica

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Abstract

The present study, through a bibliographic research, has the intention to highlighting the relevance of the nursing professional in the Material and Sterilization Center of hospital institutions. Understanding that the CME corresponds to the "heart" of the hospital, the role of nurses working in this space is of paramount importance, given their responsibility in the participation, coordination, execution, supervision and evaluation of all stages of the processing of health products. In this bias, the study had a brief historical digression about the Material and Sterilization Center, in order to highlight robotic surgery in this context, elucidating the nursing professional as an indispensable role for the whole process. In this way, it was understood that Robotic Surgery is a great technological innovation for surgical procedures, since it guarantees better surgical conditions and less invasive procedures in care, articulating science, safety and quality, through the nursing team.

Descriptors: Material and Sterilization Center; Robotic Surgery; Nursing; Perioperative Nursing; Surgery Center.

Resumén

El presente estudio, a través de una investigación bibliográfica, tiene la intención de resaltar la relevancia del profesional de enfermería en el Centro de Material y Esterilización de instituciones hospitalarias. Entendiendo que el CME corresponde al "corazón" del hospital, el papel de los enfermeros que actúan en este espacio es de suma importancia, dada su responsabilidad en la participación, coordinación, ejecución, supervisión y evaluación de todas las etapas del procesamiento de los productos de salud. . En ese sesgo, el estudio tuvo una breve disgresión histórica sobre el Centro de Material y Esterilización, con el fin de resaltar la cirugía robótica en ese contexto, dilucidando al profesional de enfermería como un papel indispensable para todo el proceso. De esta forma, se entendió que la Cirugía Robótica es una gran innovación tecnológica para los procedimientos quirúrgicos, ya que garantiza mejores condiciones quirúrgicas y procedimientos menos invasivos en la atención, articulando ciencia, seguridad y calidad, a través del equipo de enfermería.

Descriptores: Centro de Material y Esterilización; Cirugía Robótica; Enfermería; Enfermería Perioperatoria; Centro Cirúrgico.

Resumo

O presente estudo por meio de uma pesquisa bibliográfica oriunda-se do intuito de salientar a relevância do profissional da enfermagem no Centro de Material e Esterilização das instituições hospitalares. Compreendendo que o CME corresponde ao “coração” do hospital, o papel do enfermeiro atuante neste espaço se faz de suma importância, dado sua responsabilidade na participação, coordenação, execução, supervisão e avaliação de todas as etapas do processamento de produtos para saúde. Neste viés, o estudo contou com uma breve digressão histórica acerca do Centro de Material e Esterilização, a fim de destacar a cirurgia robótica neste contexto, elucidando o profissional da enfermagem como papel indispensável para todo processo. Dessa forma, compreendeu-se que a Cirurgia Robótica é uma grande inovação tecnológica para os procedimentos cirúrgicos, uma vez que garante melhores condições cirúrgicas e procedimentos menos invasivos no atendimento, articulando ciência, segurança e qualidade, por meio da equipe de enfermagem.

Descritores: Centro de Material e Esterilização; Cirurgia Robótica; Enfermagem; Enfermagem Perioperatória; Centro Cirúrgico.

Introduction

Techniques of robotic surgical operations are being used increasingly in hospitals, since their method is minimally invasive to the patient. This procedure has been performed in surgeries related to the areas of urology, gynecology, cardiac surgery, thoracic surgery, among others. In this context, robotic instruments are highly complex for the cleaning process due to their conformation, and with that, the importance of the Nursing professional in the disinfection process of this material should be highlighted[1-6].

Until recently, the Material and Sterilization Center (CME) functioned as an extension of the Surgical Center, as it served almost exclusively to this sector. Today, the scenario values and enhances good processing practices in surgical centers in Brazil, through regulatory requirements in force[7,8].

The CME must have a professional with a higher level to coordinate all activities related to the processing of PPS, according to the professional competences defined in specific legislation. Professional performance must be exclusive in this unit throughout the working day, as determined by RDC ANVISA No. 15/2012 to ensure exclusive dedication and conditions for professionals to develop their work with quality, responsibility and technical-scientific knowledge[9].

In this light, the CME is configured in the context of the health organization, highlighted by its peculiarity and characterization as a support unit for all assistance and diagnostic services that need dental-medical-hospital articles to provide assistance to their users[6].

Even so, the understanding of the influence of cleaning, disinfection and sterilization procedures of materials in the prevention and control of hospital infections highlights the great need for this Center in Hospital Institutions, since they determine a direct impact on the quality of the service provided and imply, often, an increase in the period of hospitalization and, consequently, in the costs of hospital care[10,11].

Above all, the nurse is the standard used for being prepared through knowledge to correctly conduct the process of the surgical act, starting from the reception in the hospital until the surgery. And, in this specific study, the nurse working in the Material and Sterilization Center and specifically in the process of disinfection of material for robotic surgery, must be understood as a careful work and extreme responsibility for instrumentalizing direct care[1,4,5,12,13].

The general objective of the present research is based on analyzing the relevance of nursing in the material and sterilization center for the process of disinfection of material for robotic surgery. Thus, the specific objectives are: to understand what Robotic Surgery is; highlight the Material and Sterilization Center in the hospital context; to praise the role of the Nurse in the CME for the process of disinfection of material for robotic surgery.

Methodology

It is understood that the research method is a set of procedures and techniques used to collect and analyze data, which provides the means to achieve the proposed objective, that is, they are the "tools" we make use of in the research. , in order to answer our question.

Thus, to solve the research problem in order to achieve all the proposed objectives, the work consists of a bibliographic review, in which the methodological procedure to be adopted ends up as a systematic review research, bringing together relevant studies on CME and robotic surgery elucidating the role of nurses in this context, and aims to analyze what books, articles and journals report on the proposed topic. The searches were carried out in indexed databases such as SciELO, Ministry of Health, ANVISA, academic journals, legal documents and in books available in the college's library.

Thus, to carry out the study, we worked with indexers using the keywords: Material and Sterilization Center, Nursing, Robotic Surgery, Disinfection, Sterilization, Contamination, Cleaning, Surgical Materials, among others..

Results and Discussion

In order to weave reflections on robotic surgery, it is necessary to understand how technology has been shaping all spheres of society, in the scope of health, education, economy, etc.; it appears that robotic surgery is the highest technological procedure existing in health today.

In this sense, it becomes visible to see in our current context that as man develops, he creates practical and efficient means to achieve his purposes, thus, new inventions and/or readaptations arise to simplify his adaptation and survival. Technology is a “[...] set of scientific knowledge and principles that apply to the planning, construction and use of equipment in a certain type of activity”[6].

In this context, technologies are historical and cultural productions. Even so, the 21st century is marked by significant changes, as it has undergone the transformation of “material culture” into a new technological paradigm, in which it is organized through digital technologies[4].

In view of this, human development allowed the appropriation of the historical development of society and, thus, of the culture that encompasses all human construction carried out throughout history. Culture is divided into two groups: material things and non-material things. The group of material things includes work instruments, objects and machines. In the group of non-material things, non-physical aspects are included, such as knowledge, arts, habits and customs. Thus, according to the used and internalized culture, through which they have access in a given social group, man constitutes society and creates its culture.

It is thus understood that the human being, through his social relationships, appropriates culture and knowledge according to his life experience. Man, when appropriating a material instrument, creates knowledge about the tool and passes this knowledge on to his children, who will do the same later, thus making knowledge hereditary and perpetual. In this way, man is understood as a historical-cultural being, where knowledge of him provides a set of potentialities that will create means for his survival, from a

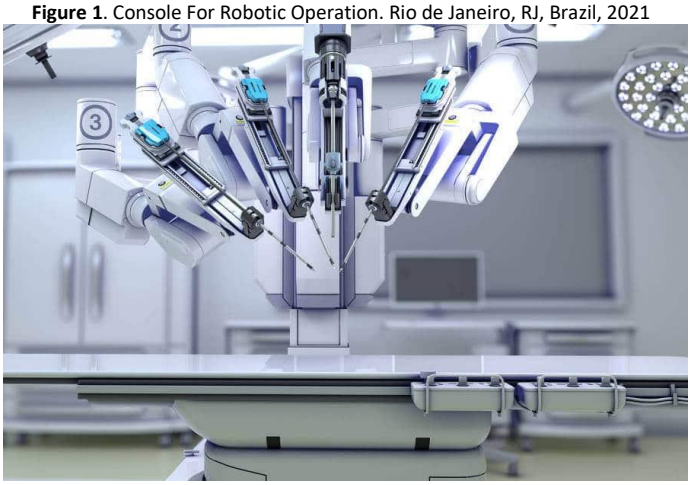
simple instrument to the most complex machines. By acquiring knowledge of the world, man develops science and art which, consequently, from his actions, his skills and knowledge are unified, acquiring his know-how. In view of this, man becomes able to discover in objects, attributes then unknown, being able to master them and develop new physical, psychic and cognitive functions[14].

Robots, originally conceived in the field of science fiction, have been artifacts that are increasingly present in contemporary human societies. In fact, these machines have gained space within the most diverse professional sectors, performing repetitive tasks that require high precision, often in situations with a high degree of danger. The term "robotics" derives from "robota", a Czech word meaning "servant" or "worker". The application of robots began in industries, but has expanded in the most different scenarios, from employment to explore the depths of the sea to use in rescue missions[1,12,15].

With the progress of robotics in the health area, and observing the current literature, it is noted that the implementation of robots has been beneficial in head and neck, gastrointestinal, gynecological, cardiac and urological surgical procedures[10]. Thus, robotic surgery as the highest form of technology is a reality today in many hospital units, which makes bioethical reflection on the relationships involving this procedure essential[3,13].

It is primarily understood that robotic surgery essentially consists of a console to operate the instrument and the robotic operation itself7,15, with four arms, through which three surgical instruments as well as the 3D camera system are controlled. In this way, the console can be illustrated by Figure 1 below:

Figure 1. Console For Robotic Operation. Rio de Janeiro, RJ, Brazil, 2021



Source: GSaúde (2021).

Figure 2. Robotic Parts. Rio de Janeiro, RJ, Brazil, 2021

Source: GSaúde (2021).

In this procedure, the surgeon is able to manipulate the movements of each arm of the Da Vinci robot individually through a joystick, similar to that of a video game. This simple fact already offers a great advantage to the surgeon, as it guarantees more freedom. The robot is not limited to exclusively linear maneuvers[1], but also in 360 degrees, making it possible to perform movements that were hitherto impossible.

With the help of the camera in one of the arms, the surgeon is able to orient himself, so nothing is done "blindly". In addition, the robot's arms ensure much more firmness in the actions, eliminating any tremor that the human hand could present. So everything is very safe and effective[5,7]. Some surgical instruments are used in the arms, illustrated in Figure 2.

Robots in a surgical environment make it possible to simulate basic tasks such as suturing, hemostasis and dissection – but also major procedures such as cholecystectomy and gastrofundoplication, among others. The simulators promise an intimate approach to reality, contributing to the improvement of surgical techniques and, at the same time, to minimizing the risks to real patients.[12,13].

The progress of robotics, together with the favorable results obtained with the use of robots in operations, has raised ethical discussions about its wide complexity and excellence in surgical procedures, since its method is minimally invasive to the patient[1,15]. In addition, robotic instruments are highly complex for the cleaning process due to their conformation, and with that, the importance of the Nursing professional in the disinfection process of this material, in the Material and Sterilization Center, should be highlighted[3,5,8].

It is known according to authors and researchers in the area that the CME is a technical support unit for inspection, preparation, cleaning, sterilization, packaging, storage and distribution of materials for health units. Its objective is to provide contamination-free materials for use in various clinical and surgical procedures and to standardize procedures for processing materials. In this context, this sector must be located close to the supply centers, such as the warehouse and laundry, and have easy transport and communication with receiving centers, such as C.C., Emergency, C.O. and other units. You must have access to locker rooms and toilets for the areas[7,16].

The requirements of this hospital field are complex and the server is responsible for providing materials free of any contamination, suitable for use. The history of sterilization and materials Processing Centers followed the surgical procedures, in order to guarantee better surgical conditions and less invasive procedures in care. This sector

works with a view to preventing infections, even if indirectly, articulating science, safety and quality, through the nursing team[5,10].

Ordinance No. 1884/94 of the Ministry of Health16 establishes that all health care establishments where there are Surgical Centers, C.O., Ambulatory, etc., must have a Material and Sterilization Center. Furthermore, this sector should be composed of the following areas:

Contaminated Area: This is the area intended for receiving contaminated material from all hospital units and where material is cleaned.

Preparation Area: This is the area where materials are inspected, prepared, packaged and identified for later sterilization and where all consumables are prepared.

Sterilization Area: This is the area where materials are sterilized.
Storage Area: It is a place of great importance, as it stores all the sterilized material to be distributed to the hospital units.

Dispensing Area: It is the area where the sterile material is distributed.

According to the Collegiate Board Resolution-CBR no. 50/2002, the CME includes: washing and decontamination area; preparation material; sterilization area; storage and distribution area for sterilized materials. Above all, CBR No. 307/2002 also states that the CME must exist when there is a center, delivery center and/or outpatient clinic, hemodynamics, high complexity emergency and urgency[2,5,17].

In addition, the Materials and Sterilization Center can be considered as the "heart" of the hospital[8], post its need for all hospital units, since it is only from this center that the other sectors will be able to follow up on patient care. Figure 3 shows a Materials and Sterilization Center:

Figure 3. Materials and Sterilization Centers. Rio de Janeiro, RJ, Brazil, 2021

Source: Bioplus (2020).

In this bias, the flow of the Material and Sterilization Center must be practical and continuous, so the team and the material must follow a unilateral flow, since the direction occurs from a contaminated area to a clean area.[12,13]. One can see the importance of CME in the control of nosocomial infections, since surgical site infection is one of the main complications caused in patients who need surgery and other procedures, representing a challenge for hospitals in the control and prevention of infections[11].

As shown in Figure 4, it is possible to understand these procedures within the operating cycle of the Material and Sterilization Center.

In the acquisition, the conditions of the instruments and articles are verified, as well as the safety of the professional and the articles that can be dismantled, where the classification process is carried out, between critical, semi-critical and non-critical articles.

Critical items: come in contact with sterile tissues or the vascular system and require sterile for use, as they have a high risk of causing infection. All articles that will come into contact with the surgical site, instruments and hands of the surgeon and assistants.

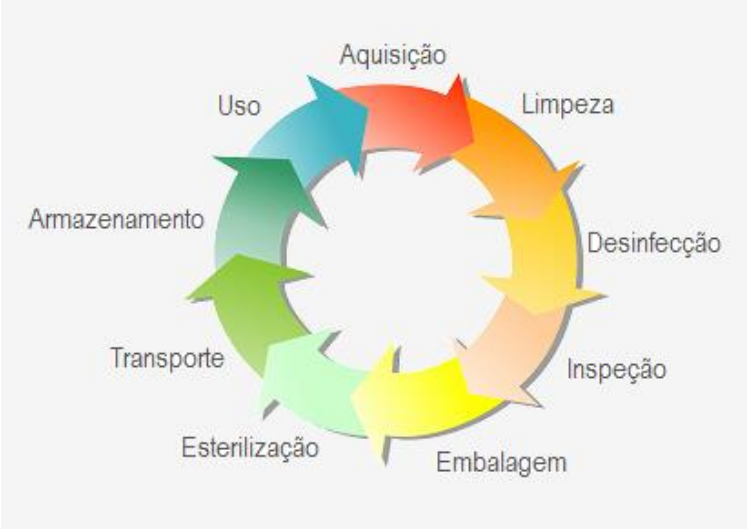
Semi-critical items: are those intended for contact with non-intact skin or intact mucous membranes. Require high-level disinfection or sterilization.

Non-critical articles: articles intended for contact with the patient's intact skin. Eg: bedpans (trimmers), pressure devices. Require low or medium level cleaning or disinfection[8].

Surgical instruments, in turn, are classified as: dieresis, that is, tissue separation (eg scalpel handle, scissors), hemostasis or reduction of blood flow (eg Kelly forceps, Crille), tissue synthesis/junction (ex: Needle holder), specific or special that were created specifically for the surgical time (ex: Retractors, hooks) and robotic forceps (ex: Large Needle, Prograsp, Maryland Bipolar, Cadiere Forceps, Fenestrated Bipolar Forceps, Bipolar Cables and Monopolar, Trocars, Obturator and Endoscope).

In the instrument decontamination/disinfection process, they are immersed in enzymatic detergent. Cleaning is the main stage of article processing, which involves the removal of dirt (biofilm), removal or reduction of microorganisms and removal or reduction of pyrogenic substances from the inputs, from a mechanical friction, using soap and water and after undergo disinfection process in an ultrasonic washer.

Figure 4. CME cycle. Rio de Janeiro, RJ, Brazil, 2021



The preparation process involves drying with the removal of moisture, using compressed air (treated) and/or nitrogen, sterilization using trays, stainless steel boxes or containers and, finally, packaging these instruments to its new use, enabling the maintenance of sterility, protection for transport and storage, in addition to providing the aseptic transfer of the articles.

The processing of robotic instruments is very similar to that of videolaparoscopy instruments. Robotic instruments have two irrigation ports, one for manual cleaning and one for automated cleaning. Water (pre-wetting) and enzyme solution should be injected into both. Keep the solution in contact with the instrument, as recommended by the manufacturer[17].

Enzymatic solution contains special enzymes that dissolve protein materials (protease, lipase, amylase) and products with neutral pH must be used and according to the manufacturer's instructions. Open the tips of the tweezers by means of their pulleys and with the aid of a brush, perform friction, moving the handle of the instrument along its entire amplitude, in sequence, mechanical cleaning with water jets (high pressure flush). After connecting the tweezers to the PCF ultrasonic washer connectors in a specific rack and selecting the specific cycle on the washer[9,17].

To clean the endoscope, inspect its lenses, do not use anything abrasive to clean the tip. You can submerge the endoscope and insert a minimum of 15 mL of solution into the holes, rinse completely with cold water for a minimum of 60 seconds, wash the button discharge ports and do not use an abrasive brush, dry with a lint-free cloth, have care with the endoscope tip, inspect all the material and after sending it for preparation and sterilization according to the manufacturer's instructions (low temperature sterilization)[9].

To facilitate the identification of the number of lives, identification can be placed with a stripe (self-washing) or using a permanent pen, remembering that for robotic tweezers there are 10 lifetimes of use for each, the system itself signals[22]. Cleaning the surgical instrument must be rigorous, which is one of the most important steps in the sterilization process. At this stage, all residue and dirt must be removed, as the microbial load forms barriers and protects microorganisms, preventing sterilizing agents from penetrating the articles, making subsequent steps ineffective and compromising sterilization[4,6]. However, it is considered that the instruments to be used with patients must be processed properly, so that this material does not become a source of contamination by transmission of microorganisms.

In this bias, it is considered the extreme need to implement a continuous flowchart for the proper processing of articles, as illustrated below in the Flowchart for CME as shown in Figure 5.

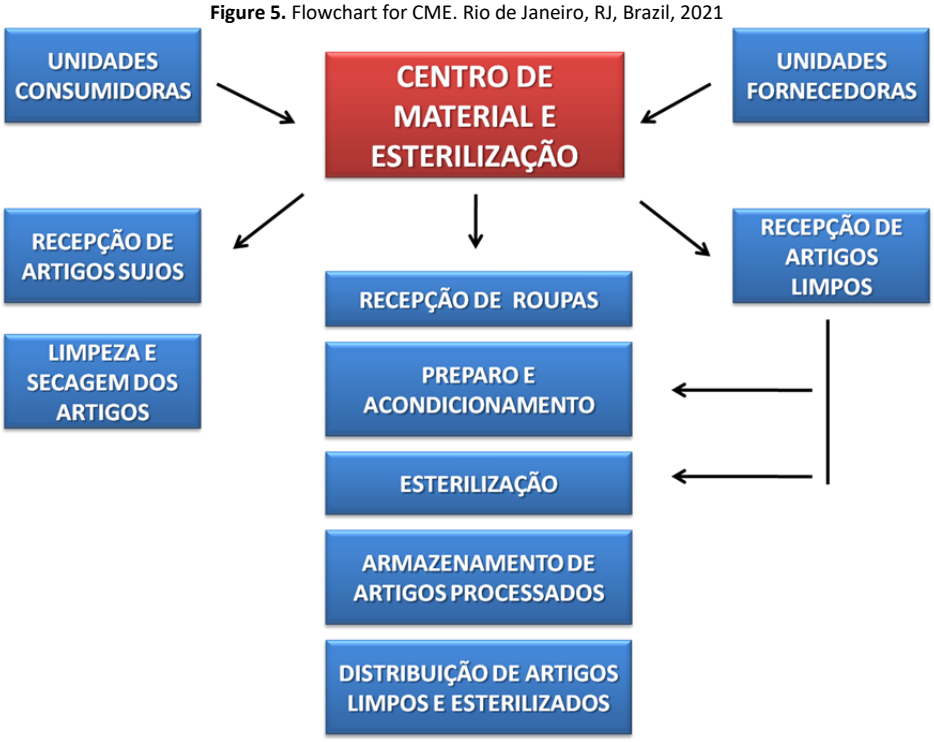
The material must follow a sequence of procedures, starting in the contamination area and ending in the clean area. The same flow must be respected by professionals in the sector, which must not be transported between the two areas to prevent contamination of articles. According to the CME structure, carrying out this entire procedure for sterilizing materials has numerous advantages, such as effectiveness, as there is control of the entire process (washing, sterilization, packaging and storage) by nursing professionals, in addition to favoring better organization in the management of material resources and encourage the completion of training for all staff[7,16].

In order for surgical instruments to be processed properly - in order to ensure patient safety - it is necessary to implement programs of Permanent Education in Health that reach all professionals who work in this area, seeking changes in the work process through awareness, engagement and sharing and application of scientific knowledge in professional practice, as a fundamental factor for the recognition and appreciation of professionals and in the fight against infection, since health was influenced by technological advances and indicators of the quality of processes, thus, professionals need to follow these changes and be better trained, supported by political, cultural and ethical values[4,5,8].

With the changes resulting from the institutionalization process of the Unified Health System (SUS), primary health care has developed more efficiently and effectively in its social assistance practices, increasing

the demand for small invasive procedures performed in health units. . Thus, some municipal health units carry out the process of sterilization of articles and for this, it is necessary to obtain a reserved space for the adequate performance of this process so that it occurs in excellence[10,11].

Figure 5. Flowchart for CME. Rio de Janeiro, RJ, Brazil, 2021



Final Considerations

Through this review, it can be shown that for the functioning of a CME, the presence of the nursing professional is of vital importance. The nurse's role begins in the unit's planning phase, with the appropriate choice of materials and resources, as well as the selection and training of personnel, taking into account the sector's profile. He is still responsible for coordinating activities, guidance and supervision of all stages of product reprocessing[4,18,19].

Within the complex context of health-related infection control (HAI) and its determining factors, CME plays a relevant role. The planning of this unit is of paramount importance, considering different stages of processing of dental-medical-hospital items until their distribution to consumer units. Therefore, this planning must be carried out by a multidisciplinary team, whose care must be focused on the dynamics of the sector's functioning[5].

In this way, it is understood that the role of nursing in robotic surgery is really a work of great relevance, both for professionals who work in the CME and for those who do not work in this environment, but are willing to improve their skills. Above all, the Material and Sterilization Center is essential so that the biological safety of the hospital unit is maintained.

References

1. Ishihara K, Fukushi T. Introduction: roboethics as an emerging field of ethics of technology. Account Res. 2010;17(6):273-7. https://doi.org/10.1080/08989621.2010.523672
2. Pinto EV, Lunardi LS, Treviso P, Botene DZ. A. Atuação do enfermeiro na cirurgia robótica: desafios e perspectivas. Revista SOBECC. 2018;23(1). https://revista.sobecc.org.br/sobecc/article/view/378
3. Abdalla RZ. Cirurgia robótica, devo abrir mão? Arq. Bras. Cir. Dig 2012;25(2):74-85. https://doi.org/10.1590/S0102-67202012000200002
4. Bartolomei S, RicciTonelli LR. Trabalho do enfermeiro no Centro de Material e seu lugar no processo de cuidar pela enfermagem. Rev. Esc. Enferm USP. 2006;40(3):412-417. https://doi.org/10.1590/S0080-62342006000300014
5. Cristóforo BB, Karau VCS, Ruan MFM, Hollebe P. Processo de esterilização de artigos em unidades básicas de saúde. In: 56º Congresso Brasileiro de Enfermagem. Disponível em: http://www.bstorm.com.br/enfermagem/index-p2.php?cod=61904&popup=1
6. Cruz EA, Soares E. Prática de enfermagem em central de material e esterilização: uma abordagem estrutural das representações sociais. Rev. Enferm. UERJ. 2003 Ago;11(2):159-64. Disponível em: https://pesquisa.bvsalud.org/portal/resource/pt/bde-14677
7. Guadagnin SVT, Primo MGB, Tipple AFV, Souza ACS. Centro de Material e Esterilização: Padrões arquitetônicos e o processamento de artigos. Revista Eletrônica de Enfermagem. 2005;1(1):38-45. Disponível em: https://revistas.ufg.br/fen/article/view/905
8. Silva AC. O enfermeiro na central de material e esterilização: invisível, mas essencial. [dissertação]. Rio de Janeiro (RJ): Universidade Federal do Estado do Rio de Janeiro, Programa de Pós-Graduação em Enfermagem; 2007.

9. Associação Brasileira de Enfermeiros de Centro Cirúrgico, Recuperação Anestésica e Centro de Material de Esterilização (SOBECC*).* Diretrizes de Práticas em Enfermagem Cirúrgica *e* Processamento de Produtos para a Saúde*.* 7. ed. SOBECC; 2017.
10. Silva AC, Aguiar BGC. O enfermeiro na Central de Material e Esterilização: Uma visão das unidades consumidoras. Rev Enferm UERJ. 2008;16(3):377-81. Disponível em: https://pesquisa.bvsalud.org/portal/resource/pt/bde-15136
11. Silva AC, Aguiar BGC. O enfermeiro na Central de Material e Esterilização: Uma visão das unidades consumidoras. Rev Enferm UERJ. 2008;16(3):377-81. Disponível em: https://pesquisa.bvsalud.org/portal/resource/pt/bde-15136
12. Tipple AFV, Souza TR, Bezerra ALQ, Munari DB. O trabalhador sem formação em enfermagem atuando em centro de material e esterilização: desafio para o enfermeiro. Rev Esc Enferm USP. 2005 Jun;39(2):173-80. https://doi.org/10.1590/S0080-62342005000200007
13. Hockstein NG, Gourin CG, Faust RA, Terris DJ. A history of robots: from science fiction to surgical robotics. J Robotic Surg. 2007;1:113-118. Disponível em: https://link.springer.com/article/10.1007%2Fs11701-007-0021-2
14. Poffo R, Toschi AP, Pope RB, Celullare AL, Benício A, Fischer CH, Vieira MLC, et al. Cirurgia robótica em Cardiologia: um procedimento seguro e efetivo. Einstein (São Paulo). 2013;11(3):296-302. https://doi.org/10.1590/S1679-45082013000300007
15. Almeida LGC. O Crescimento das Cirurgias Robóticas no Brasil. G Saúde. 2021;1(1):1-3. Disponível em: http://drcrippa.com.br/o-crescimento-das-cirurgias-roboticas-no-brasil/
16. Olavarrieta JRL, Coronel P, Pérez YO. História, evolución, estado actual y futuro de la cirurgía robótica. Rev Facultad Med. 2007;30(2):109-114. Disponível em: http://ve.scielo.org/scielo.php?script=sci_arttext&pid=S0798-04692007000200002
17. Agência Nacional de Vigilância Sanitária (ANVISA). Normas para Projetos Físicos de Estabelecimentos Assistenciais de Saúde. 2. Ed. Brasília: ANVISA; 2004.
18. Cunha ALSM, Marthins AV. Guia Prático de Enfermagem em Cirurgia Robótica. Editora dos Editores: 1ª Ed. Brasil, 2020.
19. Kenski, V. O que são tecnologias e por que elas são essenciais. In: Educação e Tecnologias: O novo ritmo da informação. 8. ed. Campinas: Papirus; 2012.