

Implementation of a management tool to standardize and process ventilation devices in the Sterile Processing Department

Aplicação da ferramenta de gestão na padronização e processamento de material ventilatório no Centro de Material e Esterilização

Aplicación de la herramienta de Gestión en la estandarización y procesamiento de material ventilatorio en el Centro de Material y Esterilización

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ABSTRACT: Objective: To report the experience of implementing the 5W2H management tool to standardize and process ventilation devices in the Sterile Processing Department (SPD) of a referral hospital. **Method:** This is an experience report of a nursing team working in the SPD of a referral hospital for high-complexity surgery on the implementation of the 5W2H management tool to standardize and process ventilation devices. **Results:** The process consisted of four steps: implementing the management tool and administering the questionnaire, training the nursing team, standardizing the ventilation devices, and producing a catalog for the ventilation devices. The 5W2H tool helped plan the work process developed in the SPD and identify the nursing team's weaknesses during the processing of items from the ventilation devices. **Conclusion:** Using the management tool to detail problems associated with the nursing team training and with the standardization of ventilation devices allowed reducing issues related to incorrect assembly and loss of ventilation devices.

Keywords: Nursing. Sterilization. Quality management.

RESUMO: Objetivo: Relatar a experiência da aplicação da ferramenta de gestão 5W2H para a padronização e processamento de material ventilatório no Centro de Material e Esterilização (CME) de um hospital de referência. **Método:** Trata-se de um relato de experiência com uma equipe de enfermagem atuante no CME em um hospital referência em cirurgia de alta complexidade e aplicação da ferramenta de gestão 5W2H para a padronização e processamento de material ventilatório. **Resultados:** Foram aplicadas quatro etapas: implementação da ferramenta de gestão e do *quiz*, capacitação da equipe de enfermagem, realização da padronização do material ventilatório e formulação do catálogo do material ventilatório. A ferramenta 5W2H favoreceu o planejamento do processo de trabalho desenvolvido no CME e a identificação das fragilidades da equipe de enfermagem durante o processamento dos itens do material ventilatório. **Conclusão:** O uso da ferramenta de gestão para o detalhamento do problema associado à capacitação da equipe de enfermagem e à padronização do material ventilatório possibilitou reduzir os problemas relacionados à montagem incorreta e ao extravio dos materiais ventilatórios.

Palavras-chave: Enfermagem. Esterilização. Gestão da qualidade.

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RESUMEN: **Objetivo:** Relatar la experiencia de la aplicación de la herramienta de gestión 5W2H para la estandarización y procesamiento de material ventilatorio en el Centro de Material y Esterilización (CME) de un hospital de referencia. **Método:** Se trata de un relato de experiencia con un equipo de enfermería actuante en el CME en un hospital referencia en cirugía de alta complejidad y aplicación de la herramienta de gestión 5W2H para la estandarización y procesamiento de material ventilatorio. **Resultados:** Fueron aplicadas cuatro etapas: implementación de la herramienta de Gestión y del *quiz*, capacitación del equipo de enfermería, realización de la estandarización del material ventilatorio y formulación del catálogo del material ventilatorio. La herramienta 5W2H favoreció la planificación del proceso de trabajo desarrollado en el CME y la identificación de las fragilidades del equipo de enfermería durante el procesamiento de los ítems del material ventilatorio. **Conclusión:** El uso de la herramienta de gestión para el detalle del problema asociado a la capacitación del equipo de enfermería y a la estandarización del material ventilatorio posibilitó reducir los problemas relacionados al montaje incorrecto y al extravío de los materiales ventilatorios.

Palabras-clave: Enfermería. Esterilización. Gestión de la calidad.

INTRODUCTION

The Sterile Processing Department (SPD) is a health service unit whose work processes depend on specific knowledge and practices with different objectives and purposes than those of other hospital units. It is considered an indirect care sector with the mission of providing processed healthcare products (HCPs) to all care and diagnostic services, ensuring the quality necessary for safe care^{1,2}.

Some of its functions include acquiring, receiving, cleaning, decontaminating, packaging, sterilizing, and providing reusable, processed, and safe products to clinical procedures performed in requiring units, such as wards, intensive care units, outpatient clinics, and surgical suites, always following an organizational standardization to avoid risks and maintain the quality of the service offered³.

Effective management is essential and indispensable for the smooth operation of any service. Implementing a quality management process helps organize and develop measures aimed at continuous improvement, thus strengthening the efficiency of the work provided, with constantly evolving actions. Management methodologies and tools contribute to restructuring the service's internal processes, promoting advances for units and/or users^{3,5}.

The process of planning, standardizing, and processing ventilation devices in the SPD can be carried out with the implementation of management tools, such as 5W2H. This tool is widely adopted because it is easy to understand and use. The method seeks to answer seven essential planning questions that are analyzed as a whole^{3,5,6}.

Considering this scenario, the SPD is classified as class I when it processes non-critical, semi-critical, and critical HCPs, with a processable and non-complex nature; while a class II

SPD processes non-critical, semi-critical, and critical HCPs, with a processable and complex or non-complex nature⁷.

The modernization in product design makes the processing of HCPs more complex, requiring proper systematization to be effective, especially regarding oxygen therapy products, which are often used to assemble equipment, making connections and transporting gases^{2,7}.

Ventilation tools are made of flexible and resistant materials, with good durability even when repeatedly subjected to temperatures ranging from 50 to 75 °C. Their purpose is to introduce microparticles of liquids and/or gases that can be inhaled, reaching the airways, and thus alleviating inflammatory, conjunctive, and obstructive processes^{8,9}.

This category of items comprises a wide variety of processable materials that are important in respiratory therapy, including: nebulizers, humidifiers, bag-valve masks, anesthesia circuits, and ventilator circuits, as well as masks and elbows¹⁰.

The hospital profile determines which ventilation devices to use and how to assemble them. Therefore, improvement starts with standardization, that is, clearly and accurately defining how to perform the actions to minimize errors and decrease deterioration during the process¹¹.

From this perspective, management tools are involved in the standardization process, ensuring compliance with best practices related to the processing of ventilation devices and leading to effective hospital care. Management tools used for analysis and decision-making allow defining, measuring, examining, and proposing solutions to problems that interfere with direct or indirect patient care¹².

The relationship between standardization and processing of ventilation therapy devices combined with the use of management tools is scarcely addressed in the literature, making the subject relevant and justifying the present study.

OBJECTIVES

To report the experience of implementing the 5W2H management tool to standardize and process ventilation devices in the SPD of a referral hospital.

METHOD

This is an experience report with a descriptive design on the implementation of the 5W2H management tool to standardize and process ventilation devices in the SPD of a large referral hospital for neurosurgery from the Brazilian public health system (*Sistema Único de Saúde* — SUS) in Pernambuco (PE). Implementing the management tool involved four steps.

The management tool was introduced to nursing technicians working in the SPD from August 2018 to August 2019. The SPD has a centralized type II profile, with a physical area subdivided according to recommendations from the Collegiate Board Resolution (*Resolução da Diretoria Colegiada* — RDC) No. 15¹³. It is equipped with modern technology to process various HCPs and track cleaning, packaging, disinfection, and sterilization processes.

The first step was implementing a management tool, which would enable planning the standardization and processing of ventilation devices in the SPD. The management tool used was 5W2H, named after seven words: what, where, who, why, when, how, and how much². The method consists of answering the seven questions so as to implement the essential aspects of an action plan based on identified and analyzed causes for control, definition of deadlines, and responsibilities that must be clearly developed by all team members.

A questionnaire with five structured questions was elaborated to evaluate these professionals' knowledge of ventilation devices and complement the situation diagnosis of the work process developed in the SPD. The questionnaire was developed by a team of professionals trained in ventilation devices: a resident in surgical suite nursing, an attending nurse, a nurse responsible for ventilation devices, the SPD nursing supervisor, and a nursing technician who works in the ventilation device packaging area.

The five questions of this instrument addressed the following items: types of anesthesia circuits and components of the circuits used in the surgical environment and in imaging departments, types of bag-valve masks and their components, list of ventilation devices received and processed in

the SPD, ventilation device processing flow, and identification of the packaging of ventilation items for low-temperature sterilization.

After the first step, three more had to be implemented, given the team's poor knowledge of these materials. The second step was training the nursing team, using visual materials, and, above all, making contact with all professionals and adopting a unified message on ventilation devices.

The third step standardized the ventilation device, measuring all materials and recording the values in an inventory. The fourth step consisted of elaborating a catalog with images of all standardized ventilation devices and kits processed in the SPD. In parallel to the catalog construction step, visits were made to units that require ventilation devices to know and evaluate the need of each sector concerning the use of ventilation items, defining new ventilation kits and establishing a communication process between the SPD and hospital sectors, such as the surgical environment.

RESULTS

In the exposed scenario, a management tool was adopted to structure the plan of implementing some solution for a potential problem, such as the standardization and processing of ventilation devices in the SPD. The results are described in Chart 1. The questionnaire allowed the nursing team working in the SPD to identify the main weaknesses found in the processing of ventilation devices and to make a preliminary diagnosis of the work process developed in the SPD to support the standardization of ventilation devices. The questionnaire analysis produced the following list of weaknesses: incorrect identification of items from ventilation device kits; different ways of assembling the kits; different ways of processing the kits; and loss and exchange of part of their items.

The nursing team's training took place *in loco* and covered all SPD on-call teams and work shifts so that the nursing resident of the surgical suite program could develop the learning process during her rotation in the area of storage and distribution of HCPs processed in the SPD. The standardization of ventilation devices allowed the elaboration of a catalog with photos of standardized ventilation, anesthesia, and inhalation therapy devices. The presentation of the devices included components and images of the devices assembled and disassembled for use in the SPD cleaning and packaging areas (Figure 1).

Chart 1. Implementation of the 5W2H management tool to standardize and process ventilation devices in the SPD. Recife (Pernambuco), 2019.

Implementation of the 5W2H management tool						
What will be done? (What)	Why will it be done? (Why)	Where will it be done? (Where)	When will it be done? (When)	Who will do it? (Who)	How will it be done? (How)	How much will it cost? (How much)
Standardize the processing of ventilation devices. Plan steps: 1. situation diagnosis of the work process; 2. team training; 3. standardization of ventilation devices; 4. preparation of the catalog.	Minimize usage errors.	In the class II SPD of a tertiary referral hospital for high-complexity surgeries in the municipality of Recife.	Between August 2018 and August 2019.	Surgical Suite Nursing resident.	1 st step: Situation diagnosis of the work process based on the formulation of a questionnaire administered to the nursing team; analysis of the answers and elaboration of the training content.	The nursing resident funded the costs of the material used, and the service also provided some resources.
	Reduce potential product damage.			SPD Nursing Supervision.	2 nd step: Training of the SPD nursing team on ventilation devices, including all on-call professionals and work shifts.	
	Reduce processing costs due to improper or incorrect device assembly.			Nurse responsible for ventilation devices and nursing technician from the ventilation device packaging area.	3 rd step: Preparation and implementation of the inventory to standardize ventilation devices.	
					4 th step: Elaboration of the ventilation device catalog.	

SPD: Sterile Processing Department.

DISCUSSION

Quality management tools can favor data interpretation, in addition to predicting uncertainties and reducing unforeseen events in processes unknown to the manager. Besides helping gather information, they promote data organization and analysis¹⁴.

The 5W2H management tool elaborates a structured strategy for task execution and control. As an action plan, the 5W2H should be adopted to define deadlines, responsibilities, infrastructure, as well as human, financial, and technical

resources. It should also be used to identify the actions and attributions of each professional for the performance of activities, plan the various interventions that will be developed, and provide support for the decisions involved in each stage of the work process².

Implementing new practices in health services requires choosing a method that establishes standards to help them achieve high levels of excellence. The 5W2H management tool guides the actions that should be carried out and implemented, following the development of what was established in the planning stage^{14,15}.

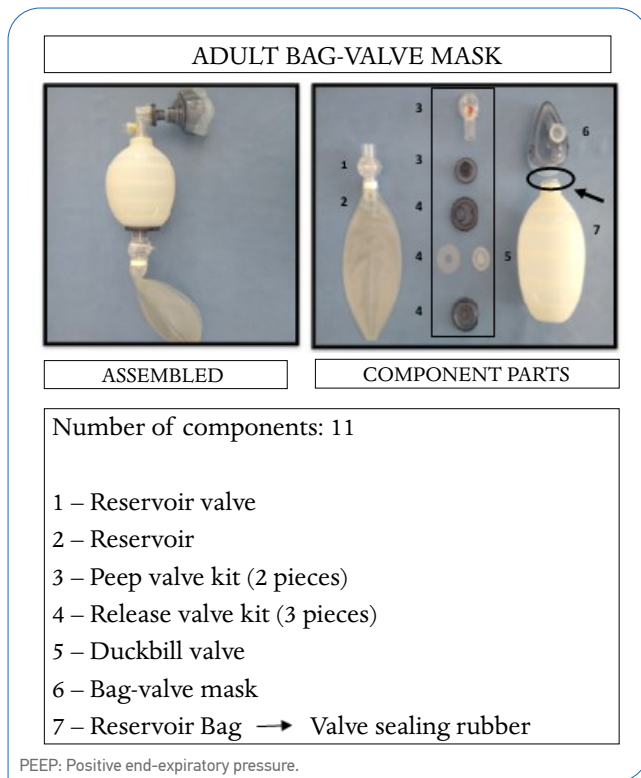


Figure 1. Ventilation device catalog. Recife (Pernambuco), 2020.

In environments such as the SPD, standardizing and planning work processes are essential for developing best practices because this department is a technical support unit where HCPs are properly processed. The tasks performed in the SPD include reception, cleaning, decontamination, packaging, sterilization, and distribution of safe products for use in clinical, surgical, and diagnostic intervention procedures¹⁶.

These procedures require specialized and trained staff. The complex work developed in the SPD requires studies that investigate factors such as the development of standard operating procedures (SOP) and protocols and the evaluation of processing stages³. The nurse is responsible for managing the SPD and operationalizing all HCP processing stages.

Among the numerous activities developed by them, the management of material resources has become prominent due to the increase in health technologies. The supply of HCPs, such as ventilation devices, to requiring units (e.g., emergency departments, surgical suites, and intensive care units) should be competent and effective to avoid possible errors in different operational processes¹⁷.

Although little described in the literature, the practice of processing ventilation devices is relevant for infection control, since the rate of healthcare-associated infections (HAIs) in health facilities is significant¹⁸.

Choosing the process that will ensure care quality and patient safety against the risk of acquiring HAIs is essential for the prevention and control of these diseases, especially those associated with mechanical ventilation. Thus, the standardization of operational procedures for the processing of ventilation devices should be carefully considered¹⁹.

Actions such as the implementation of management tools and interventions to minimize errors and loss of components during the assembly of ventilation devices, as well as the training of the nursing team and the standardization of new kits, allow the organization of ventilation devices available in the sector.

The administration of the questionnaire on the work flow process related to ventilation devices to the nursing team and the evaluation of responses from those responsible for processing these HCPs allowed the elaboration of resources — such as the inventory (descriptive list of items) and the catalog (photos of the items) — that presented the proposed thematic content and systematized the training of professionals working in the area.

Nursing team training is part of the Continuing Health Education (CHE) process, recognized as the most appropriate educational approach to provoke changes in professional performances and work contexts, in addition to strengthening the reflection on teamwork and the action performed. In this context, the nursing team training on ventilation devices produced positive effects, obtained by readjusting work practices and reducing possible failures in the packaging of ventilation kits prepared and supplied during the process¹⁹.

Defined as the adoption of measures to systematize production and aimed at establishing techniques that ensure the safety and quality of the process, standardization works as a connection between team training and the implementation of management tools, making the process homogeneous and consistent.

From this perspective, developing competences relevant to the administration and proper operation of the SPD involves management by a nurse with technical-scientific experience and ability, concerned with the evaluation of service quality indicators and the implementation of management, care, and educational activities¹⁹.

Study limitations include difficulties in meeting the deadlines established in the action plan proposed by the

5W2H management tool and in controlling the quality of work process indicators developed in the area of ventilation device processing, given the frequent need to adjust the distribution of professionals due to unexpected absences in daily on-call shifts and the high rotation of employees in the department schedule.

CONCLUSION

The combination of implementing the 5W2H management tool, standardizing the processes, and consequently developing a catalog with images of ventilation devices, in addition to training the nursing team, provided solutions to minimize problems and errors in device assembly processes, preventing losses and unnecessary costs in the packaging for product sterilization. Adopting the tool also led to innovations in the administration of quality management, care, and the work process in the SPD.

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CONFLICT OF INTERESTS

The authors declare there is no conflict of interests.

AUTHORS' CONTRIBUTION

SMCC: Project administration, Formal analysis, Conceptualization, Data curation, Investigation, Methodology, Writing – review & editing. CGS: Writing – review & editing. LSRS: Writing – review & editing. CSAAV: Writing – review & editing, Supervision, Validation. EBFP: Project administration, Formal analysis, Conceptualization, Data curation, Investigation, Methodology, Writing – review & editing.

REFERENCES

- Martins JF, Antunes AV. Staff sizing in the material and sterilization center of a university hospital. *Rev Esc Enferm USP*. 2019;53:e03496. <https://doi.org/10.1590/S1980-220X2018027703496>
- Associação Brasileira de Enfermeiros de Centro Cirúrgico, Recuperação Anestésica e Centro de Material e Esterilização. *Práticas recomendadas: centro cirúrgico, recuperação pós-anestésica e centro de material e esterilização*. 7ª ed. Barueri: Manole; 2017.
- Costa R, Montenegro HRA, Silva RN, Almeida Filho AJ. The role of central sterile supply department nursing team members: an integrative review. *Esc Anna Nery*. 2020;24(3):e20190316. <https://doi.org/10.1590/2177-9465-EAN-2019-0316>
- Brasil. Ministério da Saúde. Conselho Nacional de Saúde. Resolução nº 466, de 12 de dezembro de 2012 [Internet]. Brasília: Ministério da Saúde; 2012 [accessed on Nov. 27, 2021]. Available at: http://bvsms.saude.gov.br/bvs/saudelegis/cns/2013/res0466_12_12_2012.html
- Lagranha ML, Anderson TJ, Speck R, Antonio RD. Processamento de produtos para saúde utilizados no atendimento a paciente com suspeita ou infecção confirmada pelo Covid-19 [Internet]. 2020 [accessed on Nov. 27, 2021]. Available at: <https://www.gov.br/ebserh/pt-br/hospitais-universitarios/regiao-sul/hu-ufsc/saude/covid-19/protocolos-e-planos-de-contingencia/protocolos-gerais-covid-19/processamento-de-produtos-para-saude-utilizados-no-atendimento-a-paciente-com-suspeita-ou-infeccao-confirmada-pelo-covid-19-05-2020-15h10>
- Trindade JPA, Vasconcelos LSNOL, Ribeiro EL, Watanabe E, Tipple AFV. Armazenar tubos de silicone antes do empacotamento impede a esterilização? *Acta Paul Enferm*. 2018;31(5):518-24. <https://doi.org/10.1590/1982-0194201800072>
- Miranda AMF, Quintino APN, Martins L, Calicchio LG, Silva MVG, Santos RR, et al. Nota técnica Coronavírus e a CME [Internet]. NASCECME; 2020 [accessed on Nov. 27, 2021]. Available at: <http://nascecme.com.br/2014/wp-content/uploads/2020/03/Nota-T%C3%A9cnica-Anexos-28-03-2020-17h45.pdf>
- Bugs TV, Rigo DFH, Bohrer CD, Borges F, Marques LGS, Vasconcelos OR, et al. Perfil da equipe de enfermagem e percepções do trabalho realizado em uma central de materiais. *Reme: Rev Min Enferm*. 2017;21:e-996. <https://doi.org/10.5935/1415-2762.20170006>
- Tamiasso RSS, Santos DC, Fernandes VDO, Ioshida CAF, Poveda VB, Turri RNT. Quality management tools as strategies for reducing surgery cancellations and delays. *Rev SOBECC*. 2018;23(2):96-102. <https://doi.org/10.5327/Z1414-4425201800020007>
- Brasil. Ministério da Saúde. Agência Nacional de Vigilância Sanitária. Resolução – RDC nº 15, de 15 de março de 2012. Dispõe sobre requisitos de boas práticas para o processamento de produtos para saúde e dá outras providências [Internet]. Brasília: Ministério da Saúde; 2012 [accessed on Nov. 27, 2021]. Available at: https://bvsms.saude.gov.br/bvs/saudelegis/anvisa/2012/rdc0015_15_03_2012.html
- Ventura KS, Suquizaqui ABV. Aplicação de ferramentas SWOT e 5W2H para análise de consórcios intermunicipais de resíduos sólidos urbanos. *Ambient Constr*. 2020;20(1):333-49. <https://doi.org/10.1590/s1678-86212020000100378>

12. Rossetto V, Toso BRGO, Rodrigues RM. Organizational flow chart of home care for children with special health care needs. *Rev Bras Enferm.* 2020;73(suppl 4):e20190310. <https://doi.org/10.1590/0034-7167-2019-0310>
13. World Health Organization. Decontamination and reprocessing of medical devices for health-care facilities [Internet]. Geneva: WHO/PAHO; 2016 [accessed on Oct. 30, 2019]. Available at: <http://apps.who.int/iris/bitstream/handle/10665/250232/9789241549851-eng.pdf;jsessionid=034E349F27874D382B05849382C38500?sequence=1>
14. Holanda MA, Pinheiro BV. COVID-19 pandemic and mechanical ventilation: facing the present, designing the future. *J Bras Pneumol.* 2020;46(4):e20200282. <https://doi.org/10.36416/1806-3756/e20200282>
15. Sade PMC, Peres AM, Zago DPL, Matsuda LM, Wolff LDG, Bernardino E. Assessment of continuing education effects for nursing in a hospital organization. *Acta Paul Enferm.* 2020;33:eAPE20190023. <https://doi.org/10.37689/acta-ape/2020A00023>
16. Parente AN, Torres RSC, Macedo WTP, Freitas ATM, Silva CSO, Silva ECL. Evidências profissionais de enfermeiros em Central de Material e Esterilização: contribuições de uma revisão integrativa. *Enfermagem Brasil.* 2018;17(4):377-85. <https://doi.org/10.33233/eb.v17i4.1245>
17. Hauk L. Guideline for sterilization. *AORN J.* 2018;108(2):P10-P12. <https://doi.org/10.1002/aorn.12351>
18. Ishida JP, Oliveira DA. Um estudo sobre a Gestão da Qualidade: conceitos, ferramentas, custos e implantação [Internet]. Presidente Prudente: Toledo Prudente Centro Universitário; 2019 [accessed on Mar. 1, 2023]. Available at: <http://intertemas.toledoprudente.edu.br/index.php/ETIC/article/view/7742>
19. Cascaes MM, Faveri R. Plan52: ferramenta para gestão baseada em 5w2h. [Internet]. Tubarão: Universidade do Sul de Santa Catarina; 2020 [accessed on Mar. 1, 2023]. Available at: <https://repositorio.animaeducacao.com.br/bitstream/ANIMA/15962/1/Documenta%20a7%20a3o%20-%20Plan52.pdf>