

# Biosecurity and protocols at the material and sterilization center in the COVID-19 pandemic

**RESUMO | OBJETIVO:** Identificar métodos de biossegurança e protocolos utilizados no Centro de Material e Esterilização, durante a pandemia da COVID-19. **MÉTODO:** Estudo transversal, observacional, descritivo e analítico, de abordagem quantitativa. O local foi o Centro de Material e Esterilização de hospital universitário do norte do Brasil, cuja coleta de dados ocorreu mediante entrevista com equipe de enfermagem do setor. A análise foi realizada e as variáveis foram descritas pelo cálculo de frequência absoluta e média. **RESULTADOS:** Os participantes relataram a implantação de protocolos de biossegurança atualizados no setor durante a pandemia. Entre os entrevistados, 26,1% relataram não ter participado de treinamentos acerca do protocolo; 69,7% citaram a realização de capacitações acerca de paramentação e manuseio de materiais, reforço de orientações, através de reuniões e folders. **CONCLUSÃO:** Houve implantação de protocolo institucional no Centro de Material e Esterilização do hospital, abrangendo a segurança do profissional durante a pandemia da COVID-19.

**Descritores:** Esterilização; COVID-19; Medidas de segurança.

## ABSTRACT | Abstract

**OBJECTIVE:** To identify biosafety methods and protocols used in the Material and Sterilization Center, during the pandemic of COVID-19. **METHODS:** Cross-sectional, observational, descriptive and analytical study with a quantitative approach. The site was the Material and Sterilization Center of a university hospital in northern Brazil. Data collection occurred through interviews with the nursing staff of the sector. The analysis was performed and the variables were described by calculating the absolute frequency and the mean. **RESULTS:** The participants reported the implementation of updated biosafety protocols in the sector during the pandemic. Among the interviewees, 26.1% reported not having participated in training about the protocol; 69.7% cited the carrying out of training about paramentation and handling of materials, reinforcement of orientations, through meetings and folders. **CONCLUSION:** An institutional protocol was implemented in the Material and Sterilization Center of the hospital, covering the professional's safety during the pandemic of COVID-19.

**Keywords:** Sterilization; COVID-19; Security measures.

**RESUMEN | OBJETIVO:** Identificar los métodos y protocolos de bioseguridad utilizados en el Centro de Material y Esterilización, durante la pandemia de COVID-19. **MÉTODOS:** Estudio transversal, observacional, descriptivo y analítico, con un enfoque cuantitativo. El lugar fue el Centro de Material y Esterilización de un hospital universitario del norte de Brasil, cuya recolección de datos ocurrió a través de entrevistas con el personal de enfermería del sector. Se realizó el análisis y se describieron las variables calculando la frecuencia absoluta y la media. **RESULTADOS:** Los participantes informaron de la aplicación de protocolos de bioseguridad actualizados en el sector durante la pandemia. Entre los entrevistados, el 26,1% informó de no haber participado en la formación sobre el protocolo; el 69,7% mencionó la realización de formación sobre paramentación y manejo de materiales, refuerzo de orientaciones a través de reuniones y carpetas. **CONCLUSIÓN:** Se implementó un protocolo institucional en el Centro de Material y Esterilización del hospital, cubriendo la seguridad profesional durante la pandemia de COVID-19.

**Palabras claves:** Esterilización; COVID-19; Medidas de seguridad.

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## INTRODUÇÃO

The Material and Sterilization Center (MSC) is the functional unit intended for the processing of health products for health services. This process involves several steps that consist of receiving these products, cleaning, sterilizing, preparing, storing and distributing these materials and articles to the consumer sectors.<sup>1</sup>

The MSC is considered a complex environment, in which activities involving contaminated materials, fluids, chemicals, sharps, among others are routinely carried out. These activities entail risks that can be grouped into biological, ergonomic, physical, accidental and chemical. These working conditions can trigger risks to the health of professionals working in the sector, in addition to interfering with the quality of work.<sup>2</sup>

Considering the risks that health professionals are exposed to daily, biosecurity measures must be developed and implemented to control infections and work accidents. Health biosafety strategies encompass actions aimed at preventing, reducing or eliminating risks that may interfere with or compromise the quality of life of health workers. Among these measures are biosafety protocols, implemented in different sectors of health units.<sup>3</sup>

The implementation of the biosafety protocol in the MSC sector, together with the training and qualification of professionals, become essential to raise awareness of the risks and safety measures to be carried out, thus minimizing and controlling threats to the health of those resulting from routine contact with contaminated materials.<sup>4</sup>

In some cases, the activities carried out by the various health sectors, including the MSC, need to be modified and adapted, according to health regulations, aiming at disease prevention and safety of professionals, a fact that occurred during the COVID-19 pandemic.<sup>5</sup>

In 2019, in the city of Wuhan (China), the pandemic began with the new variant of the coronavirus. COVID-19 is the name of the disease caused due to the infection

by the SARS-CoV-2 virus, which has spread rapidly between countries, causing the pandemic that the world is currently experiencing.<sup>6</sup> The clinical picture of the disease ranges from asymptomatic infection, mild symptoms that may include cough, fever and fatigue, or the presence of severe respiratory symptoms, which may lead to the need for hospital care and ventilatory support, due to respiratory difficulty.<sup>7</sup>

Infection with the SARS-CoV-2 virus occurs when the individual comes into contact with people or surfaces that house it, and transmission can be done by direct and/or indirect contact, or by inhaling droplets that are expelled during speech, sneezing or coughing. The virus can remain in the environment for hours or even days, and closed, unventilated places with the presence of many people also contribute to spread and transmission.<sup>8</sup>

Despite the easy transmissibility of the virus and high potential for contamination, the work process and the processing of health products (PPS) in MSCs have not changed. The protocols were still based on the guidelines listed in RDC No. 15, of March 15th, 2012 and RDC No. 156, of August 11th, 2006. However, the need for the correct use of PPE for handling the materials, including long-sleeved waterproof apron, N95 mask, goggles or face shield, high-top rubber gloves, waterproof, closed-toe shoes.<sup>9</sup>

In addition, it was oriented to eliminate processes that generate aerosols, such as the use of vaporizers (steamers). Instead, chemical disinfection can be opted for for thermosensitive products and for those resistant to heat, thermal disinfection is used.<sup>10</sup>

Health professionals who work daily in hospital environments constitute a risk group for COVID-19 and are highly susceptible to infections, in addition to being subjected to a stressful workload and, often, to inadequate working conditions.<sup>11</sup> Thus, health institutions must develop and implement biosafety plans, aiming at the well-being and safety of these professionals in the face of the pandemic.<sup>12</sup>

Considering that the nursing team makes up a large part of the area working in the MSC and plays a fundamental role in the activities of this sector, these professionals are potentially exposed to risks of contamination by the SARS-CoV-2 virus.<sup>13</sup>

When analyzing risk considerations at the Material and Sterilization Center, and the need for prevention strategies for health professionals during the pandemic, the following question guided the study: During the COVID-19 pandemic, was an updated biosafety protocol implemented in the MSC sector?

Therefore, the present study aimed to identify the biosafety protocols used in the MSC sector during the COVID-19 pandemic. And as specific objectives: to analyze the adherence of the nursing team to the protocols, and to identify the occupational risks of the researched sector.

## METHOD

Cross-sectional, observational, descriptive and analytical study, with a quantitative approach, developed at the Sterilization Material Center of a university hospital, located in the North Region of Brazil.

Study participants were professionals from the MSC nursing team of the aforementioned hospital who were in accordance with the selection criteria for this research. The inclusion criteria were: being a nursing professional working in the MSC sector and having worked during the pandemic. Exclusion criteria: professionals on leave or on leave at the time of collection.

Data collection took place from August 2020 to June 2021, in which systematic interviews were carried out with the participants. The instrument for obtaining and recording this information was a questionnaire identifying the date, time and period of collection that contained questions about the participant's socioeconomic, demographic and professional data.

In addition to this information, other variables chosen were: activities performed by these professionals in the sector, level of perception about the risks these profes-



nals were exposed to in the work environment, use of personal protective equipment and whether protocols were used in this sector during the COVID-19 pandemic.

The collected data were tabulated in spreadsheets, in the Microsoft Excel operating system, and analyzed by the Software for Statistics and Data Science (STATA) system. Subsequently, the variables were categorized and described by calculating absolute and mean frequencies.

The research was evaluated by the Ethics Committee of the Hospital Universitário Getúlio Vargas and obtained a favorable opinion via Plataforma Brasil, with Certificate of Presentation for Ethical Assessment nº 38750720.1.0000.5613, respecting the ethical precepts of research with human beings, based on Resolution No. 466/2012, of the National Health Council.

**RESULTS**

The total study population consisted of 23 professionals who agreed to participate in the research and answered the questionnaire formulated by the researcher. Participants are distributed among nursing professionals (nurses, technicians and assistants) working in the MSC of the hospital surveyed.

The majority of participants were female (78.2%), 65.2% were nursing technicians and 43.4% had worked in the sector for more than five years. Among the interviewees, 56.4% concluded specialization, 52.1% had a monthly income above five minimum wages and 56.4% had more than one employment relationship.

Participants declared that the biosafety protocol was used in the daily life of the MSC (91.3%), 74% said that, after the pandemic, they were implemented by the institution, updated protocols on the risk and prevention of contamination by the Sars-CoV-2 virus.

About the level of knowledge about MSC's risks before working in the sector, 34.8% of respondents rated knowledge as "Good", 30.4% as "Reasonable", 13% as "Excellent" and 21.8% as "Very little". In

**Table 1: Profile of nursing professionals working in the Material and Sterilization Center, 2021.**

Variables	No. (total=23)	%
<b>Gender</b>		
F	18	78,2
M	5	21,8
<b>Age (years)</b>		
<30	2	8,7
31-40	4	17,4
41-50	11	47,8
>50	6	26,1
<b>Acting time (years)</b>		
<1	5	21,8
1 - 3	6	26,1
4 - 5	2	8,7
> 5	10	43,4
<b>Education level</b>		
High School	5	21,8
Graduation	5	21,8
Specialization	13	56,4
<b>Profession</b>		
Nurse	6	26,1
Nursing technician	13	56,4
Nursing assistant	3	13
Others	1	4,5
<b>MSC Function</b>		
Nurse	3	13
Nursing technician	15	65,2
Nursing assistant	5	21,8
<b>Type of server</b>		
Public	18	78,2
EBSERH	5	21,8
<b>*Monthly income (minimum wages)</b>		
≤ 3	5	21,8
4 - 5	6	26,1
>5	12	52,1
<b>Other types of employment relationships</b>		
Doesn't have	8	34,9
Yes, 1	13	56,4
No, 2	2	8,7

\* Considered minimum wage: R\$1.212,00. Source: the authors, 2021.

addition, 52.2% of the participants reported that the hospital offered sufficient information about the biosafety of professionals and 78.2% said they had participated in



courses and training on safety at work.

Of the participants, 69.7% reported carrying out training and/or training on the safety of MSC professionals during the COVID-19 pandemic, while 26.1% reported that it did not occur, and one participant chose not to respond, since he was on leave and returned to work in the sector less than a month ago.

Regarding Personal Protective Equipment (PPE) used in the sector, participants reported the use of waterproof headcovers and gloves, 87% mentioned the use of specific masks (PFF2, NPF3, N95) and apron, and 78% highlighted the use of protective eyewear.

In Graph 1, the main occupational hazards of MSC cited by the professionals interviewed (n=23) are analyzed.

The prevalence of biological (100%) and physical risks reported (91.4%) by the participants was observed.

Accidental (69.6%) and chemical (65.2%) risks were mentioned several times, highlighting the risk of accidents with sharp materials, thermal injury due to the high temperature of the machines, risk of falls, as a result of floor moisture in some areas, and risk of contact (direct or indirect) with substances and chemicals harmful to professionals.

Regarding ergonomic risks (56.5%), concerns about impaired hearing were highlighted, due to exposure to loud noises for long periods; bad posture, due to the position during work activities; and physical exhaustion, due to the repetitive effort in some activities.

## DISCUSSION

When observing the results obtained in this study, the predominance of females in the MSC sector was noticed, which can be linked to the results of other studies that cover the predominance of women in the area of nursing, showing that, despite the presence of male professionals in the field of nursing, this is still a predominantly female profession.<sup>14-15</sup>

By associating the characteristics of the

**Table 2: Analysis on risk perception and biosafety measures in a Material and Sterilization Center, 2021.**

Questions	n° (%)
Level of knowledge of MSC's risks before working in the sector.	
Very little	5 (21,8)
Reasonable	7 (30,4)
Good	8 (34,8)
Excellent	3 (13)
Were protocols used before the pandemic?	
Yes	21 (91,3)
No	2 (8,7)
Have you participated in biosafety training?	
Yes	18 (78,2)
No	5 (21,8)
Does the hospital provide sufficient information about the risks and protective measures in the sector?	
Yes, frequently	12 (52,2)
Yes, rarely	9 (39,1)
No	2 (8,7)
Were updated protocols used during the pandemic? What kind?	
Yes, state/national	3 (13)
Sim, local	3 (13)
Sim, institutional	17 (74)
Has the hospital been able to meet the demand for PPE during the pandemic?	
Yes, frequently	17 (74)
Yes, rarely	5 (21,8)
No	1 (4,2)
Was there training/training on safety at the MSC in the face of COVID-19?	
Yes	16 (69,7)
No	6 (26,1)
Doesn't know	1 (4,2)
What PPE were used in the sector during the pandemic? (n=23)	
Specific masks (N95, PFF2, similar)	20 (87)
Headcovers	23 (100)
Apron	20 (87)
Waterproof gloves	23 (100)
Protective glasses	18 (78)
Face shield	
Source: the authors, 2021.	

activities carried out at the MSC with the working time of most participants, concerns arose about the professional's quality of life, since the activities carried out in the sector require great physical and mental ef-

fort and are factors that can generate wear and tear in the worker's life.<sup>16</sup> Thus, it is observed that professionals working in the MSC, for many years, have consequences resulting from exposure to the risks present



in the sector, impairing the professional's quality of life.

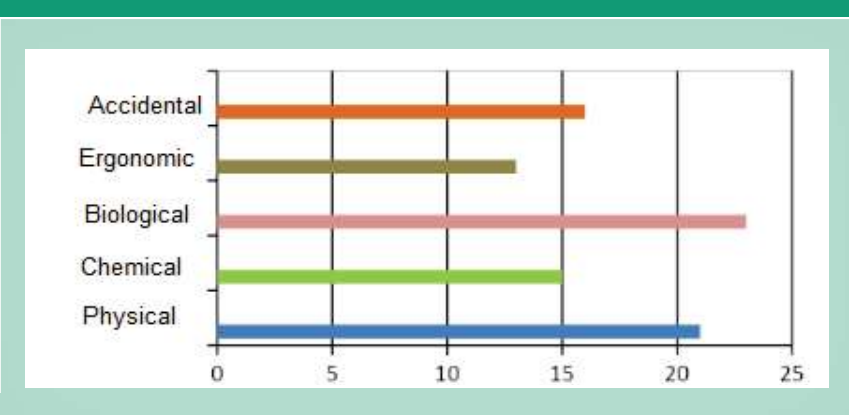
Some studies that cover the level of nursing education on MSC themes indicate that the participants had prior knowledge about the work of nurses and their respective attributions in the sector, however, pointed out complaints about the short workload in the discipline offered and obstacles in associating theory with practice, in addition to reporting that they acquired specific knowledge of the sector only during their daily work.<sup>17,18</sup> The role of nurses in MSC is a complex process and involves several possibilities and, often, during graduation, the time available to address this issue ends up not being enough to clarify students' doubts.

During the pandemic, an updated biosafety protocol was implemented at the MSC, according to participants, and there was guidance in face-to-face and online meetings, in addition to the development of folders with safety guidelines and training that covered the proper way of dressing and receiving and handling contaminated materials. It is noteworthy that despite the implementation of the protocol and the training carried out, not all professionals participated in the training. In addition, despite the care during the pandemic being similar to those carried out in everyday work, it is extremely important and duty of professionals to adhere to these guidelines to reduce contamination.<sup>19,20</sup>

The guidelines are fundamental during the face of the COVID-19 pandemic, as professionals working in the MSC and in other hospital sectors must be prepared for the daily work. For this, it is necessary that the protocols implemented are well defined and the team is trained.<sup>21</sup> Professionals who stopped participating in training and qualification end up losing an extremely important process, especially in a chaotic scenario, such as the COVID-19 pandemic, given the high risk that health professionals are and the need to emphasize safety during work in hospital sectors.

Participants demonstrated comprehen-

Graph 1: Risks most cited by professionals in Material and Sterilization Center, 2021.



Source: the authors, 2021.

sive knowledge about occupational hazards within the sector and reported those that generated the greatest concern, among these, biological and physical. In other studies that addressed the most prevalent risks in MSC, the most cited were heat, the risk of contamination and accidents with sharps.<sup>22-23</sup> These studies corroborate the results of this research, which refers to the idea that the risks with contaminated sharps is a reality in the health sectors and forms of protection and prevention of accidents with professionals must be worked on.

Regarding the use of PPE, the most cited were caps, surgical and waterproof gloves, specific masks (N95 OR PFF2) and surgical masks. PPE act as barriers and help fight infection, including waterproof gloves, goggles, face shield, waterproof coat or apron, and N95/PFF2 mask or similar.<sup>24</sup> During the research, it was noticed that some professionals reported unavailability of equipment that should be provided by the hospital, especially during the pandemic, which generated fear during the work process, in addition to the constant concern about contamination by the coronavirus.

Among the limitations of the study, due to the pandemic and the state of calamity that the country was in during the end of 2020 and beginning of 2021, the phases of data collection and analysis were hampered as a result of restrictions on access to the hospital and the interview with MSC professionals. After this period, authori-

zation from the health institution and the director of the MSC was possible for the researcher to access the sector, enabling the continuity of the research.

#### CONCLUSION

There was the implementation of a protocol developed by the health institution in the MSC sector, covering prevention and care measures at work, during the COVID-19 pandemic. The guidelines currently followed by professionals are similar to the care previously carried out in the MSC sector, covering topics on the importance of using PPE daily in the sector, correct techniques for receiving and handling contaminated materials, and hand hygiene.

The investigated professionals, working in the sector, participated in the guidelines and training. Therefore, it is necessary to analyze the reasons why some of the individuals did not perform these activities, since the health team must be fully trained to face COVID-19.

It is emphasized that even after the decrease in the rate of cases of infection and mortality by COVID-19, preventive care must be maintained by the MSC team, aiming to avoid contamination among professionals, since the virus still has high transmissibility and represents a risk to public health.

It is noteworthy that despite the large amount of research on biosafety themes



during the COVID-19 pandemic, there was a lack of studies that associate care during the pandemic in the MSC sector, which constitutes an obstacle in the dissemination of studies on this extremely relevant topic and exposes a gap in the knowledge of this

area.

It is hoped that the results of this research can collaborate as a basis for the construction of future studies that address the MSC theme and the safety of professionals working in this sector for the operation of

hospitals, in addition to adding scientific knowledge, in order to generate indicators and new contributions to future work strategies that help health managers and benefit health professionals, with an emphasis on nursing. 🌱

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