



OCCUPATIONAL EXPOSURE TO COVID-19: ADHERENCE TO INDIVIDUAL PROTECTION MEASURES BY NURSING PROFESSIONALS

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ABSTRACT

Objective: To identify the use and causes for the non-use of personal protective equipment by nursing professionals who worked on the front lines in the fight against COVID-19 in referral hospitals in Rio Grande do Sul, Brazil. **Method:** A quantitative cross-sectional study conducted in seven medium and large hospitals in Rio Grande do Sul with 359 nursing professionals who worked during the viral pandemic. After collecting data using a structured, self-administered questionnaire created in Google Forms, descriptive statistical analysis was performed with Stata 13.0 software, yielding absolute and relative frequency distributions. **Results:** Most participants were female and white, with a mean age of 36 years. Additionally, 75.7% of the participants identified as technicians. The most prominent causes of non-use were "Not available" and "Poor quality, did not protect" for all devices. Surgical masks were the least used equipment, with the most frequent cause being "Procedures did not require the use of this PPE". **Conclusion:** Gowns and caps had the highest adherence. Masks, face shields, and goggles were reported as having the lowest adherence. The results offer insights into the working conditions faced by this category during the COVID-19 pandemic.

Keywords: COVID-19. Pandemics. Nursing. Universal Precautions. Personal Protective Equipment.

INTRODUCTION

In Brazil, individual protection measures for healthcare professionals are standardized by regulatory standard number 32⁽¹⁾, which addresses the safety of healthcare workers and emphasizes that personal protective equipment (PPE) must be available or replaced immediately when necessary. However, the health crisis triggered by SARS-CoV-2, the causative agent of *coronavirus disease* (COVID-19), required health services to adapt quickly to face the unknown, with necessary adjustments to meet the demand for high-complexity hospital beds and isolation⁽²⁾.

In this scenario, the demand for PPE grew and exceeded market supply, resulting in a global distribution crisis that affected Brazil at the onset

of the COVID-19 pandemic, with distribution subsequently returning to normal. Furthermore, the culture of adherence to individual protection measures is historically and documentedly fragile⁽³⁻⁶⁾, which has repercussions during the pandemic, necessitating intensive training on the correct use of PPE and hand hygiene. Among the protective measures, Standard Precautions stand out, considered universal for protection against infectious agents⁽⁷⁾, which involves the use of PPE depending on the risk of occupational exposure in each situation encountered.

It is recognized that, in the context of hospital care for patients with COVID-19, healthcare professionals are at greater occupational exposure to the disease. This group includes nursing staff, as their work involves direct and prolonged

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contact with patients, making it necessary to establish specific hospital protocols to reduce the risk of exposure⁽⁸⁾. Epidemiological data on COVID-19 as of April 14, 2023, accounted for 37,358,92 confirmed cases of the disease in Brazil, reaching 700,811 deaths in the general population⁽⁹⁾. Infections among nursing professionals represented 1.7% of the total Brazilian population, with 64,936 infected and 872 deaths⁽¹⁰⁾.

The COVID-19 pandemic has made it challenging to adapt the use of PPE due to high demand, material shortages, and the use of low-quality equipment, as well as work overload and incorrect handling. This highlights the need for adequate staffing levels and ongoing training for professionals⁽¹²⁾. To interrupt the cycle of COVID-19 transmission, it is recommended to use caps, goggles, or face shields, as well as 95% filtration masks, waterproof aprons, and procedure gloves. Masks with 95% filtration, such as N95 and PFF2, are crucial for the respiratory protection of professionals, and face shields serve as a physical barrier for the face against contaminants⁽¹⁸⁾.

Given occupational exposure to highly lethal infectious agents such as COVID-19, the relevance of individual protection measures stands out, as do the factors limiting the adoption of PPE use, which have been highlighted in the literature^(3-6, 12-14). Among the limiting factors, the lack of ongoing education on the subject in healthcare services stands out, leading to a lack of knowledge about the function of PPE and its correct use, as well as the difficulty of adapting to its use⁽¹⁵⁾.

The gaps in knowledge in this area of research are noteworthy. Studies highlight the need to identify potential risk factors, the factors and causes of non-adherence, and the effectiveness of available protection. Additionally, they promote the routine use of personal protective equipment and the technical and scientific training of nursing staff. It is essential to develop educational initiatives and training and to provide structural support from hospitals to ensure safety in nursing work. To this end, it is crucial to encourage new studies to understand this phenomenon⁽¹⁶⁻¹⁹⁾. Thus, the following research question was formulated: What protective measures are being used by nursing professionals who face COVID-

19 while working in referral hospitals in the state of Rio Grande do Sul?

Given this, the present study aimed to investigate the use and reasons for the non-use of personal protective equipment among nursing professionals working on the front lines in the fight against COVID-19 in referral hospitals in Rio Grande do Sul, Brazil.

METHOD

This is a quantitative cross-sectional study, excerpted from the larger macro-research study, "Mental health and perception of risks and harm among nursing professionals in referral hospitals in Rio Grande do Sul in the face of the COVID-19 pandemic: A mixed methods study"⁽²⁰⁾.

Data collection was conducted between August 2020 and July 2021 at seven hospitals in Rio Grande do Sul, which served as referral centers in their regions for the care of patients with COVID-19. The research covered the metropolitan (Igrejinha), southern (Bagé and Pelotas), missionary (Cruz Alta), valley (Santa Cruz do Sul), midwest (Santa Maria), and northwest (Três Passos) macro-regions, including units that were part of the care flow for patients with the disease.

All nursing professionals, both graduate and undergraduate, assigned to sectors that provided care for suspected and/or confirmed cases of COVID-19 were interviewed. The sample consisted of 470 eligible professionals linked to the units, with 359 nursing professionals responding to the questionnaire, excluding those who were on vacation or away from work. With a frequency of 50%, a confidence level of 95%, a margin of error of 5%, an effect size design, and cluster 1, the minimum number of participants was estimated to be 211.

Data collection was carried out by contacting hospital managers and requesting the email addresses of eligible professionals, to whom the electronic form created in *Google Forms* was sent. This form included the Free and Informed Consent Form and a structured, self-administered instrument developed by the original research team, which consisted of 34 variables. For this study, the variables of interest were selected from block I (position/function, unit/sector, shift, employment status, total weekly hours worked,

other employment status, years of experience, gender, color/race, and age in years); in block II (has a pre-existing condition); and in block III (availability and suitability of PPE: surgical mask, N95/PFF2 mask, protective goggles, face shields, apron/gown, waterproof apron/gown, shoe covers, and cap). PPE used (surgical mask, N95/PFF2 mask, protective goggles, face shields, apron/gown, waterproof apron/gown, shoe covers, and cap). Regarding the use of PPE, the response options were a *Likert* scale (Never; Rarely, Almost always, and Always), which was dichotomized into No (Never) and Yes (Rarely, Almost always, and Always); the reason for not using PPE, difficulties with availability, whether training was received, how sufficient the training was, the source of the training, and whether the respondent felt technically prepared to use PPE.

The research data were compiled in an Excel spreadsheet, automatically generated by Google Forms, and the variables related to PPE were extracted to the Stata 13.0 software format. The data were analyzed using descriptive statistics, with absolute and relative frequency distributions, central tendency measures, and standard deviation for the age variable.

The data was produced after approval by the Research Ethics Committee of the Federal University of Santa Maria, identified by CAAE number 34292720.0.1001.5346. The ethical principles outlined in Resolution 466/12 of the National Health Council regarding research

involving human beings were respected. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) instrument was considered to comply with the research production guidelines of the Enhancing the Quality and Transparency of Health Research Network (EQUATOR).

RESULTS

The participating professionals were 75.7% (272) nursing technicians, 84% (302) female, and 78.8% (283) reported having white skin color, with an average age of 36 years (SD=9.4), ranging from 19 to 57 years, concentrated in the 31 to 40 age group, with 34.9% (123) of respondents.

The use of PPE by nursing professionals, categorized by their characteristics, is presented in Table 1. It is noteworthy that, among female professionals, adherence to the use of personal protective equipment was nearly 100%, except for surgical masks, with an adherence rate of 75.4% (224). Among men, use was close to 95.0%, varying between the most used PPE, face protection (98.3%, 56), and the least widely used, surgical masks (74.6%, 41). There was a statistically significant difference in the distribution by gender in the use of clothing protection ($p = 0.02$) and scalp protection ($p = 0.001$), with higher percentages of use among women.

Table 1. Use of PPE by nursing professionals in seven hospitals in Rio Grande do Sul (N=359), 2021

Characteristics of nursing professionals		Use of Personal Protective Equipment					
		Goggles or face shields %	Apron/ waterproof %	Surgical mask* %	N95 Mask %	Shoe covers** %	Nursing cap %
Gender	Female (302)	99,3	99	75,4	98,7	94,4	98,7
	Male (57)	98,3	94,7	74,6	94,7	91,2	91,2
Has a previous illness	No (272)	98,9	97,8	73,8	97,4	93	96,7
	Yes (87)	100	100	80	100	96,5	100
Time at work	1 to 10 years (231)	98,7	97,8	77,6	97,8	93	97
	>10 years (124)	100	99,2	70,8	98,4	96	98,4
Professional category	Nurses (87)	100	96,5	71,4	96,5	90,7	98,9
	Nursing Technician (272)	98,9	98,9	76,5	98,5	94,9	97,1
Unit feature	Critique (202)	99,5	98	76,3	98,5	92,1	97,5
"Actuation"	Clinic (157)	98,7	98,7	74	97,4	96,2	97,4

Legend: variables with the highest number of ignored *n=352, **n=276

Source: Database of the study "Mental health and perception of risk and harm of nursing professionals in reference hospitals in Rio Grande do Sul in coping with the COVID-19 pandemic: Mixed methods study", 2021.

Table 2 shows the results regarding the non-use of PPE. The main reason given was “The procedures did not require the use of this PPE,” ranging from 56.6% (30) for the shoe cover to 70.8% for the cap. The second most common reason for non-use was “Not available,” accounting for 12.6% of surgical masks, 12.5%

of N95 masks, 18.1% of aprons, 18.2% of waterproof aprons, 22.6% of shoe covers, and 10.4% of caps (medical or nursing caps). The third most frequent cause for non-use was “Poor quality, did not protect,” which predominated for surgical masks (11.7%), aprons (15.3%), and shoe covers (11.3%).

Table 2. Causes of non-use of PPE by nurses and nursing technicians in seven hospitals in Rio Grande do Sul (N=359), 2021

Cause of non-use of PPE / Personal Protective Equipment	Surgical mask (n=103) %	Mask N95 (n=56) %	Goggle (n=94) %	Face shields (n=101) %	Apron (n=72) %	Apron/ waterproof (n=77) %	Shoe cover (n=53) %	Caps (n=48) %
Not available	12,6	12,5	11,7	4,9	18,1	18,2	22,6	10,4
The procedures did not require the use of this PPE	69,9	69,6	60,6	58,4	56,9	59,7	56,6	70,8
I didn't fit in; it was uncomfortable	2,9	7,1	21,3	28,7	5,6	10,4	3,8	6,3
Poor quality, no protection	11,7	7,1	4,3	4,9	15,3	10,4	11,3	6,3
No need to use it. My health is good	1	1,8	2,1	2	1,4	0	3,8	6,3
I don't know what this PPE is for	1,9	1,8	0	1	2,8	1,3	1,9	0

Source: Database of the study "Mental health and perception of risk and harm of nursing professionals in reference hospitals in Rio Grande do Sul in coping with the COVID-19 pandemic: Mixed methods study", 2021.

DISCUSSION

The COVID-19 pandemic has resulted in a significant number of infections and deaths worldwide. Healthcare professionals are a high-risk group, as they are directly exposed to the coronavirus while providing care. In this context, individual protection for professionals is essential to prevent contamination by the disease⁽⁸⁾.

When examining the distribution of PPE use by gender, a slightly higher proportion of use was observed among women, with statistical significance noted for the use of protective clothing ($p = 0.02$) and scalp protection ($p = 0.001$). Corroborating the results of a cross-sectional study conducted in Rio Grande do Sul, reports of work accidents involving biological material were documented between 2014 and 2019, with women exhibiting a higher use of PPE⁽¹²⁾. It is worth noting that self-care in the profession, regardless of gender, is often neglected in the workplace and everyday life. Professionals usually suffer from physical and mental health problems, but above all, they prioritize the health of their patients, which leads them to need care themselves⁽²¹⁾.

When stratifying the use of PPE by the

presence of pre-existing conditions, adherence is nearly 100% for all PPE. Although not statistically significant, this data is relevant given the potential vulnerability to complications from COVID-19 infection among people with pre-existing conditions. During the pandemic, there was a recommendation for the removal or relocation of professionals with chronic conditions from healthcare areas⁽²²⁾. Among the conditions considered risk factors are obesity, cardiomyopathy, hypertension, cerebrovascular disease, severe lung disease, immunosuppression, chronic kidney disease, and age over 60 years⁽²³⁾.

Regarding the length of service, PPE use was predominant among those who had been working for more than 10 years. It should be noted that, although reports in the literature indicate that occupational exposure to pathogens is more prevalent among younger workers with less experience⁽²⁴⁾, it is recognized that more experienced professionals tend to overlook individual protection measures.

A qualitative study conducted in an emergency department in the northwestern region of the state of Rio Grande do Sul highlighted, through one of the interviews conducted, that professionals did not use procedure gloves because of their

confidence in their technical skills, based on years of professional experience⁽²⁵⁾. It is understood that, regardless of length of service, the normalization of procedures without the proper use of PPE must be avoided, as there is a higher risk of occupational exposure to biological material. Continuing education activities are essential for promoting a culture of safety among healthcare professionals, emphasizing the importance of PPE in maintaining workers' health.

The analysis by professional category indicated that nursing technicians reported using PPE in slightly higher proportions than nurses, except for face protection (goggles or face shields) and the use of caps. A cross-sectional study conducted in two Brazilian hospitals among 522 nursing professionals, before the COVID-19 pandemic, compared adherence to PPE use by professional category. The results indicated that nursing technicians had higher average scores than nurses, indicating a statistically significant correlation⁽¹⁸⁾.

Given the distribution by professional category, it is essential to consider the type of training required for professional practice and the length of exposure during the care provided to users. It should be noted that nursing training encompasses scientific and technical skills that require in-depth study of both basic and specific content, providing greater theoretical support for understanding the occupational risks to these professionals. However, it is understood that nursing technicians are the professionals who spend the most time in direct patient care, which may increase the perception of the need to use PPE to prevent occupational exposure to infectious agents.

The stratification of PPE use by work unit (clinical or critical) did not yield statistically significant results. Still, the exposure of professionals in both units is evident, not only to COVID-19 but also to other infectious diseases, such as cases involving care for patients with tuberculosis and multidrug-resistant germs, events commonly found in the hospital setting. In May 2020, the Federal Nursing Council (COFEN) shared a technical note on the use of PPE in critical areas, emphasizing the need for availability and use by professionals⁽¹⁰⁾. In this context, it is worth noting that the use of PPE will

depend on the recognition of the pathogen to which the professional will be exposed and thus the adoption of the recommended measures to avoid exposure, a fact that does not apply only to COVID-19⁽²⁾.

Although PPE is mandatory for healthcare professionals exposed to biological material in the workplace, as set out in Regulatory Standard No. 32⁽¹⁾, it was the consideration of the lethality of COVID-19 that brought the factors leading to its non-use to the fore. When investigating the reasons for not using PPE, the perception that the equipment was not necessary to perform the procedures was predominant, with this assertion being the most common for all types of PPE.

According to PAHO/WHO guidelines and recommendations from the Ministry of Health, PPE should be used based on the potential biological risk present in the activity to be performed. When caring for COVID-19 patients, professionals should use scalp protection, face protection, respiratory protection, clothing protection, and shoe protection⁽¹⁸⁾. The preparation of professionals through continuing education is essential for developing a culture of safety regarding occupational exposure to biological materials. A study conducted with primary care professionals in the municipality of Picos, Piauí, found that the nursing professionals evaluated did not have sufficient knowledge about PPE to ensure its correct use⁽¹³⁾, highlighting the essential role of training.

The unavailability and inadequacy of PPE were particularly evident in 2020, at the onset of the COVID-19 pandemic, due to the exponential increase in demand, which exceeded global production capacity.⁽¹⁰⁾ In the present study, this was the second cause attributed to non-use. This result is corroborated by a survey of 218 healthcare professionals working at the University Hospital of Paraíba, which found that most respondents reported not having access to all PPE during the pandemic⁽¹⁴⁾. Even before COVID-19, the unavailability or irregular supply of PPE was already occurring in the care of patients with infectious diseases. This fact was verified in a study conducted in Rivers, Nigeria, which assessed the occupational risk related to HIV among healthcare professionals in public and private units⁽⁶⁾.

The third reason for non-use was "Poor

quality, did not protect,” which was predominant for surgical masks, aprons, and shoe covers. In this context, occupational health surveillance aims to address the factors that contribute to the risks and hazards to the health of this population⁽²²⁾. Considering that the non-use of PPE affects the health of professionals, it is necessary to provide adequate resources to prevent occupational exposure and enhance infection control⁽²⁶⁾. This finding is particularly relevant considering the challenges faced by professionals in dealing with COVID-19, as it highlights that the unavailability or lack of confidence in the quality of PPE provided can reduce adherence to protective measures, leading to occupational exposure to COVID-19.

In the face of the COVID-19 pandemic, some protective measures are essential, such as respiratory protection with surgical masks and N95 masks and protection of mucous membranes with goggles or face shields to prevent exposure to the virus. Although the importance of respiratory and facial protection has been historically recognized⁽²⁷⁾, the present study identified difficulty in adapting to the use of N95 masks, protective goggles, and *face shields* as a reason for non-use. They found that of the 203 professionals who reported performing aerosol-generating procedures during the COVID-19 pandemic, only 26.1% (53) wore face shields and 43.3% (88) wore protective goggles⁽¹⁴⁾.

It is recognized that, even with training, nursing staff frequently fail to use PPE, especially when exposed to exhausting work routines, which are commonly experienced during the pandemic⁽²⁸⁾. A study conducted among 11,368 healthcare professionals in the North, Northeast, Midwest, Southeast, and South regions of Brazil found that a minority of respondents reported skin changes due to mask use during the COVID-19 pandemic⁽²⁹⁾.

It is worth noting that studies conducted before the COVID-19 pandemic already demonstrated low adherence to the use of personal protective

equipment among nursing professionals^(3,4), often due to inadequate knowledge about disease transmission, highlighting the need for educational strategies to reduce the risk of contamination in this population. Furthermore, it is essential that these professionals be heard regarding their demands for the use of PPE and that studies be conducted to develop more ergonomic equipment that does not cause skin lesions while also ensuring sufficient quality and quantity to provide adequate protection and prevent contamination of professionals during their professional practice.

The study's limitations include data collection, which was hindered by the need to conduct it entirely remotely due to the pandemic, making it challenging to access professionals and ensure their participation in the questionnaire. This necessitated further research to achieve the desired sample percentage. Additionally, this is a self-reported study, and therefore the data obtained refer to the opinions of the professionals interviewed.

CONCLUSION

It is worth noting the higher level of use for clothing and scalp protection among women, regarding the highest proportions of reasons for not using PPE among these—surgical masks, face shields, and goggles—the perception that the equipment was not necessary to perform the procedures prevailed, an assertion with the highest proportion for all PPE.

This study presents the challenges faced by nursing professionals during the COVID-19 pandemic, providing input for discussions on working conditions aimed at improving safety and reducing the risk of exposure. The need to keep professionals trained and up to date is explained, as other conditions in the healthcare environment require the use of personal protective equipment.

EXPOSIÇÃO OCUPACIONAL AO COVID-19: ADESÃO ÀS MEDIDAS DE PROTEÇÃO INDIVIDUAL POR PROFISSIONAIS DE ENFERMAGEM

RESUMO

Objetivo: identificar o uso e causas para o desuso das medidas de proteção individual por profissionais de enfermagem que atuaram na linha de frente no enfrentamento à COVID-19 em hospitais de referência do Rio Grande do Sul, Brasil. **Método:** estudo quantitativo de abordagem transversal desenvolvido em sete instituições

hospitais de médio e grande porte do Rio Grande do Sul com 359 profissionais da enfermagem que trabalharam no período de pandemia viral. Após coleta de dados com questionário estruturado e autoaplicável criado no Google Forms, foi feita a análise estatística descritiva utilizando o software Stata 13.0 com distribuição de frequências absolutas e relativas. **Resultados:** a maioria do sexo feminino, branca e idade média de 36 anos, 75,7% são técnicos. As causas mais proeminentes de não utilização foram "Não estava disponível" e "Qualidade ruim, não protegia" para todos os dispositivos. A máscara cirúrgica foi o equipamento de menor uso com maior frequência da causa "Os procedimentos não exigiam o uso deste EPI". **Conclusão:** vestimenta e touca tiveram maior adesão. Máscara, *faceshields* e óculos foram relatados como de menor adesão. Os resultados oferecem subsídios para a discussão das condições de trabalho enfrentadas por esta categoria durante a pandemia de COVID-19.

Palavras-chave: Covid-19. Pandemias. Enfermagem. Precauções universais. Equipamentos de proteção individual.

EXPOSICIÓN OCUPACIONAL AL COVID-19: ADHESIÓN A LAS MEDIDAS DE PROTECCIÓN INDIVIDUAL POR PROFESIONALES DE ENFERMERÍA

RESUMEN

Objetivo: identificar el uso y las causas para el desuso de medidas de protección individual por profesionales de enfermería que actuaron en primera línea en la lucha contra el COVID-19 en hospitales de referencia del estado de Rio Grande do Sul, Brasil. **Método:** estudio cuantitativo de enfoque transversal desarrollado en siete instituciones hospitalarias de mediano y gran tamaño de Rio Grande do Sul con 359 profesionales de la enfermería que trabajaron en el período de pandemia viral. Tras la recolección de datos con cuestionario estructurado y autoaplicable creado en Google Forms, se realizó el análisis estadístico descriptivo utilizando el software Stata 13.0 con distribución de frecuencias absolutas y relativas. **Resultados:** la mayoría del sexo femenino, blanca y promedio de edad de 36 años, 75,7% son técnicos. Las causas más importantes de no uso fueron "No estaba disponible" y "Calidad deficiente, no protegía" para todos los dispositivos. La mascarilla quirúrgica fue el equipo de menor uso con mayor frecuencia de la causa "Los procedimientos no requerían el uso de este EPI". **Conclusión:** vestimenta y gorro tuvieron mayor adherencia. Mascarilla, *face shields* y gafas fueron reportados como de menor adherencia. Los resultados ofrecen contribuciones para la discusión de las condiciones de trabajo enfrentadas por esta categoría durante la pandemia de COVID-19.

Palabras clave: COVID-19. Pandemias. Enfermería. Precauciones universales. Equipos de protección individual.

REFERENCES

- 1 Brasil. NR 32 - Segurança e Saúde no Trabalho em Serviços de Saúde. 2005. Disponível em: URL: https://enit.trabalho.gov.br/portal/images/Arquivos_SST/SST_NR/NR-32.pdf
- 2 Anvisa. Agência Nacional de Vigilância Sanitária. Ministério da Saúde. 2020. Nota técnica GVIMS/GGTES/ANVISA Nº 04/2020. Orientações para serviços de saúde: Medidas de prevenção e controle que devem ser adotadas durante a assistência aos casos suspeitos ou confirmados de infecção pelo novo coronavírus(SARS-CoV-2) – atualizada em 09/09/2021. Disponível em: URL: https://www.gov.br/anvisa/pt-br/centraisdeconteudo/publicacoes/servicosdesaude/notas-tecnicas/2020/nota-tecnica-gvims_ggtes_anvisa-04_2020-25-02-para-o-site.pdf
- 3 Sousa RK, Gonçalves N, Silva TL, Echevarria-Guanilo ME. Equipamentos de proteção individual na assistência hospitalar de enfermagem: revisão de escopo. Texto Contexto Enferm [Internet]. 2022; 31. DOI: <https://doi.org/10.1590/1980-265X-TCE-2021-0421pt>
- 4 Galeno JA, Freire FA, Carvalho GT, Silva MC, Mouta AA, Beltrão RP, et al. Indispensabilidade do Uso de Equipamentos de Proteção Individual. Ensaios e Ciência. 2021; 25(5):541-45. DOI: <https://doi.org/10.17921/1415-6938.2021v25n5-esp.p541-545>
- 5 Cunha QB, Freitas EO, Pinno C, Petry KE, Silva RM, Camponogara S. Standard precaution adherence by nursing workers: a mixed methods study. Texto Contexto Enferm [Internet]. 2021. DOI: <https://doi.org/10.1590/1980-265X-TCE-2020-0240>
- 6 Akpuh N, Ajayi I, Adebawale A, Suleiman HI, Nguku P, Dalhat M, et al. Occupational exposure to HIV among healthcare workers in PMTCT sites in Port Harcourt, Nigeria. BMC Public Health. 2020; 20(1):451. DOI: <https://doi.org/10.1186/s12889-020-08528-5>
- 7 Sousa AR, Abreu KB, Pierot EV, Rêgo MM, Sena IV, Almeida RN, et al. Standard precautions and nursing: bibliometric review. Rev. enferm. UFPE online. 2024; 18. DOI: <https://doi.org/10.5205/1981-8963.2024.262514>
- 8 Teixeira CF, Soares CM, Souza EA, Lisboa ES, Pinto IC, Andrade LR, et al. The health of healthcare professionals coping with the Covid-19 pandemic. Ciênc. Saúde Colet. 2020; 25(9):3465-74. DOI: <https://doi.org/10.1590/1413-81232020259.19562020>
- 9 Brasil. Ministério da Saúde. Painel coronavírus. 2023. Disponível em: URL: <https://covid.saude.gov.br>
- 10 Conselho Federal De Enfermagem (COFEN). Nota Técnica: Uso de EPI em áreas críticas. 2020. Disponível em: URL: https://www.cofen.gov.br/wp-content/uploads/2020/05/NOTA_TECNICA-COFEN.pdf
- 11 Ventura-Silva JM, Ribeiro OM, Trindade LL, Nogueira MA, Monteiro MA. International year of the nursing and the pandemic of covid-19: media expression. Ciência, Cuidado e Saúde. 2020; 19. DOI: <https://doi.org/10.4025/ciencuidsaude.v19i0.55546>
- 12 Bertelli C, Martins BR, Reuter CP, Krug SB. Acidentes com material biológico: fatores associados ao não uso de equipamentos de proteção individual no Sul do Brasil. Cienc. Cuid. Saude. 2023; 28(3):789-801. DOI: <http://dx.doi.org/10.1590/1413-81232023283.08222022>
- 13 Moura MS, Silva RK, Mendes PM, Sousa AS, Neto FJ. Knowledge and use of personal protective equipment by nursing professionals during the Covid-19 pandemic. Rev. esc. enferm. USP. 2021; 55. DOI: <https://doi.org/10.1590/1980-220X-REEUSP-2021-0125>
- 14 Sarges DC, Conde SR, Viana MG, Chaves TD. O impacto da pandemia pela covid-19 em profissionais de saúde em um hospital universitário. Braz J Infect Dis. 2022; 26. DOI: <https://doi.org/10.1016/j.bjid.2022.105554>

<https://doi.org/10.1016/j.bjid.2021.101807>

15 Rodrigues HS, Lisboa RB, Peixoto MG, Kameo SY. Conhecimento e adesão às práticas de biossegurança por profissionais de saúde no Brasil: uma revisão integrativa. *REV CIENT FAC EDUC M*. 2023; 14(2):521-38. DOI: <https://doi.org/10.31072/rev.v14i2.1347>

16 Alves NS, Oliveira BA, Carvalho TA, Carvalho TA, Sampaio LS, Almeida RO, et al. Riscos Ocupacionais e seus Agravos aos Profissionais de Enfermagem: Revisão Integrativa da Literatura. *RCC*. 2021; 12(1). Disponível em: <https://periodicos.ufrn.br/casoseconsultoria/article/view/25687>

17 Cunha QB, Freitas EO, Magnago TS, Brevidei MM, Cesar MP, Camponogara S. Association between individual, work-related and organizational factors and adherence to standard precautions. *Rev Gaúcha Enferm*. 2020; 41. Disponível em: URL: <https://seer.ufrgs.br/index.php/rge/article/view/99818>

18 Pereira VH, Torres LN, Rodrigues NM, Monteiro DA, Moraes JT, Pereira-Ávila FM, et al. Compliance with standard precautions by nursing professionals and related factors. *Esc Anna Nery*. 2021; 25(3). DOI: <https://doi.org/10.1590/2177-9465-EAN-2020-0193>

19 Sousa KR, Miranda MA. Percepção dos profissionais de enfermagem sobre o uso dos equipamentos de proteção individual na emergência. *Com. Ciências Saúde*. 2021; 32(2):49-60. Disponível em: URL: <https://revistaccs.espdf.fepecs.edu.br/index.php/comunicacaoemcienciasdasaude/article/view/797>

20 Centenaro AP, Andrade A, Franco GP, Cardoso LS, Spagnolo LM, Bonow C, et al. Saúde mental e percepção de riscos e danos de profissionais de enfermagem de hospitais de referência do Rio Grande do Sul no enfrentamento da pandemia Covid-19: estudo de métodos mistos. *Mendeley Data*. 2023; 2. Disponível em: <https://revistaccs.espdf.fepecs.edu.br/index.php/comunicacaoemcienciasdasaude/article/view/797>

21 Williams SG, Fruh S, Barinas JL, Graves RJ. Self-Care in Nurses. *J Radiol Nurs*. 2022; 41(1):22-27. DOI: <https://doi.org/10.1016/j.jradnu.2021.11.001>

22 Brasil. Ministério da Saúde. Recomendação de proteção aos trabalhadores dos serviços de saúde no atendimento de COVID-19 e outras síndromes gripais. 2020. Disponível em: URL: https://www.saude.gov.br/files/banner_coronavirus/GuiaMSRecomendacoesdeprotecaoatrabalhadore-COVID-19.pdf

23 Brasil. Ministério da Saúde. Atendimento e fatores de risco. 2021. Disponível em: URL: <https://www.gov.br/saude/pt-br/assuntos/covid-19/atendimento-e-fatores-de-risco#:~:text=Idade%20igual%20ou%20superior%20a,card%C3%A9aDaca%2C%20miocardiopatia%20isqu%C3%A9Amica%20etc>

24 Garbaccio JL, Regis WC, Silva RM, Estevão WG. Occupational accidents with the nursing team involved in hospital care. *CogitareEnferm*. 2015; 20(1):146-52. DOI: <https://doi.org/10.5380/ce.v20i1.37661>

25 Rieth GH, Loro MM, Stumm EM, Rosanelli CL, Kolankiewicz AC, Gomes JS. Uso de equipamentos de proteção individual pela enfermagem em uma unidade de emergência hospitalar. *Rev. enferm. UFPE on line*. 2014; 8(2):365-71. Disponível em: <https://pesquisa.bvsalud.org/porta/resource/pt/biblio-1033658>

26 Zhu S, Kahsay KM, Gui L. Knowledge, Attitudes and Practices related to standard precautions among nurses: A comparative study. *J Clin Nurs*. 2019; 28(19-20):3538-46. DOI: <https://doi.org/10.1111/jocn.14945>

27 Brasil. Sociedade Brasileira de Pesquisa em Materiais (SBPMat). Rio de Janeiro, 2020. Disponível em: URL: <https://www.sbpmat.org.br/en/tag/gripe-espanhola/>

28 Huang L, Lin G, Tang L, Yu L, Zhou Z. Special attention to nurses' protection during the COVID-19 epidemic. *CritCare*. 2020; 24(1): 120. DOI: <https://doi.org/10.1186/s13054-020-2841-7>

29 Gir E, Silva ACO, Caetano KAA, Menegueti MG, Brandão MGSA, Lam SC, et al. Skin lesions associated with the use of N95 respirators among health professionals in Brazil in 2020. *Rev. Latino-Am. Enfermagem*. 2023; 31. DOI: <https://doi.org/10.1590/1518-8345.5937.3762>

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