


Association between skin injuries and the importance attributed to prevention by health professionals during the pandemic

Associação entre lesão cutânea e importância atribuída à prevenção pelos profissionais de saúde na pandemia

Asociación entre lesión cutánea e la importancia atribuida a la prevención por los profesionales de la salud durante la pandemia


Euzeli da Silva Brandão^a 

Regina Serrão Lanzillotti^b 

Paula Dadalti Granja^c 

Liliane Faria Silva^d 

Maria Helena Sant'Ana Mandelbaum^e 

Renato Tonole^f 

How to cite this article:

Brandão ES, Lanzillotti RS, Granja PD, Silva LF, Mandelbaum MHS, Tonole R. Association between skin injuries and the importance attributed to prevention by health professionals during the pandemic. Rev Gaúcha Enferm. 2024;45:e20230114. doi: <https://doi.org/10.1590/1983-1447.2024.20230114.en>

ABSTRACT

Objective: To verify the association between the occurrence of skin lesions due to the use of products and/or personal protective equipment and the importance attributed to preventive care among health professionals working on the front lines of the struggle against the COVID-19 pandemic.

Method: Cross-sectional, analytical study, carried out between May and June 2020, with a convenience sample (n=398) of health workers from 10 professional categories. To verify the existence of an association between the occurrence of skin lesions and exposure variables, a Contingency Table was used to obtain the Prevalence Ratio and respective Confidence Intervals.

Results: 260 (65.3%) participants self-declared the development of skin lesions, predominantly nurses (53.8%), women (54.0%), from public institutions (52.8%), characterized by pressure injuries (37.3%), contact/allergic dermatitis (25.8%), or both lesions simultaneously (16.5%). More than half of professionals (53.5%) used preventive products, mainly moisturizers (51.0%).

Conclusion: There was probability of an association between professionals who attributed less importance to the predictor "Protocol for proper product PPE and products" and the risk of skin injuries.

Descriptors: Skin. Health personnel. Program of risk prevention on working environment. Personal protective equipment. COVID-19.

RESUMO

Objetivo: Verificar a associação entre ocorrência de lesão cutânea por uso de produtos e/ou equipamentos de proteção individual e importância atribuída aos cuidados preventivos entre profissionais de saúde atuantes na linha de frente durante a pandemia da Covid-19.

Método: Estudo transversal, analítico, realizado entre maio e junho de 2020, com uma amostra por conveniência (n=398) de profissionais de saúde de 10 categorias profissionais. Para verificar a existência de associação entre a ocorrência ou não de lesão de pele e as variáveis de exposição utilizou-se Tabela de Contingência para obter a Razão de Prevalência e respectivos Intervalos de Confiança.

Resultados: 260 (65,3%) participantes autodeclararam desenvolvimento de lesões na pele, predominando enfermeiros (53,8%), mulheres (54,0%), provenientes de instituições públicas (52,8%), caracterizadas por lesões por pressão (37,3%), dermatite de contato/alérgica (25,8%), e ambas as lesões de forma simultânea (16,5%). Mais da metade dos profissionais (53,5%) usou produtos preventivos, principalmente hidratantes (51,0%).

Conclusão: Ocorreu probabilidade de associação de risco entre a ocorrência de lesão de pele e a menor importância atribuída ao fator preditor Protocolo para uso adequado de produtos e EPIs.

Descritores: Pele. Pessoal de saúde. Programa de prevenção de riscos no ambiente de trabalho. Equipamento de proteção individual. COVID-19.

RESUMEN

Objetivo: Verificar la asociación entre la aparición de lesiones cutáneas por el uso de productos y/o equipos de protección personal y la importancia atribuida al cuidado preventivo entre los profesionales de la salud que trabajaran en la primera línea de defensa contra la pandemia de la COVID-19.

Método: Estudio analítico transversal, realizado entre mayo y junio de 2020, con una muestra por conveniencia (n=398) de profesionales de la salud de 10 categorías profesionales. Para verificar la existencia de asociación entre la aparición o no de lesiones cutáneas y las variables de exposición, se utilizó una Tabla de Contingencia para obtener el Índice de Prevalencia y los respectivos Intervalos de Confianza.

Resultados: 260 (65,3%) participantes declararon el desarrollo de lesiones cutáneas, predominantemente enfermeras (53,8%), mujeres (54,0%), de instituciones públicas (52,8%), caracterizadas por lesiones por presión (37,3%), de dermatitis contacto/alérgicas (25,8%) y ambas lesiones simultáneamente (16,5%). Más de la mitad de los profesionales (53,5%) utilizan productos preventivos, principalmente hidratantes (51,0%).

Conclusión: Hubo probabilidad de asociación de riesgo entre la aparición de lesiones cutáneas y la atribución de menor importancia al factor preditor "Protocolo para el uso adecuado de productos y EPP".

Descriptores: Piel. Personal de salud. Programa de prevención de riesgos en el ambiente de trabajo. Equipo de protección personal. COVID-19.

^a Universidade Federal Fluminense (UFF). Escola de Enfermagem Aurora de Afonso Costa. Departamento de Fundamentos de Enfermagem e Administração. Niterói, Rio de Janeiro, Brasil.

^b Universidade do Estado do Rio de Janeiro (UERJ). Instituto de Matemática e Estatística. Niterói, Rio de Janeiro, Brasil.

^c Universidade Federal Fluminense (UFF). Faculdade de Medicina, Departamento de Medicina Clínica. Niterói, Rio de Janeiro, Brasil.

^d Universidade Federal Fluminense (UFF). Escola de Enfermagem Aurora de Afonso Costa. Departamento de Enfermagem Materno-Infantil e Psiquiátrica. Niterói, Rio de Janeiro, Brasil.

^e Universidade do Vale do Paraíba (Univap). Departamento de Pós-Graduação Lato Sensu. São José dos Campos, São Paulo, Brasil.

^f Instituto Nacional de Câncer (INCA). Hospital do Câncer I. Niterói, Rio de Janeiro, Brasil.

■ INTRODUCTION

The new coronavirus pandemic, which causes the severe acute respiratory syndrome - coronavirus 2 (SARS-CoV-2) led to a change in the behavior of health workers during the care provided to people with suspected or confirmed COVID-19 cases. Since this virus is highly infectious, it became essential to enhance recommendations for health workers to clean their hands with antiseptic soaps and use personal protective equipment (PPE), meaning these equipment were used more often and for longer periods. Although these are biosafety measures, they constitute chemical and physical factors that contribute to the development of different lesions, such as pressure and friction injuries, acne, eczema, and contact dermatitis, which may even have infectious complications^(1,2).

A cross-sectional study carried out in the Hubei province, China, showed that 97% of the 700 health workers interviewed presented damaged skin. The regions affected included nasal bridge (83.1%), hands, and the malar and frontal areas. Among signs and symptoms, dryness and desquamation were the most common (70.3%). Health workers that used PPE for longer than six hours were more likely to suffer skin damage than those who used it for shorter periods⁽³⁾. In Italy, nurses who worked in Intensive Care Units during the pandemic presented pressure injuries as the main complication from the use of PPE⁽⁴⁾.

In the state of Ceará, Brazil, a cross-sectional study carried out in May 2020, with 1,106 health workers, showed that 69.4% had pressure injuries from the use of PPE, with approximately 2 to 3 lesions per worker. The areas affected included: nasal bone, nose wings, zygoma, ears, and malar area⁽⁵⁾.

It is noteworthy that the development of any type of skin lesion in health workers increase their vulnerability to infection, facilitating the appearance of illness, in addition to interfering in self-image and self-esteem. Studies show that the lack of access to information about the adequate management of PPE products increased the emergence of skin lesions, generating not only physical damage, but also anxiety, and compromising mental health^(6,7).

During the COVID-19 pandemic, adverse effects of long-term PPE use could be observed in an unprecedented scale⁽⁸⁾, but few studies provided scientific evidence regarding effective measures to prevent these issues, specifically for this public^(2,9). Thus, specialist associations, such as the Portuguese Association for the Treatment of Wounds (APTF)⁽¹⁰⁾, the Nurses Specialized in Wound, Ostomy and Continence (NSWOCC)⁽¹¹⁾, and the National Pressure Injury Advisory Panel (NPIAP)⁽¹²⁾, elaborated recommendations to prevent and minimize the damage from products and PPEs on the skin of health

workers, in an attempt to prevent illness and, consequently, the need to leave work at a time when the deficit of workers was such an issue.

Despite being fundamental, the implementation of the recommended measures required health workers to change their behavior and the importance they gave to preventive skin care. In this regard, it should be noted that changes are not easy understand and incorporate, especially in such a short and troubled period^(6,7), since they require reviewing concepts, values, beliefs, habits, and availability of resources that are adequate for application in the necessary context.

Believing that these challenges must be recognized, analyzed, and understood in order to enable the elaboration of adequate strategies to face the future, the relevance of this study stands out, as it has the potential to produce innovative evidence, since national and international research on this topic, using this design, is still scarce – especially in regard to research about associated with the development of skin injuries in health workers caused by PPE use during the pandemic^(2,9), which, in itself, is already a justification for this research.

The following research question emerged from the considerations above: Is there an association between the occurrence of skin lesions caused by the use of personal protective equipment and products and the importance attributed to preventive care by front line health professionals during the COVID-19 pandemic? Thus, the objective elaborated for this research was: to verify whether there is an association between the occurrence of skin lesions caused by the use of personal protective equipment and products and the importance attributed to preventive care by front line health professionals during the COVID-19 pandemic.

■ METHOD

Analytical, cross-sectional study, guided by the instrument Strengthening the Reporting of Observational Studies in Epidemiology (STROBE). A convenience sample was formed by active health workers from Rio de Janeiro, embodied in the population evaluated according to the records of the Regional Councils of different professional categories of health in Rio de Janeiro (nurses, nursing technicians, physicians, nutritionists, and physical therapists), totaling 375,370 records. We used an estimated error of 10% and a confidence level of 95%, according to the percentile of the Normal Standard Distribution, to estimate the prevalence and Confidence Interval. As a result, we found 384 sample units, considered to be an expressive representation of our population, since there was a Standard Normal Probability Distribution.

Health workers were recruited to be part of the sample through access to an invite to participate on the on-line survey. This invite was disseminated by researchers and other health workers (snowball technique) in social media (WhatsApp, Facebook, and Instagram). As they clicked on the link provided, they received more information on the research and gained access to the Informed Consent Form. Only after demonstrating agreement by signing the form they gained access to the online data collection instrument (Google forms®).

Data were collected from May to July 2020, and the following inclusion criteria were considered: health workers from the state of Rio de Janeiro (nurses, nursing technicians, physicians, nutritionists, physical therapists, pharmacists, dentists, social workers), who worked on the front lines of patient care in different health services during the pandemic, and fully filled in the Google Forms® online form. We excluded from analysis forms filled out by health professionals who declared being on sick leave or who were absent during research for any other reason.

From the 458 people who accessed the link of the invite to consult detailed information on the research and fill in the consent form, 400 agreed to participate, gaining access to another link, where they could fill in the data collection instrument (Google forms®). However, while filling in the survey, two professionals reported being on leave from work, leaving 398 participants.

To characterize the workers, the first part of the survey (data collection instrument) included questions about sociodemographic and work-related data, such as sex, age, professional category, type of institution where they worked according with management regime (federal, municipal, state, private, or philanthropic), work sector, work regime according to work journeys (on duty; any day of the week, including weekends and holidays; and daily workers – those who work from Monday to Friday at times from 7 am to 19 pm). In the second part of the survey, participants self-declared whether they developed skin injuries due to the use of products and PPE; the region of the body affected; the type/characteristic of the skin lesion; whether they were trained in the work institution for the proper use of products and PPE; whether they had products such as soaps and antiseptics and PPE (caps, goggles, face shields, surgical masks/N95/FFP2, gloves, hoods, shoe covers) available to use/replace when necessary; and whether the respondent used or not products to prevent skin injury (moisturizing cream, foam, thin silicone sheets, extra thin hydrocolloid dressing, barrier cream/spray).

At the end of the survey, five statements were elaborated regarding the importance professionals gave to prevention: 1. Skin problems related to the use of products and/or PPE; 2. Measures to prevent skin lesions; 3. Skin care; 4. Training for the use of products and/or PPE; 5. Protocol for adequate PPE/product use. These were considered to be predictors, and include aspects related to individual responsibility (self-care) and institutional responsibility⁽¹⁰⁻¹²⁾. The importance health workers gave to the statements received a score according to a ratio scale from 0 to 10. The importance was considered to be effective when the score was from 8 to 10 – that is, results from 8 to 10 indicated that the respondent was not exposed, and results below 8 indicated they were.

The selection of sociodemographic and work-related variables was based on their relevance, according to literature, in regard to preventing skin lesions caused by PPE or products during the COVID-19 pandemic^(2,9). The statements, in turn, were based on recommendations from specialized associations published at the time⁽¹⁰⁻¹²⁾. A pilot test of the survey was carried out and evaluated by five nurses in the front lines of the pandemic. All suggestions they made were accepted. The survey of participants in the pilot test was not included in the database.

Data collected in Google Forms® was imported into a Microsoft Excel® spreadsheet and then to the software Statistical Package for the Social Sciences (SPSS), version 24.0. We carried out a descriptive, sociodemographic, and work-related analysis, according to absolute and relative frequencies.

To verify whether there was any possible association between the self-declared possibility of skin lesion (outcome) and predictor variables (training for the use of products and PPE; availability of products and PPE; and use of preventive products) we elaborated a Contingency Table with all of the frequencies observed that were associated with the responses of health workers, which allowed uncovering the Prevalence and Prevalence Ratios (PR), as well as the respective confidence intervals (CI)⁽¹³⁾. Similarly, we calculated the prevalences and PRs for the five propositions associated with the two score groups (0 to 7 and 8 to 10). The chi-squared test was used to verify whether the association between the variables was statistically significant.

All respondents involved in the online survey signed the informed consent. The study was carried out according to national and international ethics guidelines and approved by the Research Ethics Committee of the Medicine Department of the Universidade Federal Fluminense, under CAAE: 31263020.2.0000.5243.

RESULTS

From the 398 sample observations, most participants were female (82.8%). Regarding age, 51.0% were 40 years old or younger. Regarding professional category, there were 54.0% nurses, 18.6% physicians, and 17.8% nursing technicians, while physical therapists, pharmacists, nutritionists, dentists, social workers, perfusionists, and oral health assistants made up 9.6% of the sample.

Concerning the original institution, there was a predominance of public institution professionals 80.9%, most of whom worked on duty (64,5%), according to Table 1. From these workers, 60.0% came from Intensive Care Units (ICUs) and nursing wards. From the 35.4% day workers, 61.8% worked in outpatient clinics, Primary Healthcare Units, and nursing wards.

According to the respondents themselves, 260 (65.3%) health workers were affected by skin lesions due to the use of protective equipment or products. Most (54%) were female and worked in public institutions (52.8%), Table 1.

According to the professional category, nurses were the most affected (140 – 53.8%), followed by physicians (48 – 18.4%) and nursing technicians (47 – 18.1%). Other professional categories represented 9.6%.

Regarding the type of injury, according to the self-declaration of the participants, there was a significant number of pressure injuries (97 – 37.3%) and allergic contact dermatitis (67 – 25.8%). These lesions also appeared in combination in 43 (16.5%) workers, as Table 2 shows.

Regarding the area of the body affected by the lesions, which were reported by 260 health workers, most lesions were on the face (36.6%), hands (10,3%), the pinna of the era (6.5%), and feet (0.4%). In workers who reported lesions in more than one region, the most common were 19.6% on the face and pinna; 11.5% on the face and hands; 8.5% on the face, pinna, and hands; 2.3% on the pinna and hands; 0.4% on hands and feet; 0.4% on face, pinna, and head; 0.4% on face, pinna, hands, and feet. 3.1% did not provide this information.

Table 1 – Prevalence of skin lesions according to demographic and work-related characteristics of participants (n=398). Rio de Janeiro, Brazil, 2020

Variables	Skin injuries						Prevalence (%)
	Yes		No		Total		
	Absolute	%	Absolute	%	Absolute	%	
Sex							
Female	215	54.0	115	28.8	330	82.8	65.15
Male	45	11.3	23	5.7	68	17.2	66.18
Age							
Over 40 years	120	30.0	76	19.0	196	49.0	61.22
Up to 40	140	35.0	62	15.7	202	51.0	69.31
Work regime							
Duty	178	44.7	79	19.8	257	64.5	69.26
Day workers	82	20.6	59	14.8	141	35.4	58.16
Institution							
Public	210	52.8	112	28.1	322	80.9	65.22
Private	50	12.5	26	6.5	76	19.1	65.79

Source: Research data, 2020.

Regarding the use of preventive products, 121 of the 260 respondents (46.5%) denied using them. From the 139 (53.5%) who used them, most (71 – 51.0%) declared using moisturizing cream.

Table 3 shows a probable association between the development of skin lesions and the risk exposure of health professionals, regarding the lack of training to use products

and PPE, and the availability of said supplies in the institution. Regarding the validation of the association between injuries and the respective variables, according to the Chi-square Test, the significance levels were 0.5872, 0.0214, and 7.5098E-08.

The prevalences and prevalence ratios presented in Table 4 show a likely risk of association between the development of skin injuries and the exposure of professionals, and

Table 2 – Prevalence of skin injuries in among participants. Rio de Janeiro, Brazil, 2020

Type of injury	Participants	(%)
Acne	7	2.7
Allergic/contact dermatitis	67	25.8
Allergic/contact dermatitis, acne	14	5.4
Pressure injury	97	37.3
Pressure injury, acne	10	3.9
Pressure injury, allergic/contact dermatitis	43	16.5
Pressure injury, allergic/contact dermatitis, acne	17	6.5
Pressure injury, hives	1	0.4
Not informed	4	1.5
Total	260	100.00

Source: Research data, 2020.

Table 3 – Prevalence ratio of skin injuries and their respective confidence interval according to training for the use of PPE, availability of PPE, and use of preventive products for participants. Rio de Janeiro, Brazil, 2020

Predictor variables	Skin injuries			Prevalence (%)	PR	CI p _{value} =5%
	Yes	No	Total			
Training for the use of products/PPE						
No	88	43	131	67.18	1.04	1.02-1.06
Yes	172	95	267	64.42		
Availability of products/PPE						
No	70	23	93	75.27	1.21	1.16-1.26
Yes	190	115	305	62.30		
Use of preventive products						
No	121	103	224	54.02	0.68	0.63-0.72
Yes	139	35	174	79.89		

Source: Research data, 2020.

Table 4 – Prevalence and prevalence ratio of skin injuries and confidence intervals according to the importance given by health workers to the prevention of skin lesions by using PPE and products during the COVID-19 pandemic. Rio de Janeiro, Brazil, 2020

Specification	Skin injuries			Prevalence (%)	PR	CI p _{value} =5%
	Yes	No	Total			
Skin problems						
Exposed (less than 8)	124	72	196	63.27	0.94	
Not exposed (from 8 to 10)	136	66	202	67.33		0.92-0.96
Preventive measures						
Exposed (less than 8)	101	54	155	65.16	1.00	0.99-1.00
Not exposed (from 8 to 10)	159	84	243	65.43		
Skin care						
Exposed (less than 8)	95	47	142	66.90	1.04	1.02-1.06
Not exposed (from 8 to 10)	165	91	256	64.45		
Training						
Exposed (less than 8)	62	36	98	63.27	0.96	0.94-0.98
Not exposed (from 8 to 10)	198	102	300	66.00		
Protocol for adequate PPE use						
Exposed (less than 8)	84	33	117	71.79	1.15	1.11-1.19
Not exposed (from 8 to 10)	176	105	281	62.63		

Source: Research data, 2020.

Note: Specification: Statements relative to the importance attributed by the workers.

the lower importance attributed to predictor factors such as “Skin care” and “Protocols for the adequate use of products and PPE”. Regarding the validation of the association between the lesion and the respective statements, according with the chi-squared test, we found significant levels of 0.3947, 0.9559, 0.6230, 0.6214, and 0.0802, showing that only the protocol for the proper use of products and PPEs presented a statistical significance close to the usual level of 5%.

DISCUSSION

Considering that the skin of health workers was infinitely more exposed during the COVID-19 pandemic due to the long-term continuous use of personal protection equipment

and products, it became relevant to investigate the association between skin lesions and the importance professionals gave to preventing this type of injury. Although it is necessary to guarantee access to sufficient amounts of PPE with recognized efficiency, the lack of supplies, especially PPE, forced professionals to use the same ones for a longer period, with a detrimental effect to their health. This fact was shown by this study as it indicated how likely it was that the lack of training and of PPE and protective products in the institution were associated to the risk of skin injuries and the exposure of respondents.

In this regard, it is worth noting that, in some places, such as Wuhan, in China, due to the difficulties in accessing PPE, health workers used the same ones for long periods of

time, and in some situations, the professionals themselves had to purchase their own. Skin care took a back seat so as not to waste supplies⁽¹⁴⁾.

To make matters worse, despite the vulnerability of the skin of these professionals during the pandemic and the adverse effects of frequent, long-term use of PPE and products, the results of this study show that 71.79% of workers gave little importance (scoring from 0 to 7) to the predictor factor "Protocols for adequate PPE/product use". This is associated with the need to raise the awareness of health workers regarding care to guarantee skin integrity, even in chaotic situations such as the one experienced by the COVID-19, whose most worrisome aspect was the risk of aerial infection.

These results are associated to the work context of health professionals during the pandemic, as they were constantly exposed to the virus, leading to an expressive number of death and disease in health workers^(6,7), many of whom were work colleagues. This meant that workers constantly focused their concern on preventing the aerial transmission of the disease to the detriment of care to maintain the integrity of their own skin when caring for the diseased.

In addition to the work overload and the frequent and prolonged exposure to patients contaminated by COVID-19, the work journeys and the time spent in the workplace increased, as did the complexity of the activities carried out, while rest breaks became rarer⁽¹⁴⁾.

A study showed that, although health workers knew the importance of frequent pauses between work shifts, constantly exchanging PPE would be a waste, and, as a result, they kept these equipment on for longer⁽¹⁵⁾. In this regard, a research by the Oswaldo Cruz Foundation, about the work conditions, revealed alarming data about the impact of the pandemic on the lives of health professionals, revealing significant changes in the lives of 95% of the study participants⁽¹⁶⁾. Another study showed that skin health issues in nurses, especially skin ulcerations from the prolonged use of PPE, increased the prevalence of mental disorders, such as Burnout⁽¹⁷⁾. In addition to being exposed to physical harm due to the prolonged use of PPE, these workers were also greatly exposed to stressors, which led to emotional and psychic disorders and compromised their mental health. This shows that, in addition to adequate work conditions, the psychosocial work is extremely relevant to preserve the mental and physical health of workers and increase the quality of the care provided⁽¹⁷⁾. It is noteworthy that work-related skin lesions are responsible for a large part of medical leaves among health professionals and the consequent days of work lost⁽¹⁸⁾. As an example, regarding nurse workers, we are reminded that the National Association of Private Hospitals requested the Ministry of Health to reduce the period the workers could

be on leave to guarantee the network would continue to be operational considering the increased number of COVID-19 cases. At the time, a Council member reiterated how these workers were exhausted by two years of work overload and the work conditions confronted by the category⁽¹⁹⁾.

Considering the need to prevent work-related exposure of health professionals, even in adverse situations, and to keep the most professionals active, in order to reduce the impact of the reduced work force in society, the care to promote health and prevent disease between health workers must be prioritized⁽²⁰⁾.

Regarding skin health, after the pandemic, the results of this study point at the need to invest in research about preventing occupational dermatoses related with the professional activities of health workers, in order to elaborate institutional protocols. In this regard, we emphasize the need to make resources available to provide more adequate and comfortable equipment, that causes less problems when used; to establish new parameters for the acquisition of supplies; to promote continuous training of health workers about skin care during calamities, epidemics, and pandemics; and to integrate health units, universities, and productive sectors of society to develop more adequate innovations and technologies.

Regarding study limitations, it should be noted that data were collected online, according to participant responses, and there was no medical confirmation of the diagnostic of skin lesions, which were self-declared. This can be seen as a form of bias. Another limitation is related to the fact that the population under study is a convenience sample, which may not be representative of the health worker population as a whole.

■ CONCLUSION

The study showed that professionals who attribute less importance to the predictor "Protocol for adequate PPE use" are probably associated with risks of developing skin lesions and being more exposed. This is not in accordance with guidance from national and international recommendations/protocols elaborated in order to maintain the integrity of the skin, which can directly or indirectly impact the development of lesions and illness.

The results of this study show how necessary it is to produce further research about the topic, with new designs, and how institutions must organize in the post-pandemic period to anticipate issues by predicting and providing quality materials; elaborating protocols to guide professionals; and providing constant training to prepare these workers to deal with alarming situations, such as those experienced during

the pandemic, including concerns about how to maintain the skin integrity of health workers.

REFERENCES

- Hu K, Fan J, Li X, Gou Xi, Li X, Zhou X. The adverse skin reactions of health care workers using personal protective equipment for COVID-19. *Medicine*. 2020;99(24):e20603. doi: <http://doi.org/10.1097/MD.00000000000020603>
- Brandão ES, Mandelbaum MHS, Silva LF, Reis BL, Tonole R. Prevención de lesiones cutáneas causadas por productos y equipos de protección personal durante COVID-19: revisión de alcance. *J Wound Care*. 2020;29(LatAm sup 3):6-12. doi: https://doi.org/10.12968/jowc.2020.29.LatAm_sup_3.6
- Lan J, Song Z, Miao X, Li H, Li Y, Dong L, et al. Skin damage and the risk of infection among healthcare workers managing coronavirus disease-2019. *J Am Acad Dermatol*. 2020;82(5):1215-6. doi: <https://doi.org/10.1016/j.jaad.2020.03.014>
- Bambi S, Giusti GD, Galazzi A, Mattiussi E, Comisso I, Manici M, et al. Pressure injuries due to personal protective equipment in Covid-19 critical care units. *Am J Crit Care*. 2021;30(4):287-93. doi: <https://doi.org/10.4037/ajcc2021178>
- Coelho MMF, Cavalcante VMV, Moraes JT, Menezes LCG, Figueirêdo SV, Branco MFCC, et al. Pressure injury related to the use of personal protective equipment in COVID-19 pandemic. *Rev Bras Enferm*. 2020;73(Suppl 2):e20200670. doi: <https://doi.org/10.1590/0034-7167-2020-0670>
- Villegas JLV, Choque RAM, Verduguez CAG, Aguilar AAV. Influencia de la pandemia del COVID-19 en la salud mental de los trabajadores en salud. *Gac Med Bol*. 2021 [citado 2023 Jun 27];44(1):75-80. Disponible en: http://www.scielo.org.bo/scielo.php?script=sci_arttext&pid=S1012-29662021000100013&lng=ess
- Restauri N, Sheridan AD. Burnout and Posttraumatic Stress Disorder in the Coronavirus Disease 2019 (COVID-19) Pandemic: Intersection, Impact, and Interventions. *J Am Coll Radiol*. 2020;17(7):921-926. doi: <https://doi.org/10.1016/j.jacr.2020.05.021>
- Jiang Q, Song S, Zhou J, Liu Y, Chen A, Bai Y, et al. The prevalence, characteristics and prevention status of skin injury caused by personal protective equipment among medical staff in fighting covid-19: a multicenter cross-sectional study. *Adv Wound Care*. 2020;9(7):357-64. doi: <https://doi.org/10.1089/wound.2020.1212>
- Silva LFM, Almeida AGA, Pascoal LM, Neto MS, Lima FET, Santos FS. Skin injuries due to Personal Protective Equipment and preventive measures in the COVID-19 context: an integrative review. *Rev Latino Am Enfermagem*. 2022;30:e3522. doi: <https://doi.org/10.1590/1518-8345.5636.3522>
- Alves P, Moura A, Vaz A, Ferreira A, Malcato E, Mota S, et al. PREPI | COVID19. Prevenção de lesões cutâneas causadas pelos Equipamentos de Proteção Individual (máscaras faciais, respiradores, viseiras e óculos de proteção) [Internet]. *Journal of Tissue Healing and Regeneration*; 2020 [cited 2023 Jun 27]. Available from: <https://eaaf.org/wp-content/uploads/covid19-PDFs/Portugal/APTFeridas-RECOMENDACAO-PREPI-COVID19.pdf>
- LeBlanc K, Heerschap C, Butt B, Bresnai-Harris J, Wiesenfeld L, et al. Prevention and management of personal protective equipment skin injury: update 2020. *NSWOC*; 2020 [cited 2023 Jun 27]. Available from: <https://www.nswoc.ca/ppe>
- The National Pressure Injury Advisory Panel. NPIAP position statements on preventing injury with n95 masks [Internet]. NPIAP; 2020 [cited 2023 Jun 27]. Available from: https://cdn.ymaws.com/npiap.com/resource/resmgr/position_statements/Mask_Position_Paper_FINAL_fo.pdf
- Zangirolami-Raimundo J, Echeimberg JO, Leone C. Research methodology topics: Cross-sectional studies. *J Hum Growth Dev*. 2018;28(3):356-60. doi: <https://doi.org/10.7322/jhgd.152198>
- Wang J, Zhou M, Liu F. Reasons for healthcare workers becoming infected with novel coronavirus disease 2019 (COVID-19) in China. *J Hosp Infect*. 2020;105(1):100-1. doi: <https://doi.org/10.1016/j.jhin.2020.03.002>
- Uthayakumar AK, Panagou E, Manam S, Schauer A, Veraitch O, Walker S, et al. PPE-associated dermatoses: effect on work and wellbeing. *Future Healthc J*. 2021;8(1):e67-e69. doi: <https://doi.org/10.7861/fhj.2020-0210>
- Fundação Oswaldo Cruz. Escola Nacional de Saúde Pública Sergio Arouca [Internet]. Condições de trabalho dos profissionais de saúde no contexto da Covid-19 no Brasil. Rio de Janeiro: FIOCRUZ; 2021 [cited 2023 Jun 27]. Available from: <http://informe.ensp.fiocruz.br/noticias/51044#:~:text=0s%20dados%20indicam%20que%2043,improvisar%20equipamentos%20em%20algum%20momento>
- Soares JP, Oliveira NHS, Mendes TMC, Ribeiro SS, Castro JL. Burnout-related factors in health professionals during the Covid-19 pandemic: an integrative review. *Saúde Debate*. 2022;46(spe 1):385-98. doi: <https://doi.org/10.1590/0103-11042022E1261>
- Elston DM. Occupational skin disease among health care workers during the coronavirus (COVID-19) epidemic [editorial]. *J Am Acad Dermatol*. 2020;82(5):1085-6. doi: <https://doi.org/10.1016/j.jaad.2020.03.012>
- Conselho Federal de Enfermagem [Internet]. Dois anos em sobrecarga, diz COFEN sobre afastamentos por covid-19. COFEN; 2022 [cited 2023 Jun 27]. Available from: http://www.cofen.gov.br/doiis-anos-em-sobrecarga-diz-cofen-sobre-afastamento-de-profissionais-por-covid-19_94840.html
- Gallasch CH, Cunha ML, Pereira LAS, Silva-Júnior JS. Prevention related to the occupational exposure of health professional's Workers in the COVID-19 scenario. *Rev Enferm UERJ*. 2020;28:e49596. doi: <https://doi.org/10.12957/ruerj.2020.49596>

■ **Acknowledgments:**

This work received support from the Ministry of Science, Technology, Innovation, and Communication, the Ministry of Health, and the National Council for Scientific and Technological Development (CNPq) – Brazil, process 401724/2020-4.

■ **Authorship contributions:**

Project management: Euzeli da Silva Brandão.
Formal analysis: Euzeli da Silva Brandão, Regina Serrão Lanzillotti, Paula Dadalti Granja, Liliane Faria da Silva.
Concept: Euzeli da Silva Brandão, Paula Dadalti Granja, Liliane Faria da Silva, Maria Helena Sant'Ana Mandelbaum.
Data selection: Euzeli da Silva Brandão, Regina Serrão Lanzillotti.
Writing – original draft: Euzeli da Silva Brandão, Regina Serrão Lanzillotti, Paula Dadalti Granja, Liliane Faria da Silva.
Writing – revision and editing: Euzeli da Silva Brandão, Regina Serrão Lanzillotti.
Investigation: Euzeli da Silva Brandão, Liliane Faria da Silva, Paula Dadalti Granja, Maria Helena Sant'Ana Mandelbaum, Renato Tonole.
Methodology: Euzeli da Silva Brandão, Liliane Faria da Silva, Regina Serrão Lanzillotti.
Acquisition of Funding: Euzeli da Silva Brandão.
Visualization: Euzeli da Silva Brandão, Regina Serrão Lanzillotti, Paula Dadalti Granja, Liliane Faria da Silva, Maria Helena Sant'Ana Mandelbaum, Renato Tonole.

The authors declare that there is no conflict of interest.

■ **Corresponding author:**

Euzeli da Silva Brandão
E-mail: euzelibrandao@gmail.com

Received: 06.29.2023
Approved: 08.28.2023

Associate editor:

Dagmar Elaine Kaiser

Editor-in-chief:

João Lucas Campos de Oliveira