

# CUIDADO É FUNDAMENTAL

Escola de Enfermagem Alfredo Pinto – UNIRIO

RESEARCH

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## COVID-19: FACTORS ASSOCIATED WITH THE USE AND ADHERENCE OF PERSONAL PROTECTIVE EQUIPMENT IN BRAZIL AMONG RESIDENTS

*Covid-19: fatores associados ao uso e adesão de equipamentos de proteção individual entre residentes no Brasil**Covid-19: factores asociados al uso y adherencia de equipos de protección personal entre los Residentes en Brasil***Camila Cristina Gregório de Assis<sup>1</sup>** **Herica Silva Dutra<sup>2</sup>** **Cosme Rezende Laurindo<sup>3</sup>** **Fábio da Costa Carbogim<sup>4</sup>** **Fernanda Moura Lanza<sup>5</sup>** **Angélica da Conceição Oliveira Coelho<sup>6</sup>** 

### ABSTRACT

**Objective:** to analyze the factors associated with the use and adherence to personal protective equipment by graduate professionals linked to residency programs in health. **Method:** cross-sectional study with 227 residents. E.P.I.covid-19 Brasil-adapted version for residents". Bivariate analysis, Fisher chi-square/exact test and calculation of the prevalence ratio were performed. Research was approved by the Ethics Committee for Research with Human Beings. **Results:** they carried out training activities on PPE (59.9%). Association between use of surgical mask ( $p \leq 0.01$ ) and age; program concentration area and use of cap ( $p \leq 0.01$ ) and surgical mask ( $p = 0.04$ ); performance of training activities and use of surgical mask ( $p = 0.02$ ) and N95 ( $p \leq 0.01$ ). Adherence to PPE ranged from 0% to 67%. **Conclusion:** factors associated with the proper use of personal protective equipment were age, area of program concentration, and performance of training activities. There were weaknesses in adherence. It is suggested to strengthen the theme of biosafety in the residence.

**DESCRIPTORS:** COVID-19; Personal protective equipment; Biosecurity; Health Personnel; Internship and residence; Internship, nonmedical;

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## RESUMO

**Objetivo:** analisar os fatores associados ao uso e a adesão aos equipamentos de proteção individual pelos profissionais pós-graduandos vinculados a programas de residência em saúde. **Método:** transversal com 227 residentes. Avaliadas variáveis relacionadas à adesão e uso adequado de equipamentos de proteção individual por meio de instrumento validado “E.P.I. covid-19 Brasil-versão adaptada para residentes”. Realizou-se análise bivariada, teste qui-quadrado/exato de Fisher e cálculo da razão de prevalência. Pesquisa foi aprovada pelo Comitê de Ética em Pesquisa com Seres Humanos. **Resultados:** realizaram atividades de capacitação sobre EPIs (59,9%). Associação entre uso de máscara cirúrgica ( $p \leq 0,01$ ) e idade; área de concentração do programa e uso de gorro ( $p \leq 0,01$ ) e máscara cirúrgica ( $p = 0,04$ ); realização de atividades de capacitação e uso de máscara cirúrgica ( $p = 0,02$ ) e N95 ( $p \leq 0,01$ ). A adesão variou de 0% a 67%. **Conclusão:** fatores associados ao uso adequado, idade, área de concentração do programa e realização de atividades de capacitação. Houve fragilidades na adesão. Sugere-se o fortalecimento do tema biossegurança na residência.

**DESCRIPTORIOS:** COVID-19; Equipamento de proteção individual; Biossegurança; Profissionais de Saúde; Internato e residência; Residência não médica não odontológica;

## RESUMEN

**Objetivos:** analizar los factores asociados al uso y la adherencia a los equipos de protección personal (EPP) por parte de profesionales graduados vinculados a programas de residencia en salud. **Método:** estudio transversal con 227 residentes. Se utilizó la versión adaptada para residentes del «Cuestionario sobre EPI en la atención primaria de salud (EPS-APS) en el contexto de la COVID-19 en Brasil. Se realizaron análisis bivariados, prueba chi-cuadrado de Fisher/prueba exacta y cálculo de la razón de prevalencia. La investigación fue aprobada por el Comité de Ética para la Investigación con Seres Humanos. **Resultados:** se realizaron actividades de capacitación sobre EPI (59,9%). Se observó asociación entre el uso de mascarilla quirúrgica ( $p \leq 0,01$ ) y la edad; área de concentración del programa y uso de cofia ( $p \leq 0,01$ ) y mascarilla quirúrgica ( $p = 0,04$ ); realización de actividades de capacitación y uso de mascarilla quirúrgica ( $p = 0,02$ ) y N95 ( $p \leq 0,01$ ). La adherencia a los EPI osciló entre el 0% y el 67%. **Conclusión:** los factores asociados al uso correcto de los EPI fueron la edad, el área de concentración del programa y la realización de actividades de capacitación. Se observaron debilidades en la adherencia. Se sugiere fortalecer el tema de la bioseguridad en la residencia.

**DESCRIPTORIOS:** COVID-19; Equipos de protección individual; Bioseguridad; Personal de Salud; Internado y residencia; Internado no Médico.

## INTRODUCTION

The COVID-19 pandemic has changed the working environment of health professionals and reiterated the importance of biosafety measures to prevent health care-related infections (HAIs).<sup>1-2</sup> The need for protection and safety of health professionals<sup>3-4</sup> is evident, including those linked to residency programs.<sup>5</sup> Residents working in the Unified Health System (SUS) have played a crucial role in tackling COVID-19.<sup>3</sup>

Like other health professionals<sup>6-8</sup>, residents are at high risk of COVID-19 infection because they are exposed to various factors, such as direct contact with contaminated patients, performing aerosol-generating procedures and/or procedures that predispose them to contact with body fluids<sup>10</sup>. In a survey of residents in the United States, 80% of the residency programs in the study had at least one resident in quarantine and 101 confirmed cases of Covid-19, which confirms the risk of contamination among these professionals.<sup>9</sup>

Although standard precautions are known by all health professionals<sup>2,11</sup>, non-compliance with biosafety standards and incorrect dressing and undressing are still a reality in health care.<sup>7-14</sup> In addition, non-adherence to personal protective equipment (PPE) and its inadequate use occurs in health services<sup>12-15</sup>, either due to a shortage of supplies<sup>9</sup> leading to the reuse of some devices and their prolonged use<sup>9,12</sup>, or due to a lack of training in the proper

use of PPE.<sup>7,16</sup> These situations generate insecurity among professionals not only when dealing with the COVID-19 pandemic<sup>3-4</sup>, but also when caring for patients with other infectious and contagious conditions. The literature indicates other variables that influence adherence to the use of PPE, such as age, length of experience and area of work.<sup>6</sup>

PPE is the main resource for reducing the mechanism of transmission and illness among health workers, which makes it indispensable for the prevention of HAIs.<sup>10,17-19</sup> Adherence to biosafety standards is fundamental for reducing occupational risks.<sup>2,7,12-14</sup>

As the studies that address the factors associated with adherence to PPE and its proper use were carried out with health professionals in general<sup>6-7,14</sup>, there is a gap in knowledge regarding professionals linked to residency programs.

In view of the above, this investigation aims to analyze the factors associated with the use of and adherence to PPE by postgraduate professionals linked to health residency programs.

## METHODS

### Type of study, place and period

This is a cross-sectional, descriptive and analytical study carried out in the 26 Brazilian states and the Federal District between August 2020 and March 2021. This study is linked to the

research "Use of personal protective equipment by health professionals in the fight against covid-19" - "E.P.I. covid-19 Brazil" and followed the recommendations Strengthening the Reporting of Observational studies in Epidemiology (STROBE) and Checklist for Reporting Results of Internet E-Surveys (CHERRIES).

### Population, selection criteria and sample

The study population was made up of postgraduate professionals linked to residency programs in the areas of Physical Education, Nursing, Pharmacy, Physiotherapy, Speech Therapy, Medicine, Veterinary Medicine, Nutrition, Dentistry, Psychology, Social Work and Occupational Therapy accredited by the Ministry of Education (MEC). The inclusion criterion was having voluntarily agreed to take part in the research during the data collection period. The exclusion criterion was being a preceptor in the residency programs. Thus, a convenience sample was adopted.

### Data collection

To publicize the survey, contact was made via email and telephone with hospitals and municipal health departments that offer residency programs in health accredited by the MEC, medical societies, regional professional councils and residency committees. Social media, such as Instagram (@epicoviduff2), Facebook (E.PI Covid19 Brasil) and WhatsApp, were also used to recruit participants who helped spread the word about the research on their social networks.<sup>20</sup> It is important to note that all the research information was made available on a dedicated website (<https://www.uff.br/epicovid19/>) and the recruitment strategies were detailed in a scientific article.<sup>20</sup>

### Data collection instrument

For data collection, we used the instrument developed and validated for the "E.P.I. covid-19 Brazil" survey, which contains 86 questions about personal and professional data, professional training, participation in training courses and the use of PPE in everyday work. To assess adherence to and proper use of PPE, 31 items were considered, divided into eight domains: disposable cap or hat, gloves, safety behavior, use of N95 mask, hand hygiene, use of apron or cloak, use of surgical mask and use of goggles.<sup>21</sup>

The tool was made available in a virtual environment on the free KoBoToolbox platform. Access to the questions related to the use of each PPE was linked to the participant's previous answer as to which PPE they used in their daily work at the service where they work. The answers to these questions were obtained using a four-point Likert scale, where the answer options were "never", "rarely", "almost always" and "always".

### Treatment, data analysis and study variables

The data stored on the KoboToolbox server was exported to the Microsoft Office Excel program for organization and processing. The answers obtained on a Likert scale were recoded as "no" (zero points) for "never", "rarely", "almost always"; and

"yes" (one point) for "always". Questions referring to the reuse of PPE were reverse scored.

Statistical analyses were carried out using the Statistical Package for the Social Sciences (SPSS) version 29.0. The Kolmogorov-Smirnov test was used to assess the normality of the sample. Descriptive analysis was carried out using absolute and relative frequencies, measures of central tendency (mean) and dispersion (standard deviation).

The independent variables were the area of concentration of the residency (PHC and other areas of concentration - Hospital and Veterinary Medicine); age (21 to 26 years and 27 years or more); completion or not of training courses on the use of PPE; time in the residency program (zero to 12 months and 13 months or more).

The dependent variables were adherence to PPE and appropriate use of PPE. Appropriate use of PPE was considered to be when the participant achieved all the points in each domain according to the Likert scale, i.e. if they scored in all the domains. To assess adherence, the following individual calculation was used: number of domains with adequate use divided by the total number of domains answered multiplied by 100. Participants were considered to have adherence to the use of PPE when they reached a percentage  $\geq 75\%$  according to the study.<sup>16</sup>

The association was analyzed using the Chi-square or Fischer's exact tests, with a p-value  $\leq 0.05$ . Prevalence rates related to the proper use of PPE and age, area of residence, time working in the program and training activities on PPE were estimated with a 95% confidence interval (95% CI).

### Ethical aspects

The research was approved by the Human Research Ethics Committee of the Federal University of Juiz de Fora, under opinion of number 4.363.912. This research received funding from CNPq (Process no. 401457/2020-6) under call MCTIC/CNPq/FNDCT/MS/SCTIE/Decit no 07/2020 - Research to tackle COVID-19, its consequences and other severe acute respiratory syndromes.

## RESULTS

227 residents took part in the study, with a predominance of nurses (37.0%), cis women (82.9%), with a partner (78.4%), working in the Southeast (58.1%). The average age was 27.9 ( $\pm 5.9$ ) years and the average time working in the residency was 14.5 ( $\pm 9.2$ ) months (data not shown in table). Among the participants, 56 (24.7%) had been diagnosed with Covid-19. The majority (59.9%) of participants reported having been trained in the use of PPE at some point during the pandemic (see Table 1).

When evaluating the proper use of PPE by the resident professionals (Table 2), it stands out that the cap and apron were the PPE with the highest percentage of proper use and that the majority of participants had inadequate safety behavior (90.6%) and hand hygiene (98.7%).

When assessing the factors associated with the adequate use of PPE by resident professionals (Table 3), an association was found between age and the surgical mask domain ( $p \leq 0.001$ ). The prevalence of adequate use of surgical masks among professionals aged between 21 and 26 was 1.47 times higher than among those aged 27 or over.

**Table 1** - Characterization of residents participating in the "E.P.I. covid-19Brasil" survey (n = 227). Brazil, 2021

Variables	N	%
<b>Professional category</b>		
Nurse	85	37,0
Physiotherapist	25	11,0
Pharmacist	20	8,8
Social Worker	20	8,8
Psychologist	18	7,9
Doctor	17	7,5
Dental Surgeon	12	5,3
Nutritionist	10	4,4
Physical Educator	7	3,1
Occupational Therapist	5	2,2
Speech therapist	2	0,9
Other	6	2,6
<b>Age</b>		
21 to 26 years old	121	53,3
27 years or older	106	46,7
<b>Gender</b>		
Cis woman	188	82,9
Cis man	36	15,9
Trans woman	1	0,4
Others	1	0,4
Do not want to declare	1	0,4
<b>Marital status</b>		
With a partner	178	78,4
Without a partner	49	21,6
<b>Region of Brazil</b>		
Southeast	132	58,1
Northeast	33	14,5
South	29	12,8
Midwest	23	10,0
North	10	4,4
<b>Diagnosed with covid-19</b>		
No	171	75,3
Yes	56	24,7
<b>Has a specialization</b>		
Sim	65	28,6

Não	162	71,4
<b>Type of specialization</b>		
Lato Sensu	61	26,9
Stricto Sensu	2	0,9
Not informed	164	72,2

Source: prepared by the author (2022). †Note: other; (Veterinary Medicine)

When assessing proper use by area of concentration of the residency program (Table 3), there was an association with the use of the cap ( $p=0.01$ ). The prevalence of proper cap use was 3.2 times higher in PHC than in the other areas of the program. Adequate use of a surgical mask ( $p=0.02$ ) was 1.3 times more prevalent in PHC than in other areas of the program. The length of time working in the program was not significant for any domain.

The completion of training activities on the use of PPE by resident professionals was statistically associated with the appropriate use of N95 masks ( $p \leq 0.01$ ) and surgical masks ( $p=0.02$ ). Resident professionals who took a course on PPE had a 1.3 times higher prevalence of appropriate use of N95 masks and a 1.7 times higher prevalence of appropriate use of surgical masks than those who did not take the course. This data is shown in Table 3.

**Table 2** - Adequate use of PPE, safety behavior, and hand hygiene by professionals linked to Health Residency Programs (n = 227). Brazil, 2021

Proper use	No (n %)	Yes (n %)
Safety behavior n=227	224 (98,7)	3 (1,3)
Hi Hand hygiene n=227	142 (62,6)	85 (37,2)
Lv Gloves n=149	135 (90,6))	14 (9,4)
G Cap n=137	119 (86,9)	18 (13,1)
M Surgical mask n=197	87 (44,2)	110 (55,8)
A Apron/Coat n= 115	71 (61,7)	44 (38,3)
M Mask N95 n= 132	64 (48,5)	68 (51,5)
Pr Face shield/ goggles n=110	54 (49,1)	56 (50,1)

Source elaborated by the author (2022).

‡ Note: the missing data is due to the participant not wearing PPE

**Table 3** - Association between age, area of concentration, training activities and proper use of PPE, safety behavior during the use of PPE and hand hygiene by professionals linked to Health Residency Programs (n=227). Brazil, 2021

Proper Use													
Age	Cap		Gloves		Apron or coat		Goggles or face shield		Surgical mask		Mask N95		
Age	Yes n(%)	No n(%)	Yes n(%)	No n(%)	Yes n(%)	No n(%)	Yes n(%)	No n(%)	Yes n(%)	No n(%)	Yes n(%)	No n(%)	Yes n(%)
21 to 26 years old	8 (10,0)	72 (90,0)	5 (6,2)	76 (93,8)	19 (33,3)	38 (66,7)	32 (60,4)	21 (39,6)	72 (64,9)	39 (35,1)	35 (53,8)	30 (46,2)	3 (2,5)
27 years or older	10 (17,5)	47 (82,5)	9 (13,2)	59 (86,8)	25 (43,1)	33 (56,9)	24 (42,1)	33 (57,9)	38 (44,2)	48 (55,8)	33 (49,3)	34 (50,7)	0 (0,00)
p value	0,20		0,14		0,28		0,05		≤0,01		0,59		
RP	0,57		0,47		0,77		1,43		1,47		1,09		
(CI 95%)	(0,240-1,354)		(0,164-1,326)		(0,483-1,239)		(0,986-2,085)		(1,116-1,931)		(0,785-1,523)		
The program's area of concentration	Yes n(%)	No n(%)	Yes n(%)	No n(%)	Yes n(%)	No n(%)	Yes n(%)	No n(%)	Yes n(%)	No n(%)	Yes n(%)	No n(%)	Yes n(%)
APS	13 (21,3)	48 (78,7)	3 (4,3)	67 (95,7)	17 (31,5)	37 (68,5)	28 (53,8)	24 (46,2)	57 (64,8)	31 (35,2)	27 (50,0)	27 (50,0)	1 (1,0)
Other areas*	5 (6,6)	71 (93,4)	11 (13,9)	68 (86,1)	27 (44,3)	34 (55,7)	28 (48,3)	30 (51,7)	53 (48,6)	56 (51,4)	41 (52,6)	37 (47,4)	2 (1,6)
p value	0,01		0,04		0,16		0,56		0,02		0,77		
RP	3,24		0,31		0,71		1,11		1,33		0,95		
(CI 95%)	(1,222-8,586)		(0,089-1,059)		(0,438-1,154)		(0,773-1,609)		(1,041-1,705)		(0,677-1,336)		
Training Activities	Yes n(%)	No n(%)	Yes n(%)	No n(%)	Yes n(%)	No n(%)	Yes n(%)	No n(%)	Yes n(%)	No n(%)	Yes n(%)	No n(%)	Yes n(%)
Yes	14 (77,8)	70 (58,8)	7 (50,0)	7 (50,0)	27 (61,4)	17 (38,6)	45 (80,4)	11 (19,6)	72 (65,5)	38 (34,5)	52 (76,5)	16 (23,5)	3 (100,0)
No	4 (22,2)	49 (41,2)	45 (33,3)	90 (66,7)	24 (33,8)	47 (66,2)	35 (64,8)	19 (35,2)	43 (49,4)	44 (50,6)	35 (54,7)	29 (45,3)	0 (0,00)

p value	0,12	0,21	0,59	0,06	0,02	≤0,01	0,15
RP	2,20	0,53	0,88	1,53	1,35	1,68	‡
(CI 95%)	(0,768-6,353)	(0,199-1,446)	(0,549-1,411)	(0,923-2,551)	(1,029-1,774)	(1,094-2,583)	

Source: prepared by the author(2021).

§Note: other areas\*; Hospital Area and Veterinary Medicine.

Source: Prepared by the authors (2021). (Chi-square test, †Fisher's exact test)

When assessing adherence to PPE, the results ranged from 0% to 67% (mean 29.1%; standard deviation 20.0%), with 48 (21.1%) participants reporting no adherence and eight (3.5%) participants achieving the highest adherence identified in the study, which was 67%. The distribution of participants in relation to adherence was 1st quartile 14.0%; median 29.0% and 3rd quartile 43.0%. In the analysis of the relationship between adherence and the associated factors, carrying out training activities on the use of PPE was related to adherence to PPE ( $p=0.03$ ), while the other factors were not related to adherence.

## DISCUSSION

This is the first Brazilian study to analyze the factors associated with adherence to and proper use of PPE by postgraduate professionals linked to health residency programs in the context of the covid-19 pandemic. The variation in the resident's age from 21 to 26 was associated with the proper use of a surgical mask; PHC services as the area of concentration of the residency program was associated with the proper use of a surgical mask and cap; the resident's length of service was not associated with the proper use of PPE; training activities on PPE were associated with the proper use of a surgical mask and N95 mask. The study showed that no resident adhered to the use of PPE  $\geq 75\%$ , and the average percentage of adherence was 29.1%.

In view of the evidence found in this study, it is suggested that all professionals, including those undergoing training in the service, should be aware of the measures and strategies to prevent HAIs.<sup>15</sup> The use of PPE is important in dealing with the pandemic and in preventing other infectious diseases, with the aim of ensuring the safety of professionals and patients and reducing the spread of diseases.<sup>12</sup>

Some studies carried out during the Covid-19 pandemic showed different percentages of adherence to the use of PPE: 41.3%<sup>22</sup>; 53%<sup>6</sup> and 90.6%.<sup>7</sup> Epidemiological studies carried out in Brazil and the United States, before the pandemic period, showed that the incorrect use of PPE can favor infection by pathogens<sup>23-24</sup>, highlighting that the lack of training also contributes to non-adherence to the use of PPE.<sup>23</sup> In addition, contamination can occur both due to the lack of PPE and incorrect de-parenting.<sup>24</sup>

This study showed that residents do not use all PPE properly. The most frequently used PPE included N95 masks, surgical masks and goggles or face shields. In the Covid-19 pandemic - with regard to the use of precautionary measures, aerosol precautions stood out, with the N95 mask being a protective factor among health professionals who carry out aerosol-generating procedures.<sup>6,14,25</sup> The proper use of goggles and face shields also helps in professional protection<sup>6,25-26</sup>, as this equipment prevents microorganisms from coming into contact with the oral cavity and airways.<sup>27</sup>

With regard to factors associated with the appropriate use of PPE, a study carried out with Qatari PHC professionals indicated that age, length of experience and area of work influenced adherence to the use of PPE.<sup>6</sup>

In this study, younger professionals had a higher prevalence of appropriate use of surgical mask PPE. In a study carried out in Ghana, the age variable was not associated with adherence to and use of PPE<sup>7</sup>, but in a study carried out in Qatar, the age factor was associated with adherence to and use of PPE. Professionals aged 50 and over were more likely to be adherent than younger professionals aged 18 to 29.<sup>6</sup>

With regard to the area of concentration of the program, preventive actions should take into account the degree of risk of contamination by Covid-19 in the different areas of concentration of the work.<sup>22</sup> A survey of PHC professionals showed that health professionals who are in contact with suspected or confirmed cases of Covid-19, in some or most shifts, were less likely to be fully compliant with adherence and use of PPE compared to those who deal with infected patients during all periods of their work activities.<sup>6</sup>

It is believed that professionals who work directly with Covid-19 patients are more aware of the risk of infection, to the extent that this interferes with their perception and behavior regarding the use of PPE.<sup>6</sup> Research in Ghana with health professionals working in the hospital environment who provided care to Covid-19 patients showed that length of service was not associated with adherence to and use of PPE.<sup>7</sup> These results are in line with the data from this study, which shows that length of service does not affect adherence to and use of PPE.

It should be emphasized that all professionals who provide direct care to patients must be adequately informed and trained.<sup>4</sup>

The exchange of knowledge and know-how can strengthen the teaching-learning process with regard to COVID-19 prevention measures.<sup>25</sup> Clinical simulations<sup>8</sup> and training activities aimed at residents on the proper use of dressing and undressing can contribute to the proper use of PPE and reduce the risk of illness<sup>8,28</sup>, as well as ongoing education in the service is a decisive factor for adherence to PPE and its proper use by health professionals<sup>11</sup>, in this study training activities are related to adherence to the use of PPE.

In this study, adherence to the use of PPE ranged from 0% to 67%. Studies carried out with health professionals during the pandemic in Ethiopia and Qatar showed low adherence to the use of PPE, 41.3%<sup>22</sup> and 53%<sup>6</sup> respectively. Low adherence may be linked to professional insecurity due to the lack and reuse of PPE<sup>28</sup>, as well as the lack of perception of the risk of illness on the part of the professional.<sup>6,22</sup> A study carried out in Ghana reported an adherence rate of 90.6%.<sup>7</sup> The high adherence rate may be related to training activities on PPE.<sup>8</sup>

The limitations of this investigation are linked to the fact that most of the participants were from the southeastern region of the country, that it was a cross-sectional study and that data was collected in a virtual environment using a self-administered questionnaire, which is why there was a low turnout of residents despite the use of various recruitment strategies.

Despite this, the study makes valuable contributions to scientific knowledge in health and nursing, including: knowing the factors associated with adherence to PPE and its use by health residents during the pandemic and highlighting the importance of strengthening the theme of biosafety in residency programs.

It is therefore recommended that training courses on PPE be developed and implemented for residents and that continuing education be encouraged, using clinical simulations as pedagogical resources for learning to enable full and safe professional practice in accordance with the work process and the reality of care. These actions aim not only to achieve the technical competencies, skills and expertise expected of residents, but also to ensure quality and safety for professionals, patients, families and the community.

## CONCLUSION

It was concluded that the factors associated with the proper use of personal protective equipment by postgraduate professionals linked to health residency programs were age, the program's area of concentration and training activities. Although adherence to personal protective equipment was low, training activities were related to adherence to PPE. In view of these results, future studies are suggested, including the use of qualitative approaches, in order to gain an in-depth understanding of the factors that prevent adherence to PPE and its appropriate use in the daily work of health residents.

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