

HEALTH PROFESSIONALS' PERCEPTION ON THE RISK OF CONTAMINATION BY COVID-19 IN BRAZIL

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ABSTRACT

Objective: to know the factors that exert an influence on the health professionals' perception of the risk of becoming contaminated with COVID-19 in Brazil.

Methods: a survey conducted from May to October 2020 with 436 active health professionals working in the front line against COVID-19. Descriptive analyses were used and a structural equation model from an exploratory factor analysis was estimated.

Results: the health professionals' perception on contracting COVID-19 was considered as medium to very high for 72% of the respondents. In the structural equation model, knowledge of the treatment for COVID-19, preparation of the health professionals to work, and safety in the institutional protocol together with confidence in official protocols and disclosures through social, printed and television media exerted an influence on confidence to face the pandemic ($P < 0.05$). This self-confidence along with the male gender were significant determinants ($P < 0.001$) for the perception of the possibility of becoming contaminated.

Conclusion: this study may contribute to the realization of strategies, public policies and guidelines that may impact on improving self-confidence and protecting the health professionals in their performance during the COVID-19 pandemic.

DESCRIPTORS: Coronavirus infections. Worker's health. Occupational risks. Personal protective equipment. Pandemics.

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PERCEPÇÃO DO RISCO DE CONTAMINAÇÃO DOS PROFISSIONAIS DE SAÚDE POR COVID-19 NO BRASIL

RESUMO

Objetivo: conhecer os fatores que influenciam a percepção do risco dos profissionais de saúde para se contaminarem com COVID-19 no Brasil.

Métodos: *survey* realizado de maio a outubro de 2020 com 436 profissionais de saúde atuantes na linha de frente da COVID-19. Utilizaram-se análises descritivas e foi estimado um modelo de equações estruturais a partir de uma análise fatorial exploratória.

Resultados: a percepção dos profissionais de saúde para contrair COVID-19 foi considerada média a muito elevada para 72% dos respondentes. No modelo de equações estruturais, o conhecimento do tratamento da COVID-19, preparo dos profissionais de saúde para atuação e a segurança no protocolo institucional em conjunto à confiança em protocolos oficiais e informações divulgadas por mídias sociais, impressa e televisiva influenciaram a autoconfiança para o enfrentamento da pandemia ($P < 0,05$). Essa autoconfiança juntamente com o sexo masculino foram determinantes significativos ($P < 0,001$) para a percepção da possibilidade de vir a se contaminar.

Conclusão: este estudo poderá contribuir para a realização de estratégias, políticas públicas e diretrizes que impactem na melhoria da autoconfiança e na proteção dos profissionais de saúde frente a sua atuação na pandemia da COVID-19.

DESCRITORES: Infecções por coronavírus. Saúde do trabalhador. Riscos ocupacionais. Equipamento de proteção individual. Pandemias.

PERCEPCIÓN DEL RIESGO DE CONTAMINACIÓN POR COVID-19 EN PROFESIONALES DE SALUD EN BRASIL

RESUMEN

Objetivo: conocer los factores que influyen la percepción del riesgo de infección por COVID-19 de los profesionales de salud en Brasil.

Métodos: estudio del tipo *survey* realizado entre mayo y octubre de 2020 con 436 profesionales de salud que trabajan en la primera línea de combate contra el COVID-19. Se utilizaron análisis descriptivos y se estimó un modelo de ecuaciones estructurales a partir de un análisis factorial exploratorio.

Resultados: la percepción de los profesionales de salud con respecto a contraer COVID-19 se consideró entre media y muy alta en el 72% de los encuestados. En el modelo de ecuaciones estructurales, el conocimiento sobre el tratamiento del COVID-19, la preparación de los profesionales de salud para trabajar, y la confianza en el protocolo institucional, en conjunto con la confianza en protocolos oficiales y diversas informaciones divulgadas a través de medios sociales, impresos y televisivos influenciaron la autoconfianza para enfrentar la pandemia ($P < 0,05$). Dicha autoconfianza, junto con el sexo masculino, fueron determinantes significativos ($P < 0,001$) para la percepción de la posibilidad de contagio.

Conclusión: este estudio podrá contribuir para que se lleven adelante estrategias, políticas públicas y directrices que repercutan sobre la mejora de la autoconfianza y sobre la protección de los profesionales de salud frente a su desempeño en la pandemia de COVID-19.

DESCRITORES: Infecciones por coronavirus. Salud del trabajador. Riesgos ocupacionales. Equipos de protección personal. Pandemias.

INTRODUCTION

In early 2020, the world went on alert due to an outbreak of pneumonia caused by a variation of the coronavirus, whose first case was reported in December 2019 in the city of Wuhan, capital of the Hubei province, China¹. The rapid increase in the number of cases was recognized as a significant outbreak leading the World Health Organization (WHO) to declare such situation as a public health emergency of international concern at the end of January 2020¹.

In this scenario, the WHO declared COVID-19 as a pandemic on March 11th, 2020, and instituted preventive measures for the population in general and especially for the health professionals working in the front line against COVID-19 for presenting a higher risk of becoming contaminated with SARS-CoV-2, due to exposure to infected patients and because it is still a challenge for active public health surveillance and an intervention in the safety culture of these professionals²⁻⁶.

High morbidity and mortality rates have been recorded among health professionals in European countries such as France and Italy, Asian such as China and Pakistan, African such as Ethiopia, and in the United States and Brazil, associated with high exposure to the virus and with the difficulties of safe adherence to the protective measures⁷⁻¹³. As causes of death, lack of knowledge in the health professionals about the virus action mechanisms and about prevention and safety measures related to personal protective equipment (PPE) have been highlighted⁷⁻¹³.

A number of studies pointed out that the health professionals' exposure to risk was directly associated with incorrect PPE use, poor equipment quality, exhaustion from the working hours depending on the seriousness of the patients' situation, and difficulty interrupting the care procedures to doffing and then donning again to return to work^{6,10-11}. In addition to that, knowledge about transmission and treatment of the disease, preparation to work in the front line, and confidence in the health authorities' recommendations were identified as strong safety predictors against the COVID-19 pandemic^{6,10-11}.

Given such reality, questions, contradictions and uncertainties have been linked to risk perception regarding the role of the professionals in the COVID-19 pandemic. Among health professionals, physicians and the Nursing team currently comprise the categories with the highest numbers of contamination and deaths due to COVID-19, not always disclosed by the health authorities, which creates uncertainty regarding the health professionals' risk perception^{10,12}. Therefore, there is a need for governments and health organizations to be actively involved in supporting such professionals, not only during public health emergencies, but also after adjustment for post-pandemic scenarios. This engagement requires collective and institutional efforts to achieve greater visibility of doing science supporting such categories. Given such challenge and considering the scarcity of studies on this topic, the purpose of this study was to know the factors that influence the health professionals' perception of becoming contaminated with COVID-19 in Brazil.

METHOD

An epidemiological study of the survey type, conducted from May to October 2020. A data collection instrument in *Google Forms* was elaborated for the study, with its proposal presentation configured as an invitation, in which the objectives, relevance and importance of participation were explained, followed by the Free and Informed Consent Form and the research link, with access to the instrument to be answered.

The construction of this instrument was based on the literature and on international recommendations/guidelines on combating the pandemic of the new coronavirus and preventing contamination of the health professionals^{1,3,14-18}.

The population included in this study was that of health professionals (physicians, nurses, nursing technicians) active in the care of patients suspected and/or infected by COVID-19 in hospitalization

units, emergency care units and intensive care units throughout Brazil. All the professionals registered with the Society of Intensive Care and the Brazilian Association of Emergency Medicine (*Associação Brasileira de Medicina de Emergência*, ABRAMEDE) were potentially eligible.

The dependent variable was the possibility of becoming contaminated with SARS-CoV-2 and contracting COVID-19. To explain such perception of the professionals' risk of contracting COVID-19, the following elements were proposed as predictors: training time, professional category, gender and age of the study participants, as well as a construct that assessed the professionals' self-confidence to work during the pandemic.

To infer such self-confidence in relation to performance against the pandemic, the participants were asked about their concern regarding the world situation imposed by the COVID-19 pandemic; knowledge about the COVID-19 transmission mechanisms and treatment; safety and preparation of the professional to work in the front line and safety in their service protocols. They were also asked in relation to donning and doffing, confidence in the official protocols and guidelines issued by the WHO, the Ministry of Health (*Ministério da Saúde*, MS) in Brazil and in the State Health Secretariats, and even reliance on the information disclosed by the printed and television media and through the social networks (*WhatsApp, Facebook, Twitter, Instagram*)¹⁹⁻²¹. A Likert scale, from 1 to 5 was used, with the following levels: very low, low, medium, high and very high.

For data analysis, descriptive statistics was used with calculation of Mean \pm Standard Deviation, median and percentages. For normality analysis, the Shapiro-Wilk test and Pearson's correlation test for parametric and continuous variables were adopted. To relate quantitative and categorical variables, Analysis of Variance (one-way ANOVA) was used, and the Kruskal-Wallis test was chosen for the non-parametric analyses.

To elaborate the multivariate model, exploratory factor analysis was used, which allowed identifying and validating the constructs used in the simultaneous equation model. Factor analysis was performed using the factor analysis method with Varimax rotation. Applying such technique requires validation of the instrument and its adaptation to the sample. The Kaiser-Meyer-Olkin (KMO) test and Bartlett's sphericity test were used. The reliability indexes were calculated for internal consistency (Cronbach's alpha). Such technique allowed exploring the correlation of the variables related to self-confidence to act against COVID-19 and confidence in the official protocols and in the information disclosed, assessed in the questionnaire.

The statistical analysis was performed in the R software, using the lavaan² package, as well as in Stata[®] v.14. The fit quality of the structural equation model was evaluated with Chi-square tests, Goodness-of-Fit-Index (GFI), Normed Fit Index (NFI), and Comparative Fit Index (CFI). In addition to that, the Root Mean Square Error of Approximation (RMSEA) and Root of the Mean quadratic Residue (RMR) were verified. A p-value <0.05 was considered statistically significant.

RESULTS

A total of 436 health professionals from all over Brazil, working in the front line of the fight against the pandemic, with a mean age of 38.1 ± 9.80 years old and 80.5% female, were reached as respondents. Among the professionals, most of the respondents were from Minas Gerais (246), followed by Rio Grande do Sul (42), São Paulo (23), Rio de Janeiro (18), Goiás (15), Ceará (13), Espírito Santo (12), Paraná (9) and Bahia (9). The rest of the respondents accounted for less than 8 and included Sergipe, Santa Catarina, Piauí, Paraíba, Santa Catarina, Rio Grande do Norte, Maranhão, Amazonas and the Federal District.

Regarding the professional category, 14.2% were physicians (62); 65.8%, nurses (287); 11.9%, nursing technicians (52); and 8.0% belonged to other health professional categories (35). In relation

to their training time, 78% had over 5 years of training (340), 10.3% between 3 and 5 years since graduation (45), and 11.7% had up to 2 years since graduation (51).

Table 1 presents the distribution of the answers related to the study variables, divided into panels. Panel A shows the answers related to the perception of the possibility of contamination by COVID-19, as well as the manifestation of concern with the world situation, knowledge and confidence in facing COVID-19.

The perception of the possibility of becoming contaminated with SARS-CoV-2 was considered low/very low for 28% of the respondents and from medium to very high for 72%. Concern in relation to the world situation was low/very low for 3.7%, evidencing moderate to very high concern for 96.3%; whereas knowledge about the mechanisms of transmission and treatment were described as low/very low by 3.7% and as moderate to very high by 96.3%.

Safety in working on the front line in the fight against the pandemic was recorded as low/very low for 18.8% and as moderate to very high for 81.2%. Regarding preparation to work in the front line of the fight against the pandemic, 17.0% considered it as low/very low and 83% as moderate to very high. In relation to safety with respect to the protocols and guidelines adopted in the service, 21.8% considered them as low/very low and 78.2% as moderate to very high and, finally, on safety for donning and doffing, 15.6% considered it as low/very low and 84.4% as moderate to very high, with a concentration of 41.5% standing out in this last classification, of high/very high, which indicates that moderately prepared professionals predominated for 42.9%.

Panel B in Table 1 presents the answers to the confidence level in the institutions related to the control of the pandemic and sources of information about it, with medium to very high confidence on the WHO guidelines above 90.0% being recorded. As for the MS guidelines, very low/low confidence was verified at 26.6%, with medium to very high confidence, 73.4%.

In relation to the state health secretariats, 22.9% identified their perception as very low/low and 77.1% indicated medium to very high confidence. Regarding printed and television media, 53.2% considered them as with very low/low confidence, with moderate to very high for 46.8% and, finally, confidence in the social networks was very low/low for 69.6% and medium to very high for 30.5%.

Table 1 – Distribution of the variables related to the perception of the professionals' safety, confidence and risk of contamination by COVID-19. Belo Horizonte, Minas Gerais, Brazil, 2020. (n=436).

	Ordinal scale				Numeric scale		
	Very low N (%)	Low N (%)	Medium N (%)	High N (%)	Very high N (%)	Median Mean ± Standard Deviation	
Panel A							
Perception about the possibility of becoming contaminated with SARS-Cov-2	27 (6.19)	95 (21.79)	169 (38.76)	94 (21.56)	51 (11.70)	3 3.10±1.06	
Concern about the world situation	6 (1.38)	10 (2.29)	87 (19.95)	181 (41.51)	152 (34.86)	4 4.06±0.87	
Knowledge about the mechanisms of transmission and treatment	1 (0.23)	15 (3.44)	128 (29.36)	195 (44.72)	97 (22.25)	4 3.85±0.80	
Safety to work in the front line of the fight against the pandemic	21 (4.82)	61 (13.99)	178 (40.83)	117 (26.83)	59 (13.53)	3 3.303±1.02	

Table 1 – Cont.

	Ordinal scale				Numeric scale		
	Very low N (%)	Low N (%)	Medium N (%)	High N (%)	Very high N (%)	Median	Mean ± Standard Deviation
Preparation to work in the front line of the fight against the pandemic	26 (5.96)	48 (11.01)	170 (38.99)	128 (29.36)	64 (14.68)	3	3.35±1.05
Safety regarding the protocols and guidelines adopted in their service	28 (6.42)	67 (15.37)	152 (34.86)	124 (28.44)	65 (14.91)	3	3.3±1.09
Safety in relation to donning and doffing	21 (4.82)	47 (10.87)	187 (42.89)	141 (32.34)	40 (9.17)	3	3.30±0.94
Panel B: Confidence Level							
World Health Organization	15 (3.44)	19 (4.36)	146 (33.49)	167 (38.3)	89 (20.41)	4	3.67±0.96
Ministry of Health	43 (9.86)	73 (16.74)	187 (42.89)	104 (23.85)	29 (6.65)	3	3.00±1.03
State Health Secretariats	32 (7.34)	68 (15.6)	185 (42.43)	127 (29.13)	24 (5.5)	3	3.09±0.97
Printed and television media	109 (25)	123 (28.21)	146 (33.49)	50 (11.47)	8 (1.83)	2	2.36±1.03
Social networks	173 (39.68)	130 (29.82)	105 (24.08)	20 (4.59)	8 (1.83)	2	1.99±0.99

For the “Perception on the possibility of becoming contaminated with SARS-CoV-2 and contracting COVID-19” variable, only the male gender presented a significant relationship ($p < 0.05$), although this was not observed for performance area, profession and training time.

The variable of interest, “possibility of becoming contaminated with SARS-CoV-2 and contracting COVID-19”, presented negative correlations (from -0.39 to -0.59/ $p < 0.05$) with the variables related to confidence to act against the pandemic. It was verified that the more self-confident the individuals felt, they estimated a lower possibility of contamination by the virus. Likewise, the possibility of becoming contaminated with SARS-CoV-2 presented a negative correlation (from -0.32 to -0.48/ $p < 0.05$) with the confidence in official protocols (from -0.35 to -0.49/ $p < 0.05$) and information disclosed by the media and social networks (from -0.39 to -0.49/ $p < 0.05$) variables, indicating that the more the health professionals trusted on these information mechanisms, the lower the possibility of contamination by the virus and contracting COVID-19.

In Table 2, the variables related to the professionals’ safety, confidence and risk perception about contracting COVID-19 corresponding to each factor stand out, indicating the factorial structure and the uniqueness of these variables. It was verified that the higher the uniqueness, the lower the relevance of the variable in the factor.

Regarding the validity of the instrument, the sample presented suitability to the factorial test, with the result of the Kaiser-Meter-Olkin (KMO) Test being 0.76 and that of Bartlett’s sphericity: Chi-square Test being approximately 1,588.21; $p < 0.0001$. It is also possible to highlight the internal consistency among the items, measured through Cronbach’s alpha, with an alpha coefficient of 0.794.

Multivariate model with exploratory factor analysis (Varimax rotation). Reliability indexes (Cronbach’s alpha).

Table 2 – Calculated factor structure for variables related to the professionals' perception of safety, confidence and risk of contracting COVID-19. Belo Horizonte, Minas Gerais, Brazil, 2020. (n=436).

Variables	Self-confidence to act against COVID-19 (AuC)	Confidence in the Official Protocols (ConPO)	Confidence in Information Disclosed (ConID)	Uniqueness
Knowledge about transmission and treatment of COVID-19	0.54	–	–	0.65
Safety to work in the front line	0.80	–	–	0.35
Preparation to work in the front line	0.92	–	–	0.14
Safety regarding the protocols and guidelines adopted in the service	0.83	–	–	0.28
Safety in relation to donning and doffing	0.52	–	–	0.70
Confidence in the Ministry of Health's protocols	–	0.85	–	0.27
Confidence in the State Health Secretariats' protocols	–	0.54	–	0.57
Confidence on information disclosed by printed and television media	–	–	0.55	0.48
Confidence in information disclosed through social networks	–	–	1.00	0.00
Eigenvalue	2.87	1.33	1.34	–
Explained variance percentage (Total: 61.65%)	31.92	14.83	14.92	–
Cronbach's alpha (Total: 0.794)	0.85	0.66	0.70	–

In the elaboration of the multivariate model, the exploratory factor analysis identified latent constructs for confidence to act against the COVID-19 pandemic (AuC) and confidence in the institutions' protocols (ConPO), as well as confidence in printed and television media and social networks (ConID). Structural equations were applied to confirm the exploratory analysis and determine the variables that exerted an influence on the perception of the possibility of becoming contaminated with SARS-CoV-2 (Table 3).

Table 3 presents the variables that influenced the AUC, and the ConPO and ConID constructs and how these, together with other variables, influenced the perception of contamination with SARS-CoV-2 and contracting COVID-19. ConPO was positively influenced by confidence in the WHO, the MS and the state health secretariats, and negatively influenced by age. ConID was positively influenced by confidence in social networks, printed and television media and age. The two previous constructs along with other specific variables of knowledge and safety to act against the COVID-19 pandemic directly contributed to define the AuC construct.

Table 3 – Results of the structural equation model for the perception of the possibility of becoming contaminated with SARS-Cov-2 and contracting COVID-19. Belo Horizonte, Minas Gerais, Brazil, 2020. (n=436).

Dependent variable	Operator	Independent variable	Coefficient	Z Stat*	p-value†	95% Confidence Interval
Confidence in the Official Protocols (ConPO)	=~	Ministry of Health	1.00	–	–	1.00
	=~	World Health Organization	1.00	8.37	< 0.0001	0.76-1.23
	=~	State Health Secretariats	1.52	8.37	< 0.0001	1.16-1.88
Confidence in the Information Disclosed (ConID)	=~	Age	-0.23	-2.38	0.017	-0.43/-0.04
	=~	Social networks	1.00			1.00
	=~	Printed/television media	0.86	3.39	0.0007	0.36-1.37
Self-confidence to act against COVID-19 (AuC)	=~	Age	0.21	2.60	0.009	0.05-0.37
	=~	COVID-19 transmission and treatment	1.00			1.00
	=~	Safety to work in the front line	1.83	11.90	< 0.0001	1.52-2.12
	=~	Preparation to work in the front line	2.11	12.58	< 0.0001	1.78-2.43
	=~	Institutional protocol	2.09	12.32	< 0.0001	1.75-2.42
	=~	Safety in donning/doffing	1.15	9.29	< 0.0001	0.90-1.39
	=~	Confidence in the official protocols	0.56	5.98	< 0.0001	0.38-0.74
Risk for contamination	=~	Confidence in information disclosed	0.25	2.31	0.021	0.03-0.46
	~	Self-confidence to act against COVID-19	-0.96	-7.50	< 0.0001	-1.21/-0.71
	~	Gender	0.57	4.88	< 0.0001	0.34-0.79

*Z Statistics, †One-way ANOVA and Kruskal-Wallis. Multivariate model with exploratory factor analysis (Varimax rotation)

The sensation of self-confidence and gender significantly explained ($p < 0.0001$) the perception of contamination with SARS-CoV-2 and the risk for contracting COVID-19. Thus, a greater sensation of self-confidence contributed to the respondents feeling a lower possibility of becoming contaminated during the fight against COVID-19, and male respondents attributed greater chances of becoming contaminated. Figure 1 shows the structural equation model.

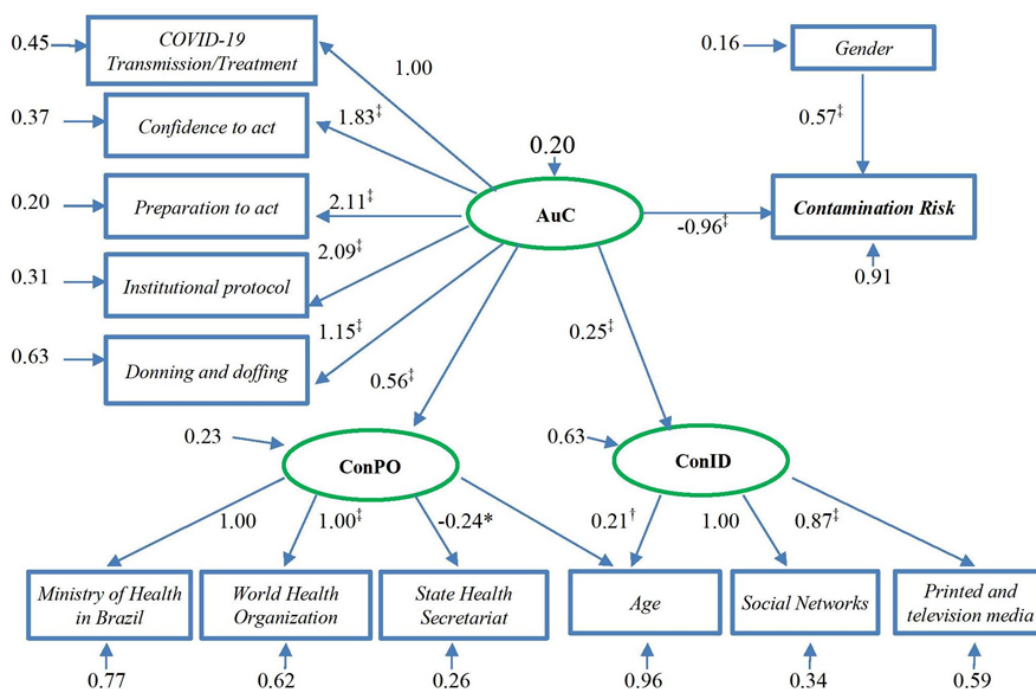


Figure 1 – Structural equation model for the perception of the possibility for becoming contaminated with SARS-Cov-2. Belo Horizonte, Minas Gerais, Brazil, 2020.

Note: Constructs: AuC – Self-confidence to act against COVID-19; ConPO – Confidence in the Official Protocols; ConID – Confidence in Information Disclosed – (printed and television media and social networks). *, †, ‡ Significant at the levels of 10%, 5%, and 1%, respectively.

Regarding the fit quality of the structural equation model, the global Chi-square Test was significant at 1% ($p < 0.001$). Table 4 shows information about the model fit indicators, indicating the suitability of the estimated model.

Table 4 – Fit and suitability indicators of the structural equation model. Belo Horizonte, Minas Gerais, Brazil, 2020. (n=436).

Indicators	Model
Chi-square (λ^2)/Degrees of freedom (df)	5.310
Goodness-of-Fit Index (GFI)	0.892
Normed Fit Index (NFI)	0.830
Comparative Fit Index (CFI)	0.883
Root Mean Square Error of Approximation (RMSEA)	0.079
Root Mean Square Error of Approximation (RMSEA)	0.074

Quality measures of the model fit: Chi-square, Goodness-of-Fit Index (GFI), Normed Fit Index (NFI), Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA) and Root of the Mean quadratic Residue (RMR).

DISCUSSION

The results of this study evidenced 15.6% safety in relation to donning and doffing facing the COVID-19 pandemic. Improper use and inadequate removal of the PPE have been identified as very important factors for strongly contributing to self-contamination in the professionals^{1,16,23-24}. The experience of the COVID-19 epidemic in Canada indicated that the high infection rates in health care workers were associated with contamination during PPE removal²¹⁻²⁴.

This health professionals' risk of contamination due to PPE has been previously discussed during the epidemic generated by the Ebola virus in 2014 and, seven years later; the same situation of contamination by PPE appears in the COVID-19 pandemic²⁵. The use of PPE in health care workplaces is recommended as a high priority, and an epidemiological study confirmed that infection by COVID-19 among health professionals can be avoided with its appropriate usage, even when at high-exposure risk, for example, while conducting aerosol-generating procedures²⁶. High-exposure risk also involves doffing, in which usually the main adequacy deviations and consequent self-contamination and spread of SARS-CoV-2 in the institutional work environment take place.

Regular training of the health professionals on donning and doffing should be continuous and monitored to minimize deviations from the protocol, self-contamination and spread of the virus among the patients. While there is global shortage of PPE, its deficiency would be another factor that can affect unsafe donning and doffing regarding PPE, which would potentially lead to a low level of preparation and readiness to fight against COVID-19.

Regarding the perception about the possibility of becoming contaminated with SARS-CoV-2, this was considered as medium to very high for 72% of the respondents. This result was corroborated by a study in Portugal, which also recorded a rate of 92.0% of professionals who reported perceived risk as moderate to high about the possibility of becoming infected with SARS-CoV-2²⁷. A study conducted in Ethiopia found that, among 301 health professionals working in the front line in a health institution, 75.5% felt unsafe about the possibility of becoming contaminated by SARS-CoV-2¹¹. In addition to that, physicians and nurses were particularly exposed to the negative effects on mental health during patient care, contributing to the potential fear of contagion¹¹. Associated with this, the healthcare providers are suffering during the pandemic due to longer shifts, balance disorders between work and personal life and concerns regarding passing on to their family members the disease which has led to intense stress and anxiety, physical and mental fatigue for such professional categories.

The concern about the possibility of becoming contaminated also becomes relevant to the strengthening of beliefs, values and attitudes that influence not only the decisions on the care practice, but also the behavior and adherence to the preventive practices against COVID-19¹⁹⁻²⁴. Due to insufficient understanding of the risk, transmissibility, pathogenicity, prevention and control of COVID-19, at an early time of the pandemic, possibly certain insecurity in the health professionals and the demand for information to enhance knowledge can generate uncertainties as for preparation to act on the front line.

Male participants attributed greater possibility of becoming contaminated with SARS-CoV-2 ($p < 0.0001$). Men and women were affected differently in the pandemic, and the greater possibility of becoming contaminated seen by the male gender professionals in this study can be due to the greater number of deaths due to COVID-19 reported globally when compared to women²⁸⁻²⁹. Another point of view is that, higher levels of smoking, alcohol consumption and comorbidities in men, such as cardiovascular diseases and diabetes, may also have contributed to vulnerability to COVID-19²⁸⁻²⁹. In addition to that, historical factors that associate men, as a group which delays seeking health care, can be related to lack of organizational and institutional incentives that may impact on a greater possibility of becoming contaminated by SARS-CoV-2. On the other hand, the biological factors indicate that the innate and adaptive immune responses are expressed in a more fragile manner in men, in addition to having a greater plasma amount of the angiotensin 2 converting enzyme, which acts as a receptor for SARS coronavirus-2 penetrate cells²⁹. Behavioral factors, such as greater exposure to risk situations, and that require greater physical efforts either inside or outside the health institutions, can also expose men to greater contamination potential when compared to women.

In this study, from the factors identified as relevant in Table 2, a multivariate model was elaborated which identified that self-confidence was positively influenced by reliance on the WHO, MS and state health secretariats' protocols, as well as confidence in the information disclosed by printed and television media (Table 3 and Figure 1).

Self-confidence was also influenced by the service protocols that need to be in consonance with the health authorities' recommendations in order to strengthen the organizational structure and practices based on the international and national guidelines^{3,6,15,28-30}. Similarly, a study conducted in the United Kingdom analyzed the health professionals' perception regarding preparation to act in the pandemic and verified that 15.5% in England and 22.8% in Wales answered that the institutional guidelines were not sufficient, and only a third saw themselves as being confident to act on the front line²⁴.

Thus, the multivariate model showed that confidence in printed and television media and social networks exerted a positive influence on the professionals' confidence to act on the front line in the fight against COVID-19. A study conducted with professionals in an Intensive Care Unit in Italy showed that 47.0% of the respondents relied on social media such as *Facebook* and *WhatsApp* in search for more information about the COVID-19 pandemic that could consistently help them in their daily practice³⁰. Although recognized as unconventional sources and often of questionable reliability at an early time of the pandemic, it was verified that many professionals resorted to these sources, seeking information that they deemed could help them in a time of ignorance about the pandemic scenario, its impact and clinical and social repercussions³¹.

Similarly, the printed and television media along with the social networks can disclose controversial/conflicting information and even politicized data about COVID-19, which can exert a negative influence on the health professionals' perception and risk, culminating in insecurity in the very institutional protocols¹⁹⁻²¹.

A study based on structural equations identified a positive and direct impact between the work of nurses in the front line, psychological resilience and engagement in institutional work³². This result suggests that training and evaluation of preventive and protective measures is essential to improve the self-protection practices. In a survey conducted in Pakistan, a significant positive correlation ($p < 0.05$) was verified between the health professionals' knowledge and their attitude towards the care practice provided to patients infected with COVID-19⁶. In addition to that, the professionals aged between 40 and 49 years old and those over 50 years old presented a significant association ($p < 0.05$) with knowledge and confidence to act during the COVID-19 pandemic⁶. On the other hand, it was identified that the older the age, the lower the confidence regarding the institutional protocols and the greater the confidence in the printed media, television media and social networks⁶. Therefore, it is inferred that professionals aged over 40 years old more easily identify outdated institutional protocols that did not meet the recommendations of the national and international health authorities and, consequently, they sought other communication means and protocols to ground their assistance.

This research may contribute to the elaboration of public evidence-based policies that can collaborate with safe practices for the health professionals, who can frequently come across institutions with few resources unable to provide sufficient facilities and supplies to ensure worker's safety. The health services need to ensure access, training and discussion regarding coping guidelines for COVID-19 to the professionals so that they can feel safe and confident in their routine, with strategies that impact on improving self-confidence and can influence greater protection of the health professionals during their performance facing COVID-19. For Nursing, as it represents a category with frequent and direct contact with the patients, this study will leave a lesson: if the elaboration of prevention strategies does not aim at reducing the mortality and physical-social burden risk, with distribution of quality PPE associated with active and frequent training, even with the team strongly working for the institution, human resources that address risk and emergency situations such as the COVID-19 pandemic will be lacking.

CONCLUSION

In this study, the structural equation model evidenced that the health professionals' risk perception of contracting COVID-19 was significantly related to the knowledge regarding disease transmission/treatment, to performance and to training of the health professionals. In addition to that, safety in the institutional protocols together with confidence in the official protocols and in the information disclosed by the printed and television media were social factors that exerted a significant influence on the professionals' confidence to act in the front line. These factors can indicate the importance of following evidence-based decision-making processes in managing the pandemic and of developing efficient collaborations between public health employees and governments to sustain continuous and accurate information and greater effort to increase public awareness regarding the work of the professionals and the COVID-19 pandemic.

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NOTES

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APPROVAL OF ETHICS COMMITTEE IN RESEARCH

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CONFLICT OF INTEREST

There is no conflict of interest.

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