

Personal protective equipment use and hand hygiene among physical therapists during the COVID-19 pandemic: an observational study

Uso de equipamentos de proteção individual e higienização das mãos entre fisioterapeutas durante a pandemia de COVID-19: um estudo observacional

Uso de equipos de protección personal e higiene de manos entre fisioterapeutas durante la pandemia de COVID-19: un estudio observacional

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Abstract

Objective: to describe personal protective equipment (PPE) use, hand hygiene and the association with biosafety training among physical therapists during the COVID-19 pandemic. Methods: this exploratory, observational, and transversal study was conducted in Brazil during the pandemic using an online self-administered questionnaire composed of the socio-demographic characteristics, PPE use, and hand hygiene. Statistical analysis was performed using Spearman's correlation and logistic regression. Results: the most PPE used were long-sleeved lab coats (82.4%), face masks (81.4%) and closed shoes (79.1%). Most physical therapists washed hands before and after procedures (87.4%). Only 47.5% had biosafety training during the COVID-19 pandemic. Biosafety training was associated with medical apron (OR = 2.21, 95%CI = 1.08 to 4.52), isolation gown (OR = 2.71, 95%CI = 1.09 to 6.75), long-sleeved lab coat (OR = 0.44, 95%CI = 0.22 to 0.87) and safety goggles (OR = 2.15, 95%CI = 1.21 to 3.84). Conclusion: although PPE use and hand hygiene are part of the Brazilian physical therapist routine, almost half of the assessed physical therapists had not performed biosafety training during the COVID-19 pandemic.

Keywords: Personal Protective Equipment; Biohazard containment; COVID-19; Hand disinfection; Occupational exposure.

Resumo

Objetivo: descrever o uso de equipamentos de proteção individual (EPI), higienização das mãos e a associação com treinamento em biossegurança entre fisioterapeutas durante a pandemia de COVID-19. Métodos: este estudo exploratório, observacional e transversal foi realizado no Brasil durante a pandemia por meio de um questionário

autoaplicável online composto pelas características sociodemográficas, uso de EPI e higienização das mãos. A análise estatística foi realizada por meio da correlação de Spearman e regressão logística. Resultados: os EPIs mais utilizados foram jalecos de manga comprida (82,4%), máscaras faciais (81,4%) e calçados fechados (79,1%). A maioria dos fisioterapeutas lavou as mãos antes e após os procedimentos (87,4%). Apenas 47,5% tiveram treinamento em biossegurança durante a pandemia de COVID-19. O treinamento em biossegurança foi associado ao avental médico (OR = 2,21, IC 95% = 1,08 a 4,52), bata de isolamento (OR = 2,71, IC 95% = 1,09 a 6,75), jaleco de manga comprida (OR = 0,44, 95% CI = 0,22 a 0,87) e óculos de proteção (OR = 2,15, IC 95% = 1,21 a 3,84). Conclusão: embora o uso de EPI e a higienização das mãos façam parte da rotina do fisioterapeuta brasileiro, quase metade dos fisioterapeutas avaliados não realizaram treinamento em biossegurança durante a pandemia de COVID-19.

Palavras-chave: Equipamento de Proteção Individual; Contenção de riscos biológicos; COVID-19; Desinfecção das mãos; Exposição ocupacional.

Resumen

Objetivo: describir el uso de equipos de protección personal (EPP), higiene de manos y la asociación con el entrenamiento en bioseguridad entre fisioterapeutas durante la pandemia de COVID-19. Métodos: este estudio exploratorio, observacional y transversal se realizó en Brasil durante la pandemia a través de un cuestionario autoadministrado en línea compuesto por características sociodemográficas, uso de EPP e higiene de manos. El análisis estadístico se realizó mediante correlación de Spearman y regresión logística. Resultados: los EPP más utilizados fueron batas de manga larga (82,4%), cubrebocas (81,4%) y zapatos cerrados (79,1%). La mayoría de los fisioterapeutas se lavaron las manos antes y después de los procedimientos (87,4%). Solo el 47,5% tuvo capacitación en bioseguridad durante la pandemia de COVID-19. La capacitación en bioseguridad se asoció con bata médica (OR = 2,21, IC del 95 % = 1,08 a 4,52), bata de aislamiento (OR = 2,71, IC del 95 % = 1,09 a 6,75), bata de laboratorio de manga larga (OR = 0,44, IC del 95 % = 0,22 a 0,87) y gafas (OR = 2,15, IC del 95% = 1,21 a 3,84). Conclusión: aunque el uso de EPP y la higiene de las manos sean parte de la rutina del fisioterapeuta brasileño, casi la mitad de los fisioterapeutas evaluados no realizaron capacitación en bioseguridad durante la pandemia de COVID-19.

Palabras clave: Equipo de Protección Personal; Contención de riesgos biológicos; COVID-19; Desinfección de las manos; Exposición profesional.

1. Introduction

Health workers are often exposed to microorganism and biological agent-related infections due to contaminated secretion or excretion contact (Da Paz Silva Filho et al., 2020; Wilkason et al., 2020). The Brazilian Ministry of Labor and Employment establishes regulations on standard precaution against infections and occupational accidents. Among these regulations, NR 32 and NR 6 refers to standard precaution for health workers (Brasil, 2005) and personal protective equipment (PPE) use at workplace (Brasil, 1978), respectively.”

Biosafety practices (i.e. PPE use and hand hygiene) have been regulated in Brazil for over ten years, but discussion regarding the topic was intensified in 2020 during the coronavirus (COVID-19) outbreak (Alves et al., 2020). The COVID-19 infection is still spreading since its origin in Wuhan-China (December 2019) and achieved pandemic proportions in March 2020 (OPAS, 2020).

According to the World Health Organization, COVID-19 is transmitted by cough and sneeze droplets of infected individuals reaching mucosal surfaces (Abdel Wahed et al., 2020). Therefore, preventive actions, such as face masks, hand hygiene and social distancing are recommended to avoid COVID-19 virus transmission (ECDC, 2020). However, social distancing is not often possible in physical therapy practice since direct contact is frequently inevitable during main procedures (Perez-Fernandez et al., 2020), reinforcing the need for rigorous biosafety practice (i.e., PPE use and hand hygiene) to ensure safety to all individuals involved in physical therapist’s health assistance. Thus, this study aimed to describe personal protective equipment (PPE) use hand hygiene and the association with biosafety training among physical therapists during the COVID-19 pandemic.

2. Methods

It was exploratory, observational and cross-sectional quantitative study, carried out without the intervention of the researchers, whose data collection made it possible to make generalizations for a given population (Bastos & Duquia, 2007;

Pereira et al., 2018), submitted to the Research Ethics Committee of Higher Education and Development Center (protocol number 4.061.152/2020). The study was conducted according to the declaration of Helsinki and all subjects signed an informed consent form.

2.1 Participants

This research was conducted with physical therapists from all expertise areas aged >18 years. Inclusion criteria were (1) physical therapy bachelor's degree and (2) working as physical therapist in Brazil during data acquisition. Individuals without internet access were excluded, while those who did not answer the application properly were considered losses.

2.2 Data Measurement

Data collection was conducted between June and July 2020 using an online self-administered questionnaire. Participants recruited by non-probability convenience sampling, in which researchers invited physical therapists through social media (Instagram, Whatsapp and Facebook) and, after response, asked to pass the invitation to their colleagues.

The questionnaire contained multiple choice questions about sociodemographic and professional data (i.e. age, years since physical therapy graduation, gender, institutions where concluded physical therapy undergraduate, physical therapy expertise areas and workplace), PPE use (select which PPE are used during clinical practice), hand hygiene habits (hand hygiene routine and frequency), biosafety training (performance of biosafety training after graduation and during pandemic) and biosafety habits modification in professional routine during the COVID-19 pandemic.

2.3 Statistical Analysis

Descriptive analysis was performed using mean and SD for continuous variables (i.e. age, years since physical therapy graduation), while absolute and relative frequencies were calculated for categorical variables (i.e. biosafety training, workplace, gender, institutions where concluded physical therapy undergraduate). Associations between biosafety training and PPE use were performed using Spearman's correlation coefficient (ρ), followed by logistic regression analysis considering biosafety training performance (Yes/No), as a dependent variable, and all variables that presented significance level of <0.2 on correlation tests, as independent variables. Odds Ratio and 95% confidence intervals (95%CI) were also calculated. Only variables with $p < 0.05$ remained on final model, and all tests were performed using Medcalc program (Ostend, Belgium). version 17.9.7.

3. Results

Sample consisted of 301 physical therapists (230 women), aged between 21 and 63 years (33.42 ± 8.2 years), and with 8.71 ± 7.57 years since physical therapy graduation. Most (55.5%, $n = 167$) physical therapists were specialists, 74.8% ($n = 225$) concluded physical therapy undergraduate at private institutions, and 43.2% ($n = 130$) had more than one specialization. Most cited specialization areas were musculoskeletal (34.6%, $n = 104$), neurological (23.3%, $n = 70$), and intensive care (21.9%, $n = 66$) (Table 1).

Table 1 – Physical Therapists general characteristics.

Characteristics	N (%)	Means ± SD
Gender		
Female	230 (76.4)	
Male	71 (23.6)	
Age		33.42 ± 8.20
Time since physical therapy graduation (years)		8.71 ± 7.57
Professional title		
Graduate	75 (24.9)	
Specialists	167 (55.5)	
Master's degree	44 (14.6)	
Doctorate degree	13 (4.3)	
Post doctoral	2 (0.7)	
Workplace		
Sports Centers	3 (1)	
Clinic	57 (52.2)	
University	15(5)	
Homecare	166 (55.1)	
Hospital	81 (26.9)	
Basic health care	4 (1.3)	
Physical therapy specialization		
Musculoskeletal	104 (34.6)	
Neurological	70 (23.3)	
Intensive care	66 (21.9)	
Respiratory	58 (19.3)	

Source: Research Data (2020).

Most frequent PPE used were long-sleeved lab coat (82.4%), face masks (81.4%), closed shoes (79.1%), and surgical gloves (69.1%) (Table 2). When questioned about PPE use, most (94.4%, n = 284) physical therapists were aware of occupational exposure risks. Regarding hand hygiene, most physical therapists washed their hands before and after any attendance or procedure (87.4%, n = 263), however, only 62.8% (n = 189) claimed to wash hands more than four times daily (Table 2).

Table 2 – Physical therapists’ frequency of PPE use and hand hygiene routine.

Variable	N (%)
PPE used	
Medical apron	60 (19.9)
Medical hood or head cover	123 (40.9)
Safety goggles	112 (37.2)
Face masks	208 (81.4)
Surgical gloves	208 (69.1)
Long-sleeved lab coat	248 (82.4)
Face shield	96 (31.9)
Isolation gown	42 (14)
Closed shoes	248 (79.1)
Hand hygiene routine	
Wash hands before and after any care or procedure	263 (87.4)
Wash hands only before care or procedures	12 (4.0)
Wash hands only after care or procedures	17 (5.3)
Wash hands only when you arrive at workplace	1 (0.3)
Do not wash hands between care or procedures	8 (2.7)
Hand hygiene frequency	
Twice a day	1 (0.3)
Three times a day	7 (2.3)
Four times a day	6 (2.0)
More than four times a day.	189 (62.8)
When is necessary	98 (32.6)

Source: Research Data (2020).

When asked about biosafety training and standard precaution against infections. 40.5% (n = 122) of physical therapists never performed biosafety training after graduation, whereas 47.5% (n = 143) performed biosafety training during the COVID-19 pandemic. In addition. 89.4% (n = 269) reported changes in biosafety practices during professional routine due to COVID-19 pandemic.

Biosafety training during COVID-19 pandemic was correlated with medical apron ($\rho = 0.241$, $p < 0.001$), closed shoes ($\rho = 0.130$, $p = 0.024$), isolation gown ($\rho = 0.250$, $p < 0.001$), face shield ($\rho = 0.205$, $p < 0.001$), long-sleeved lab coat ($\rho = -0.172$, $p = 0.003$), surgical gloves ($\rho = 0.1898$, $p = 0.001$), face mask ($\rho = 0.147$, $p = 0.01$), safety goggles ($\rho = 0.300$, $p < 0.001$), and medical hood or head cover ($\rho = 0.224$, $p < 0.001$) use (Table 3). Only medical apron (OR = 2.21, 95%CI = 1.08 to 4.52), isolation gown (OR = 2.71, 95%CI = 1.09 to 6.75), long-sleeved lab coat (OR = 0.44, 95%CI = 0.22 to 0.87), and safety goggles (OR = 2.15, 95%CI = 1.21 to 3.84) remained on final model and were significantly associated with dependent variable (Table 4).

Table 3 – Associations between biosafety training and PPE use.

PPE	Rho	p-value	95%CI
Medical apron	0.241	<0.0001	0.132 to 0.345
Medical hood or head cover	0.224	<0.0001	0.114 to 0.329
Safety goggles	0.300	<0.0001	0.193 to 0.399
Face masks	0.147	0.0106	0.0346 to 0.256
Surgical gloves	0.1898	0.0009	0.07843 to 0.2965
Long-sleeved lab coat	-0.172	0.0028	-0.279 to -0.0596
Face shield	0.205	0.0003	0.0946 to 0.311
Isolation gown	0.250	0.0001	0.141 to 0.354
Closed shoes	0.130	0.0244	0.0169 to 0.239

Source: Research Data (2020).

Table 4 – Odds Ratio (OR) with 95% confidence intervals by logistic regression for biosafety training and PPE use.

PPE	OR	95%CI	p-value
Medical apron	2.12	1.03 to 4.36	0.0421
Medical hood or head cover	1.15	0.63 to 2.09	0.6454
Safety goggles	2.15	1.21 to 3.84	0.0092
Face masks	1.09	0.53 to 2.27	0.7982
Surgical gloves	1.13	0.59 to 2.15	0.7037
Long-sleeved lab coat	0.44	0.22 to 0.87	0.0194
Face shield	1.03	0.55 to 1.91	0.9299
Isolation gown	2.71	1.09 to 6.75	0.0321
Closed shoes	1.48	0.79 to 2.78	0.2203

Legends: 95%CI = Confidence Intervals; OR = Odds Ratio. Source: Research Data (2020).

4. Discussion

This study aimed to assess PPE use and hand hygiene among Brazilian physical therapists during the third month after COVID-19 pandemic begin in Brazil. Most physical therapists used PPE on professional practice and claimed to wash hands before and after each appointment or procedure. Even though standard precaution against infections were intensified, less than half of physical therapists performed biosafety training. This training was associated with medical apron, surgical gown, long-sleeved lab coat, and safety goggles.

The present study partially corroborates with La-Rotta et al. (2013) (La-Rotta et al., 2013), who studied PPE use among Brazilian university hospital physicians. According to La-Rotta et al. (2013) (La-Rotta et al., 2013), disposable gloves, face masks, and safety goggles use among physicians were 75.6%, 56.3%, and 17.2%, respectively. Moreover, more than 80% of physicians washed hands before and after procedures. Differences in PPE frequency between studies may be related to current public health conditions and changes in biosafety procedures regarding physical therapists' routine due to the COVID-19 pandemic. Besides of that, each profession specific appointment or procedure (medicine and physical therapy) and participants workplace can influence these results.

In contrast with the present study, most studies evaluating PPE use by health professionals were conducted in hospital environment (Helfgott, Taylor-Burton, F.J. Garcini, Eriksen, & Grimes, 1998; La-Rotta et al., 2013; Lai et al., 2020). Despite the lack of national data regarding physical therapist workplaces, this study corroborates with data from the most populous Brazilian state (São Paulo), in which only 11.3% of physical therapists worked at public hospitals and 8.8% at private hospitals (Sílvia et al., 2016). Therefore, data comparison between health professionals requires caution.

The appropriate use of PPE by physical therapist in acute hospital setting was already established in the literature (Thomas et al., 2020), however, until now, PPE use by physiotherapists is not known. Besides of that, the appropriate use of PPE in other therapeutic settings has not been described. In the present study, physical therapists' profile may have reflected on biosafety training access since home and ambulatory environments are considered low-risk of infection. This hypothesis needs to be carefully interpreted and confirmed by future studies, especially considering COVID-19 infections, in which asymptomatic individuals may potentially transmit the virus (Oran & Topol, 2020).

Casual factors regarding infection risk in rehabilitation environments had been raised, such as lack of standardized precaution procedures (Perez-Fernandez et al., 2020), studies regarding specific sanitary practices in this environment (McGuckin, Chung, Humphrey, & Reisman, 1981), and inclusion of instrument and equipment handling in infection prevention protocols (Lambert et al., 2000). In this context, the need for practical and theoretical biosafety training exclusively for clinical practice of physical therapists is reinforced.

Studies before the COVID-19 pandemic performed in Ethiopia (Reda et al., 2010), Iran (Askarian et al., 2007; Barikani & Afaghi, 2012), South Africa (Laher et al., 2020) and Brazil (La-Rotta et al., 2013) described low adherence of health professionals to PPE use and hand hygiene. These findings may be related to little knowledge on the topic, inefficient professional training, negative influence of team members, conflicts of interest, failure on perceiving inherent professional practice risks and lack of time and equipment (Askarian et al., 2007; Delgado et al., 2020; La-Rotta et al., 2013). Not surprisingly, this low adherence is being reversed one year after the pandemic since most physical therapists claimed to use PPE and periodically perform hand hygiene during professional practice. Such evidence indicates positive changes in biosafety practice due to pandemic situation, as previously described by physicians and nurses (Lai et al., 2020).

Despite PPE use and hand hygiene, most assessed physical therapists never performed biosafety training. The low frequency of biosafety training among health professionals (La-Rotta et al., 2013; Reda et al., 2010; Wilkason et al., 2020) is an important concern since PPE use and removal demand proper execution to avoid infection by highly transmissible diseases (Christensen et al., 2020).

The need for biosafety training and infection control among health professionals has been described in a Systematic Review (Houghton et al., 2020). According to this study, training performance, implementation and communication of transparent protocols, leadership management and support, and PPE availability are essential factors for health professionals' adherence. In our study, regression analysis demonstrated associations between biosafety training and medical apron, isolation gown, long-sleeved lab coat, and safety goggles. This association may have been influenced by the lack of PPE information and availability for physical therapists working in home and ambulatorial environments. Nevertheless, the European Centre for Disease Prevention and Control described PPE as health professionals' essential equipment during the current pandemic (ECDC, 2020).

The health professionals' claim for specific biosafety practices regulation led to the RN-32 establishment in 2005, which disposes of standardized precaution procedures for implementing infection and occupational accident controls for health professionals, continuing education, and training (Brasil, 2005). According to the present study, most Brazilian physical therapists did not satisfy biosafety training regulation criteria. This fact may be related to Brazilians physical therapists' work system. According to Silva et al. (2016) (Sílvia et al., 2016), 47.2% of Brazilian physical therapists living in São Paulo worked as independent professionals and did not have formal employment or subordinate relationship. This work regime may lead such physical therapists to neglect training and reduce PPE use due to costs since PPEs are provided by employers (Brasil, 1978). Further investigation is required to better understand the association between biosafety practices and work regimes among physical therapists from different expertise areas.

This study is the first to investigate PPE use and hand hygiene among Brazilian physical therapists during the COVID-19 pandemic. Despite results relevance, some limitations must be mentioned. First, most assessed physical therapists worked in the Brazilian Northeast region, which may limit data generalization; second, the search for physical therapists from different expertise areas and the challenging public health moment experienced during data acquisition may not have reached physical therapists working on the COVID-19 frontline. Therefore, future studies with a large sample size, homogeneous distribution among expertise areas, and subgroup analyses should be performed.

5. Conclusion

Although almost half of assessed physical therapists had not performed biosafety training during the current pandemic, PPE use and hand hygiene are part of their routine. This training was associated with PPE use, such as medical apron, isolation gown, long sleeve lab coat and safety goggles.

Results of the present study are an alert to physical therapists working in home and ambulatorial environments during the COVID-19 pandemic. Standard precaution against infections is needed among frontline professionals since many patients demand home-based rehabilitation programs after hospital discharge, thus, requiring direct contact among therapist and patient. It is recommended that future studies analyze the use of PPE and the continuity of care by physical therapists after the pandemic period.

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