



## ORIGINAL ARTICLE

## Effects of Workplace Configurations on Frontline Physiotherapists in Public and Private Hospitals in Brazil during the Covid-19 Pandemic

Rodrigo Gonçalves dos Santos<sup>1</sup>, Arlindo Souza Amaral Neto<sup>2</sup> , Mônica Ferreira da Silva<sup>2</sup> , Paulo Victor Rodrigues de Carvalho<sup>1,2,3</sup> and Alessandro Jatobá<sup>1,4\*</sup>



<sup>1</sup>Centro Universitário Carioca (UniCarioca), Rio de Janeiro, Brazil

<sup>2</sup>Programa de Pós-graduação em Informática (PPGI), Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil

<sup>3</sup>Instituto de Engenharia Nuclear (IEN), Rio de Janeiro, Brazil

<sup>4</sup>Centro de Estudos Estratégicos (CEE), Fundação Oswaldo Cruz, Rio de Janeiro, Brazil

\*Corresponding author: Alessandro Jatobá, Centro Universitário Carioca (UniCarioca), Rio de Janeiro; Centro de Estudos Estratégicos (CEE), Fundação Oswaldo Cruz, Rio de Janeiro, Brazil

### Abstract

**Background and purpose:** The work of physiotherapists in handling Covid-19 patients depends on the severity of the patient condition. These workers rely on adequate workplaces, especially Intensive Care Units (ICU), where critical patients are handled. Private and public hospitals in Brazil dealt differently with the demands imposed by the Covid-19, and consequently, workers in public and private hospitals had to rely on distinct working conditions. Thus, this article aims to identify the possible risks, and the effects of such situations on the physical and cognitive stress of physiotherapists on the frontline of Covid-19 in ICUs in private and public hospitals.

**Methods:** A questionnaire based on the ergonomic standards was completed by 181 intensive care physiotherapists that work on ICUs that admit Covid-19 patients in the city of Rio de Janeiro, Brazil.

**Results:** 134 valid responses were collected, distributed among 22 men and 112 women, which indicate that despite the different conditions, workers on both private and public hospitals face similar conditions when dealing with large numbers of Covid-19 patients. The nature of the hospital affects the patient flow, but as the pandemic upsurges, both private and public hospitals suffered similar effects on their workplaces.

**Discussion:** Moreover, the present study highlighted the characteristics of the different types of health facilities, indicating the potential influences of ICU workplaces on the activities, health and well-being of intensive care physiotherapists on the frontline of the Covid-19 pandemic.

### Keywords

Intensive care units, Physiotherapy modalities, Covid-19, Pandemics

### Introduction

This article aims to analyze the effects of the workplace settings of physiotherapists on the front line of Covid-19 in Intensive Care Units (ICU) on their emotional exhaustion, physical and cognitive distress with an exploratory study carried out in one of the city's most affected by the pandemic in the world: Rio de Janeiro, Brazil. The Brazilian health system encompasses privately health insurance (covering 25% of the population) and public health services (delivered within the Brazilian Unified Health System - SUS). Most of the low-income population of Brazil relies exclusively on the public health services.

The private health insurance companies in Brazil are quite autonomous in negotiation with healthcare providers, in spite of current regulations, and a large amount of privately held hospitals, support and diagnostic services are accessible exclusively by private-insured individuals. Thus, private and public health organizations responded differently to the demands imposed by the Covid-19 pandemic, especially

concerning specific services like physiotherapy.

The Covid-19 pandemic has been an enormous challenge to health systems worldwide. By September 2020, Rio de Janeiro city had approximately 17,000 deaths for Covid-19 and an average of 1,300 new infections per day [1]. The large numbers of infections demanded adaptations to make healthcare facilities suitable to Covid-19 patients, and such adaptations are not always a good fit to the multidisciplinarity of care [2-4]. Regular hospital wards have been turned into Covid-19 ICUs, and regular ICUs had to undergo adaptations to receive Covid-19 patients. In Brazil, new hospitals had to be built in very little time, and existing hospitals had to fit more beds in their already limited space. In some cases, equipment like ventilators and oxygenators, meant for single-person usage at a time, were improvised for usage by multiple patients.

During an usual 12-hour shift in a Covid-19 ICU, physiotherapists may have to carry out numerous intensive care procedures, such as the support to intubation, multiple pronations, ventilation, alveolar recruitment maneuvers, weaning, extubation, cardiopulmonary resuscitation, among others [5-7]. Due to the respiratory severity of patients and the constant risk of contamination, the work routine became more physically and emotionally stressful than usual.

Thus, good configuration of the workplace becomes increasingly important in maintaining the health of workers. For example, the space available for circulation, and the positioning of the beds, might impose severe harm to physiotherapists during procedures like pronations, and difficulties in performing such procedures increase the risk of death of patients, putting physiotherapists in emotional distress. As Brazil became the epicenter of Covid-19, its rapid spread, combined with increasing working hours in inadequate, risky and harmful workplaces, have been extremely demanding to health workers.

Although differently, public and private hospitals had to promote extraordinary efforts to cope with the large demands of the Covid-19 pandemic in Brazil. By analyzing the work in public and private ICUs in one of Brazil's largest cities, this article presents an analysis of risky and harmful aspects of the workplace based on the situations in which intensive care physiotherapists are exposed.

## Methods

### Study design

This study follows a quantitative design, and data collection using a structured questionnaire distributed electronically in a sample of intensive care physiotherapists working in Covid-19 ICUs in the city of Rio de Janeiro, Brazil. Regarding the nature of the data, the research follows quantitative analysis procedures.

All procedures of his study were performed in accordance with Brazilian regulations regarding scientific research with human subjects, and the study was approved by an Institutional Review Board (IRB) before data collection.

### Subjects

The questionnaire was sent to the e-mail addresses and text message applications of physiotherapists recruited from public and private healthcare professionals databases. Intensive care physiotherapists who, at any time during 2020, worked on the frontline of the Covid-19 pandemic in public or private hospitals were included as potential participants in this study.

Data collection with self-administered questionnaires took 30 days, from October 5 to November 4, 2020. The sample size estimated a proportion of 50%, with a sampling error of 6.5% and significance level 95% in a population of about 700 intensive care physiotherapists working on the front line of Covid-19 in the city of Rio de Janeiro. With these parameters, the minimum size required was 129 participants.

### Materials

The questionnaire contained only structured questions, organized in two sections. The first section aimed to characterize the participant's profile, which should include gender, age group, education level, length of experience and type of health facility in which he/she worked during the pandemic.

The second section was based on the variables described in the Brazilian Standard Procedures Regulation #17 (NR-17) [8], expressed in the ergonomic assessment tool EAMETA [9]: Space, Environment, Furniture, Equipment, Task and Activity. The EAMETA tool enables the participatory evaluation of working conditions including the perception of both ergonomists and practitioners in the assessment of the aspects of the workplace.

The questions adopted a 5-point Likert scale, where: 0 means "very bad", 1 means "bad", 2 means "neutral", 3 means "good", and 4 means "very good". The aspects evaluated in the questionnaire, organized according to the aspects to which they are related in EAMETA [9], are listed below:

- Space
- Area of circulation
- Visibility
- Signaling
- Total room area
- Environment
- Light
- Temperature

- Noise
- Ventilation
- Harmony and beauty
- Furniture
- Benches
- Chairs
- Cabinets
- Bathrooms
- Equipment
- Computer
- Bed
- Mechanical ventilator
- Monitors of vital signs
- Flow meters
- Infusion pumps

The following aspects of work activity were also informed by participants by choosing an option among a set of possible responses:

- Which procedures in treating Covid-19 patients were more overloading;
- Which parts of their body was mostly affected;
- If they experienced suffering/illness in the workplace during the pandemic;
- If they had to take leaves due to work injuries (due to Covid-19 or not).

## Procedures

Demographic variables were analyzed to outline the profile of the intensive care physiotherapist in coping with COVID-19 in the city of Rio de Janeiro. In addition, descriptive exploratory analyses of all variables were carried out, centered on Pearson's correlations, combining variables in order to arise possible relationships between working conditions and physiotherapists' health. The analyzes were performed with the support of Microsoft Excel and PSPP software.

## Results

### Demographic analysis

The questionnaire received 219 responses, however 72 were discarded for not being from the city of Rio de Janeiro, which was the targeted location. The 181 responses left met the sampling criteria, since it exceeds 129 responses. As for the age group, gender, experience and education, the 181 respondents from the Municipality of Rio de Janeiro are distributed according to [Table 1](#).

The majority of respondents (43.65%) are aged between 26 and 45 years. It is also clear that there is a predominance of female professionals (81.77%). As for experience in the field, the informants are very experienced, e.g., almost 9 years of experience in the field (average experience: 8.96 years). As for education, 27 professionals were limited to college education. All the rest have continued their studies, and most have specialization (74.59%). The sample profile is similar to the profile shown in recent studies, both in Brazil [[10,11](#)] and in other countries [[12,13](#)] composed mostly

**Table 1:** Frequency of responses by gender, age group, sex, experience and school education.

	Category	Male	Women	Total	%
<b>Age Group</b>	Up to 25-years-old	1	17	18	<b>9.94</b>
	Between 26 and 35-years-old	11	68	79	<b>43.65</b>
	Between 36 and 45-years-old	16	49	65	<b>35.91</b>
	Over 45-years-old	5	14	19	<b>10.50</b>
<b>Experience Time</b>	Up to 5 years	7	58	65	<b>35.91</b>
	Between 6 and 10 years	8	48	56	<b>30.94</b>
	Between 11 and 15 years	7	18	25	<b>13.81</b>
	Over 15 years	11	24	35	<b>19.34</b>
<b>Education</b>	College	5	22	27	<b>14.92</b>
	Specialization	23	112	135	<b>74.59</b>
	Master's Degree	5	10	15	<b>8.29</b>
	Ph.D.	0	4	4	<b>2.21</b>
<b>Type of Health Facility</b>	Works only in Field Hospitals	4	33	37	<b>20.44</b>
	Works only in Private Hospitals	3	17	20	<b>11.05</b>
	Works only in Public Hospitals	15	62	77	<b>42.54</b>
	Works in more than one type of Health Facility	9	35	44	<b>24.31</b>
	Others	2	1	3	<b>1.66</b>
<b>Total General</b>		<b>33</b>	<b>148</b>	<b>181</b>	<b>100</b>

by young and educated women.

Most respondents (42.54%) work only in public hospitals. In order to verify the influence of the working conditions of the types of health facilities on the physiotherapist's health, 44 responses were discarded, as the respondents worked in two or more types of health facility. In these cases, there would be no way to establish relationships of cause and effect between the type of health facility and the health of practitioners.

In addition, we discarded 3 responses where the respondents worked in primary care clinics, because of the specifics of this kind of health facility, e.g., in Brazil they do not host ICUs.

**Table 2** demonstrates that workers with little experience make up more than 50% of the group of respondents in field hospitals. The professional's experience seems to be higher, proportionally, in public and private hospitals. 77.92% and 70.27% of

**Table 2:** Participants by type of health unit.

	Category	Campaign	Private	Public	Total
<b>Age group</b>	Up to 25 years	8 (21.62%)	4 (20%)	4 (5.19%)	<b>16 (11.94%)</b>
	Between 26 and 35 years	10 (27.03%)	8 (40%)	36 (46.75%)	<b>54 (40.30%)</b>
	Between 36 and 45 years	16 (43.24%)	6 (30%)	25 (32.47%)	<b>47 (35.07%)</b>
	Over 45-years-old	3 (8.11%)	2 (10%)	12 (15.58%)	<b>17 (12.69%)</b>
<b>Experience time</b>	Up to 5 years	19 (51.35%)	8 (40%)	25 (32.47%)	<b>52 (38.81%)</b>
	Between 6 and 10-years-old	7 (18.92%)	7 (35%)	24 (31.17%)	<b>38 (28.36%)</b>
	Between 11 and 15-years-old	4 (10.81%)	2 (10%)	12 (15.58%)	<b>18 (13.43%)</b>
	Over 15-years-old	7 (18.92%)	3 (15%)	16 (20.78%)	<b>26 (19.40%)</b>
<b>Education</b>	Graduation	9 (24.32%)	7 (35%)	6 (7.79%)	<b>22 (16.42%)</b>
	Specialization	26 (70.27%)	10 (50%)	60 (77.92%)	<b>96 (71.64%)</b>
	Master's degree	2 (5.41%)	1 (5%)	9 (11.69%)	<b>12 (8.96%)</b>
	Doctorate	0 (0%)	2 (10%)	2 (2.60%)	<b>4 (2.99%)</b>
<b>Overall Total</b>		<b>37 (100%)</b>	<b>20 (100%)</b>	<b>77 (100%)</b>	<b>134 (100%)</b>

**Table 3:** Descriptive frequencies of responses.

	General (N = 134)		Campaign (N = 37)		Private (N = 20)		Public (N = 77)	
	Average	SD	Average	SD	Average	SD	Average	SD
Space - Circulation Area of the Bed	2.46	1.02	2.49	0.96	2.65	1.09	2.39	1.03
Space - Visibility	2.30	1.04	2.41	<b>0.83</b>	2.45	1.32	2.21	1.06
Space - Signage	2.30	1.00	2.22	0.85	2.65	1.09	2.25	1.04
Space - Total Bed Area	2.42	1.01	2.54	0.96	2.55	1.15	2.32	1.01
Environment - Light	<b>2.75</b>	<b>0.94</b>	2.97	0.87	2.95	<b>0.83</b>	<b>2.60</b>	0.98
Environment - Temperature	2.15	1.07	2.16	1.14	2.75	0.97	1.99	1.02
Environment - Noise	2.03	1.19	1.97	1.17	2.15	1.18	2.03	1.21
Environment - Ventilation	2.21	1.00	2.46	0.93	2.75	0.97	1.95	0.96
Environment - Harmony / Beauty	2.03	1.24	2.14	1.36	2.55	1.23	1.84	1.16
Furniture - Countertops	2.22	1.24	2.30	<b>1.47</b>	2.45	1.32	2.13	1.09
Furniture - Chairs	<b>1.95</b>	<b>1.17</b>	2.03	1.24	2.45	1.36	1.78	1.06
Furniture - Cabinets	2.04	1.19	2.22	1.34	2.20	1.32	1.91	1.07
Furniture - Bathrooms	<b>1.72</b>	<b>1.19</b>	<b>1.89</b>	1.24	2.35	1.42	<b>1.47</b>	1.03
Equipment - Computer	<b>2.26</b>	<b>1.30</b>	2.43	1.44	2.40	1.31	2.14	1.23
Equipment - Bed	2.01	1.17	2.38	1.32	2.40	1.43	1.73	0.93
Equipment - Mechanical Respirator	<b>2.72</b>	<b>0.91</b>	2.95	0.88	<b>3.15</b>	1.14	2.49	<b>0.79</b>
Equipment - Vital Signs Monitors	<b>2.78</b>	<b>1.02</b>	<b>3.14</b>	0.86	2.85	1.23	2.58	0.99
Equipment - Flow meters	2.71	1.05	3.00	0.85	2.85	1.18	2.53	1.08
Equipment - Infusion Pumps	2.38	1.28	2.86	1.06	<b>3.15</b>	0.99	1.95	<b>1.28</b>

respondents who work in public and field hospitals, respectively, have specialization degrees. The number of doctored physiotherapists in private hospitals (10%), proportionally, is much higher than in public (2.6%) and field hospitals (0%).

## Descriptive analysis

As the focus of this study was the effects of the workplace settings on physiotherapists, 47 responses were discarded as they did not allow to infer the relationship between the health facilities' conditions and the physiotherapist's health, because they referred to professionals who worked in more than one type of health facility. Thus, 134 responses underwent descriptive analysis, with the respondents distributed among 22 men and 112 women. [Table 3](#) shows the descriptive statistics.

The highest overall averages were assigned to the items "Equipment - Vital Signs Monitors" (2.78), "Environment - Light" (2.75) and "Equipment - Mechanical Respirator" (2.72). This indicates that the respondents, regardless of the type of hospital, evaluated this equipment and the lighting of the environment as the highest quality items available in the workplace when treating Covid-19 patients. It is worth noting that, in private hospitals, "Equipment - Mechanical Respirator" was the item with the highest average (3.15) along with "Equipment - Infusion pumps". In field hospitals, the item "Equipment - Vital Signs Monitors" also obtained an average above 3, indicating the quality of this equipment.

In general, the question about "Equipment - Mechanical Respirator" was the one with the lowest overall standard deviation (SD) (0.91), followed by "Environment - Light" (0.94). This may point to a consensus among respondents that the mechanical respirators and lighting available at Covid-19 ICUs have little difference between them, regardless of the private or public type of hospital.

The responses on vital sign monitors, despite having an average positive perception, did not obtain the same agreement, possibly indicating differences between the equipment for monitoring vital signs in ICUs in private and public hospitals. This is confirmed by the high average measured for this type of equipment in field hospitals (3.14) with a low SD (0.86); but a not so high average in public hospitals (average: 2.58; SD: 0.99).

The responses on "Furniture - Bathrooms" (average: 1.72/SD: 1.19) and "Furniture - Chairs" (average: 1.95/SD: 1.17) obtained the lowest averages, indicating a "bad" score. However, the high SD rates may be due to differences between public and private hospitals. It can be seen that both "Furniture - Bathrooms" and "Furniture - Chairs" only present slightly better averages in private hospitals. In public and field hospitals, the item "Furniture - Bathrooms" had the worst rating, 1.47

and 1.89, respectively.

The item "Equipment - Infusion pumps" received the best score among the items of private hospitals (3.15). However, in public hospitals, this item was scored "poor" (average: 1.95) with a large SD (1.28).

**Analyzing by construct, we have the following highlights:**

- **Space:** Scores above 2 in all types of health facilities, indicating a positive but not excellent perception.
- **Environment:** In private hospitals, the averages were above 2. In field hospitals, the only item below 2 was "Environment - Noise", which is explained by the fact that it is a hospital without walls between rooms, where the sound spreads more easily. In public hospitals, all items related to the environment obtained averages close to 2, except lighting, which was the best rated item in public hospitals.
- **Furniture:** Again, private hospitals scored above 2. The field hospitals have, as previously mentioned, a low perception of quality regarding bathrooms. And public hospitals only scored above 2 in the item referring to the benches. Lockers, chairs and bathrooms had averages below 2.
- **Equipment:** Field and private hospitals obtained all averages above 2.5, except for Computer and Bed, which obtained averages around 2.4. In public hospitals, the item that stood out most positively was "Equipment - Vital Signs Monitors", followed by "Equipment - Flowmeters". Both with an average above 2.5.

We can see in [Table 4](#) that the construct with the best score was Equipment, and the one with the lowest score was Furniture.

Checking Pearson's correlation between items referring to health facilities, all correlations showed positive values and significance at the 5% probability of error level. The greatest correlations found were:

- Between "Space - Area of Circulation of the Bed" and "Space - Total Area of the Bed" (0.866);
- Between "Equipment - Flowmeters" and "Equipment - Vital Signs Monitors" (0.838);
- Between "Furniture - Countertops" and "Furniture - Chairs" (0.833).

[Table 5](#) shows the most overloading procedures, and the most affected parts of physiotherapists' bodies, as well as the consequences they suffered. It presents the quantitative per health unit and gender of the participants.

Regarding the handling of patients in bed, the procedure which, according to the respondents, is more

**Table 4:** General assessment of constructs.

	<b>General</b> (N = 134)	<b>Campaign</b> (N = 37)			<b>Private</b> (N = 20)			<b>Public</b> (N = 77)		
	<b>Average</b>	<b>Average</b>			<b>Average</b>			<b>Average</b>		
Space	2.37	2.42			2.58			<b>2.29</b>		
Environment	2.23	2.34			2.63			2.08		
Furniture	<b>1.98</b>	<b>2.11</b>			<b>2.36</b>			<b>1.82</b>		
Equipment	<b>2.48</b>	<b>2.79</b>			<b>2.8</b>			2.24		

**Table 5:** Overloading physiotherapy procedures, affected body regions, consequences and suffering/illness.

		<b>General</b>			<b>Field</b>			<b>Private</b>			<b>Public</b>		
		11	1	10	3	0	3	0	0	0	8	1	7
<b>Most overloading procedures</b>	Passive kinesiotherapy	3	2	1	0	0	0	0	0	0	3	2	1
	Decubitus Change	5	0	5	0	0	0	0	0	0	5	0	5
	I have no difficulty in any conduct	1	0	1	0	0	0	0	0	0	1	0	1
	Other: Orthostatism	55	10	45	17	2	15	12	2	10	26	6	20
	Pronation	17	2	15	4	0	4	1	1	0	12	1	11
	Bed patient sedestation	42	7	35	13	2	11	7	0	7	22	5	17
	Transfer bed/chair	11	3	8	6	2	4	0	0	0	5	1	4
<b>Most affected body regions</b>	Cervical	1	0	1	0	0	0	0	0	0	1	0	1
	Elbows	1	1	0	1	1	0	0	0	0	0	0	0
	<b>General effort</b>	3	0	3	0	0	0	0	0	0	3	0	3
	Knees	93	12	81	26	1	25	17	2	15	50	9	41
	Lumbar	7	3	4	0	0	0	1	1	0	6	2	4
	Not applicable	11	2	9	1	0	1	2	0	2	8	2	6
	Shoulders	5	1	4	3	0	3	0	0	0	2	1	1
	Fists	1	0	1	0	0	0	0	0	0	1	0	1
	<b>Dorsal region</b>	1	0	1	0	0	0	0	0	0	1	0	1
	<b>All</b>	18	3	15	3	0	3	1	0	1	14	3	11
<b>Consequences suffered</b>	Medical leave (not due to COVID-19)	26	4	22	7	0	7	4	0	4	15	4	11
	Medical leave due to Covid-19	1	0	1	0	0	0	0	0	0	1	0	1
	Reduced workload	0	0	0	0	0	0	0	0	0	0	0	0
	Department reassignment	4	0	4	0	0	0	1	0	1	3	0	3
	Dismissal	85	15	70	27	4	23	14	3	11	44	8	36
	Not applicable	46	6	40	9	0	9	7	1	6	30	5	25
<b>Experienced suffering?</b>	Yes	88	16	72	28	4	24	13	2	11	47	10	37
	No	<b>134</b>	<b>22</b>	<b>112</b>	<b>37</b>	<b>4</b>	<b>33</b>	<b>20</b>	<b>3</b>	<b>17</b>	<b>77</b>	<b>15</b>	<b>62</b>
<b>Total</b>		11	1	10	3	0	3	0	0	0	8	1	7

overloading is the “Pronation” followed by the “Bed chair transfer”. This perception is the same regardless of the type of hospital, gender and experience. Of the 134 respondents, only 5 reported not having difficulty in any procedure. It is worth noting that they are all women, work in public hospitals and have less than 10 years of experience.

Regarding the affected body region, the lower back is the region most affected according to Covid-19 ICU

physiotherapists, followed by the cervical region and the shoulders. This perception is shared between most kinds of facilities and genders. This result is compatible with the most demanding procedures: “Pronation” and “Bed/chair transfer”.

With regard to the consequences arising from the experience of suffering/illness, it is evident at the end of October and beginning of November 2020, when the data were collected, that 34.84% (26 out of 134)

of professionals had to take medical leaves due to COVID-19. Other absences account for 24.12% of the reported consequences, as shown in [Table 5](#).

Despite the low perception of quality in the items referring to the constructs (Space, Environment, Furniture and Equipment), there were only 18 cases of absences that were not motivated by COVID-19. Of these cases, it is worth noting that 14 cases occurred in public hospitals (18.18% of the 77 respondents), a type of health facility where there was a concentration of items with less perception of quality. In the other types of health unit, the percentage of leave was 5% for private hospitals and 8.10% for field hospitals. With regard to cases of leave due to COVID-19, the distribution between types of health unit was practically homogeneous: 18.92% (7 cases) for field hospitals, 20% (4 cases) for private hospitals and 19.48% (15 cases) for public hospitals.

## Discussion

Naturally, public hospitals are more likely to experience large crowds of Covid-19 patients - as most Brazilians rely exclusively on the SUS - thus presenting more difficulties in adapting to the extraordinary demand brought by the pandemic. However, as the pandemic spreads uncontrollably in Brazil, private hospitals begin to struggle to cope with the increasing demands, and may be exposing their workers to similar risks and harmful situations when compared to public hospitals, despite their larger autonomy in negotiation with providers, ability to hire, and renewing their equipment.

Pronation is a procedure that has been performed extensively with Covid-19 patients in ICUs. Its complexity demands specific and adequate furniture, requires a considerable amount of space to enable practitioners proper performance, and the equipment and furniture must be well organized [14]. A prominent finding of this study is that such conditions were hardly found in both public and private hospitals, and harmful situations due to inadequate furniture were stated by many participants.

Some studies indicate that the role played by physiotherapists is traditionally seen as secondary in intensive care. This occurs both in normal situations and during crises such as the Covid-19 pandemic, although there has been some expansion of the role of physiotherapists in ICUs [15-19]. Some studies show that it is necessary to reinforce the multidisciplinary nature of intensive care, especially in the design of health facilities, as a way of promoting safe and comfortable environments, the provision of usable equipment and furniture, promoting the health of practitioners and reducing absenteeism [20-23].

Recent literature describes difficulties of physiotherapists in positioning patients in severe conditions with Covid-19 due to many factors, from the weight of the

patient and the severity of the case, to the organization of the workplace, or the lack of colleagues available to help the procedure. The exhaustion resulting from such difficulties, as well as the emotional distress of not being able to care for patients at risk of death has led to many leaves and resignations of workers - as occurred with one of the authors of the present paper.

One of the limitations of the scope of the present study was the non-inclusion of Personal Protective Equipment (PPE). This is essentially due to the fact that the focus of this research is the equipment for collective use, not individual use. In addition, the use and supply of PPE for tackling Covid-19 has already been extensively explored in recent literature.

Another limitation of the study is the fact that it is restricted to the evaluation of the existing components in the ICUs dedicated to coping with Covid-19, therefore, it is not intended to provide recommendations for the inclusion of new regular components in the workplace. Even so, the present study allows the identification of conducts and consequences resulting from the inadequacy of the ICUs to physiotherapists, allowing the elaboration of recommendations for readjusting the structure of ICUs in future works.

## Conclusions

Several organizations, both Brazilian and international, such as the World Confederation for Physical Therapy (WCPT), European Respiratory Society (ERS) and the Brazilian Federal Council of Physiotherapy and Occupational Therapy (COFITO), have published recommendations for intensive physical therapy in the treatment of by Covid-19 patients. However, the findings of the present study portray workplaces as unhealthy to physiotherapists, given the prevalence of the difficulty of carrying out the activities indicated in the handling protocols for Covid-19 patients [24,25].

For example, with the urgent need to assemble large structures as quickly as possible, the design of the field hospitals privileged the provision of the largest possible number of beds in the available spaces. It is also worth remembering that these hospitals started to be mobilized right at the beginning of the pandemic, in parallel with the elaboration of specific protocols, which led to a prioritization of medical conducts, already traditional in the design of ICUs, which do not necessarily meets the specific needs of physiotherapists [26].

Thus, the results of this study promote, through a greater understanding of the role of physiotherapists in the treatment of critically ill patients with Covid-19, how multidisciplinary health environments can be designed to guarantee the quality, safety and wellbeing at healthcare work in both private and public health facilities and, as a consequence, assistance in times of crisis, especially in large cities like Rio de Janeiro.

The present study showed the intensive care physiotherapist profile in the Covid-19 pandemic, and also highlighted the differences and similarities between the ICUs in the diverse types of health facilities involved in coping with the pandemic, and describes potential features of workplaces that influenced the activities, health and well-being of these professionals on the frontline of the new coronavirus. Thus, the present study provides evidence for the formulation of policies, the elaboration of protocols, as well as for the design of safe and comfortable environments for the work of intensive care assistance teams.

## References

- (2022) Cumulative confirmed COVID-19 deaths per million people.
- Arnaout O, Patel A, Carter B Chiocca EA (2020) Letter: Adaptation under fire: Two Harvard neurosurgical services during the COVID-19 pandemic, *Neurosurgery* 87: E173-E177.
- Auerbach A, O'Leary KJ, Greysen SR, Harrison JD, Kripalani S, et al. (2020) Hospital ward adaptation during the COVID-19 pandemic: A national survey of academic medical centers. *J Hosp Med* 15: 483-488.
- Gopaul U, Manie S, Amosun SL (2020) Is physiotherapy ready for the management of COVID-19 in Africa? - Snippets of anecdotal evidences in two African countries. *Physiother Res Int* 25: e1847.
- Giusti EM, Pedroli E, D'Aniello GE, Stramba Badiale C, Pietrabissa G, et al. (2020) The psychological impact of the COVID-19 outbreak on health professionals: A cross-sectional study. *Front Psychol* 11.
- Ornell F, Halpern SC, Kessler FHP, de M. Narvaez JC (2020) The impact of the COVID-19 pandemic on the mental health of healthcare professionals. *Cad Saúde Pública* 36: e00063520.
- Zerbini G, Ebigbo A, Reicherts P, Kunz M, Messman H (2020) Psychosocial burden of healthcare professionals in times of COVID-19 - A survey conducted at the University Hospital Augsburg. *Ger Med Sci* 18.
- de Melo Pinto N, Quaresma MM, Hatakeyama K (2017) Machine-Man-Task system approach and regulatory standard NR 17-Ergonomics, in advances in social & occupational ergonomics. RHM. Goossens, Springer International Publishing, Cham, 355-368.
- Jatobá A, Bellas HC, Bonfatti R, Burns CM, Vidal MCR, et al. (2016) Designing for patient risk assessment in primary health care: A case study for ergonomic work analysis. *Cogn Technol Work* 18: 215-231.
- Alves FAD, de Oliveira BC, dos Santos FC, do Nascimento Matta RE, Silva HGN, et al. (2020) Perfil dos fisioterapeutas nas unidades de terapia intensiva adulto. *Rev Eletrônica Acervo Saúde* 55: e4068-e4068.
- Rocha AR, Costa RR, Toledo TR, Erickson JR (2012) Perfil de formação profissional dos fisioterapeutas das unidades de terapia intensiva da cidade de Maceió, *Cardiorespir. Physiother Crit Care Rehabil* 3: 21-30.
- Denehy L, Berney S (2006) Physiotherapy in the intensive care unit. *Phys Ther Rev* 11: 49-56.
- Onyeso OKK, Umunnah JO, Ezema CI, Anyachukwu CC, Nwankwo MJ, et al. (2020) Profile of practitioners, and factors influencing home care physiotherapy model of practice in Nigeria. *Home Health Care Serv Q* 39: 168-183.
- Thomas P, Baldwin C, Bissett B, Boden I, Gosselink R, et al. (2020) Physiotherapy management for COVID-19 in the acute hospital setting: Clinical practice recommendations. *J Physiother* 66: 73-82.
- Abaraogu UO, Ezema CI, Nwosu CK (2017) Job stress dimension and work-related musculoskeletal disorders among southeast Nigerian physiotherapists. *Int J Occup Saf Ergon* 23: 404-409.
- Abdullahi A, Bello B, Mukhtar NB, Kaka B, Abba MA, et al. (2020) Physiotherapy management of COVID-19 in Africa: Ongoing efforts, challenges, and future directions. *Physiother Theory Pract* 36: 871-872.
- Bhat A, Vasanthan LT, Samuel Babu A (2017) Role of physiotherapy in weaning of patients from mechanical ventilation in the Intensive Care Unit. *Indian J Respir Care* 6: 813-819.
- Haines KJ, Berney S (2020) Physiotherapists during COVID-19: Usual business, in unusual times. *J Physiother* 66: 67-69.
- Lino JA, Frota LGCG, Abdon APV, Cavalheri V, Mont'Alverne DGB, et al. (2021) Sleep quality and associated factors amongst Brazilian physiotherapists during the COVID-19 pandemic. *Physiother Theory Pract* 17: 1-9.
- Agnoletti V, Russo E, Circelli A, Benni M, Bolondi G, et al. (2021) From intensive care to step-down units: Managing patients throughput in response to COVID-19. *Int J Qual Health Care* 33.
- Aiken LH, Sloane DM, Clarke S, Poghosyan L, Cho E, et al. (2011) Importance of work environments on hospital outcomes in nine countries. *Int J Qual Health Care* 23: 357-364.
- Costa N, Bellas H, da Silva PRF, de Carvalho PVR, Uhr D, et al. (2021) Community health workers' attitudes, practices and perceptions towards the COVID-19 pandemic in Brazilian low-income communities. *Work* 68: 3-11.
- Persson SS, Lindström PN, Pettersson P, Andersson I (2018) Workplace relationships impact self-rated health: A survey of Swedish municipal health care employees. *Work* 60: 85-94.
- Nodooshan HS, Choobineh A, Razeghi M, Khales TSN (2017) Designing, prototype making and evaluating a mechanical aid device for patient transfer between bed and stretcher. *Int J Occup Saf Ergon* 23: 491-500.
- de SC Calvo D, Ferreira JA, Cunha DM, Mendes DP (2020) Risk management and the complexity of the right to refuse dangerous work in the context of hospital care: Preliminary issues. *Work* 67: 655-664.
- Pegorari MS, Ohara DG, Matos AP, Iosimuta NCR, Ferreira VTK, et al. (2020) Barriers and challenges faced by Brazilian physiotherapists during the COVID-19 pandemic and innovative solutions: Lessons learned and to be shared with other countries. *Physiother Theory Pract* 36: 1069-1076.