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FACTORS ASSOCIATED WITH THE ILLNESS OF NURSING PROFESSIONALS IN THE COVID-19 PANDEMIC IN A UNIVERSITY HOSPITAL

FATORES ASSOCIADOS AO ADOECIMENTO DE PROFISSIONAIS DE ENFERMAGEM NA PANDEMIA COVID-19 EM UM HOSPITAL UNIVERSITÁRIO

FACTORES ASOCIADOS A LA ENFERMEDAD DE PROFESIONALES DE ENFERMERÍA EN LA PANDEMIA DE COVID-19 EN UN HOSPITAL UNIVERSITARIO

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ABSTRACT

Objective: To evaluate the factors associated with COVID-19 illness among nursing professionals who provide care in the context of the pandemic at a University Hospital in the interior of Minas Gerais. **Method**: This is a quantitative, cross-sectional study carried out with nursing professionals between August 2020 and January 2021, using a non-probabilistic sample established for convenience. Nurses, technicians and nursing assistants were included, and professionals who were not working on the front line, who had already been vaccinated or who were on leave were excluded. **Results**: The results indicate a rate of 30.4% of nursing professionals affected by COVID-19. In addition, there was a shortage of personal protective equipment (PPE) and most of the clinical manifestations were mild. **Conclusion**: The variables gender, number of people in the same household affected by COVID-19 and sector of work were associated with professionals becoming ill, but future research is recommended to investigate other factors associated with the disease.

Descriptors: Nursing. COVID-19. Work conditions. Occupational Health Nursing.

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RESUMO

Objetivo: Avaliar os fatores associados ao adoecimento por COVID-19 dos profissionais de enfermagem que prestam assistência no contexto da pandemia em um Hospital Universitário no interior de Minas Gerais. **Métodos:** Estudo quantitativo, de corte transversal, desenvolvido com profissionais de enfermagem, entre agosto de 2020 a janeiro de 2021, utilizando amostra não probabilística, estabelecida por conveniência. Foram incluídos enfermeiros, técnicos e auxiliares de enfermagem e excluídos profissionais não atuantes na linha de frente, que já haviam sido vacinados ou que estavam afastados. **Resultados:** Os resultados apontam o índice de 30,4% de profissionais de enfermagem acometidos pela COVID-19. Além disso, foi relatada a escassez de equipamentos de proteção individual (EPIs) e a maioria das manifestações clínicas foram leves. **Conclusão:** As variáveis sexo, número de pessoas no mesmo domicílio acometidas pela COVID-19 e setor de trabalho, estiveram associadas ao adoecimento dos profissionais, porém, recomendam-se futuras pesquisas para investigar outros fatores associados à doença.

Descritores: Enfermagem. COVID-19. Condições de Trabalho. Enfermagem em Saúde do Trabalhador.

RESUMEN

Objetivo: Evaluar los factores asociados a la enfermedad por COVID-19 entre profesionales de enfermería que prestan asistencia en el contexto de la pandemia en un Hospital Universitario del interior de Minas Gerais. **Métodos:** Estudio cuantitativo, transversal, desarrollado con profesionales de enfermería, entre agosto de 2020 y enero de 2021, utilizando una muestra no probabilística, establecida por conveniencia. Se incluyeron enfermeros, técnicos y auxiliares de enfermería, y se excluyeron los profesionales que no trabajaban en primera línea, que ya habían sido vacunados o que se encontraban en excedencia. **Resultados:** Los resultados apuntan a un índice del 30,4% de profesionales de enfermería afectados por COVID-19. Además, se reportó escasez de equipo de protección personal (EPP) y la mayoría de las manifestaciones clínicas fueron leves. **Conclusión:** Las variables género, número de personas en un mismo hogar afectadas por COVID-19 y sector de trabajo se asociaron con la enfermedad de los profesionales, sin embargo, se recomienda mayor investigación para investigar otros factores asociados a la enfermedad.

Descriptores: Enfermería. COVID-19. Condiciones de trabajo. Enfermería de Salud Ocupacional.

INTRODUCTION

In March 2020, the World Health Organization (WHO) declared COVID-19 a pandemic. The acronym "COVID" derives from *Corona Virus* Disease, while "19" relates to the year 2019, when the first cases of pneumonia associated with the SARS-CoV-2 virus appeared in the Chinese city of Wuhan. SARS-CoV-2 is the name of the etiological agent that causes COVID-19, a highly contagious disease with an estimated lethality rate of 2.9%.[1]

The routine use of the equipment needed to care for patients infected with SARS-CoV-2 imposes a variety of physiological and psychological stressors that can impair the performance of healthcare professionals. Breathing effort, reduced field of vision, muffled speech making communication difficult, reduced

manual dexterity, physical and mental fatigue, as well as stress caused by hot clothing, difficulty in dressing and undressing.[2] Other variables that have had an impact on the health of healthcare workers during the COVID-19 pandemic are psychological distress manifested by generalized anxiety disorder, sleep disorders, fear of falling ill and of contaminating colleagues and family members.[3]

Nursing is the largest health professional category, with a fundamental role in prevention, care and effective responses to COVID-19. It acts from the screening of suspects, collects material for tests, advises on isolation, is on the front line in complex cases of infected patients requiring hospitalization, in addition to developing actions in health education, management and management, teaching and research.[4]

The COVID-19 pandemic has highlighted the effects of precariousness in the health sector, such as the psychological suffering of nursing workers due to the shortage of personal protective equipment, the lack of efficient protocols and flows for effective infection control, long working hours, inadequate training for the current scenario and uncertainties regarding therapeutic measures.[5]

Considering the current context produced by the COVID-19 pandemic, the possible precariousness of working conditions and the impacts caused on the health of nursing professionals, the following research question arises: What are the factors associated with the illness of nursing professionals in the care of patients with COVID-19 (suspected or confirmed) in a University Hospital in the interior of Minas Gerais? In order to answer this question, this study aims to assess the clinical, sociodemographic and work-related factors associated with COVID-19 illness among nursing professionals who provide care in the context of the pandemic at a University Hospital in the interior of Minas Gerais.

METHOD

This is a quantitative, cross-sectional study carried out with nursing professionals between August 2020 and January 2021. The research was carried out at a University Hospital in the interior of Minas Gerais, where health services are offered, from outpatient procedures to highly complex surgeries, maintaining exclusive care for patients of the Unified Health System (SUS). It has a multidisciplinary team made up of qualified professionals from various areas of health, as well as professors, technicians, residents and students from the areas of health, and is a teaching, research and

knowledge-producing hospital, always focused on humanized care. [6]

The study sample was non-probabilistic, established for convenience. Nurses, technicians and nursing assistants working in health care during the data collection period were included. Data collection was limited to January 2021, considering that this is the month in which the widespread vaccination of health professionals begins in Brazil. Professionals who were not working on the front line, who partially answered the data collection form, who had already been vaccinated or who were away from their care duties for any reason were excluded.

The *Research Electronic Data Capture* (REDCap) platform was used to draw up the script, collect and organize the data. The data was collected online with the survey link or by *QR-code, in which the* interviewees were recruited via institutional email, approaches to workplaces and bulletin boards in the institutions. The dependent variable was the occurrence or non-occurrence of COVID-19 and the independent variables were the sociodemographic, clinical and work-related factors of nursing professionals working in hospitals.

The variables related to sociodemographic factors were: gender (female, male); age group (up to 40 years, 41 years or more); marital status (with partner, without partner); skin color (white, black, yellow, brown); individual monthly income in minimum wages (1 to 3 minimum wages, 4 to 6 minimum wages, 7 to 9 minimum wages and 10 or more minimum wages); family monthly income in minimum wages (1 to 3 minimum wages, 4 to 6 minimum wages, 7 to 9 minimum wages and 10 or more minimum wages); number of people living in the household (up to one, two or three, four or more); number of people in the household with COVID-19 (zero, one, two or more) and whether the professional has moved house (yes, no).

With regard to clinical variables, they considered: risk group (no, yes); cardiovascular disease (no, yes); respiratory disease (no, yes); diabetes (no, yes); pregnant women (no, yes); age over 60 (no, yes); smoking (no, yes); obesity (no, yes).

The work variables of the nursing professionals were categorized as follows: professional category (nurse, nursing assistant and technician); work sector (outpatient clinic, surgical center, material and sterilization center, therapeutic diagnostic support unit, adult inpatient units, clinical and coronary intensive care and other); working in the COVID-19 sector (yes, no); working hours (30 hours a week, 36 hours a week, 40 hours a week); COVID-19 training (yes, no); mental health support

(yes, no, can't say); working in another health institution (yes, no).

Regarding exposure to occupational risk factors among nursing professionals, the following variables were used: public transportation (yes, no); transportation by private car (yes, no); lack of PPE (yes, no); lack of PPE: surgical mask (yes, no); lack of PPE: N95/PFF2 (yes, no); lack of PPE: face shield:(yes, no); lack of PPE: goggles (yes, no); lack of PPE: waterproof apron (yes, no); lack of PPE: waterproof apron with cap (yes, no); lack of PPE: non-disposable, non-waterproof apron (yes, no); lack of PPE: waterproof fabric apron (yes, no); lack of PPE: procedure glove (yes, no); lack of PPE: sterile glove (yes, no).

In addition, we characterized the clinical manifestations of COVID-19 in the participants who had the disease, the clinical repercussions 30 days after infection with the virus, and the occupational repercussions of the pandemic, whether or not they were absent from work due to the COVID-19 diagnosis.

A descriptive analysis of sociodemographic, clinical and work-related variables was carried out using absolute and relative frequencies. For the hypothesis tests, the outcome was the occurrence of COVID-19 in the participants. The chi-square test was used or Fisher's exact test when the chi-square assumptions were not met.

The final version of the database was transferred from Microsoft Excel ® to Stata software version 15.0, in which the analyses were carried out at a 95% confidence level ($p < 0.05$). The research was started after approval by the Human Research Ethics Committee, under Certificate of Submission for Ethical Appraisal (CAAE) 33982220.2.1001.5133 and opinion n. 4.414.831 and no sources of public or private funding were used, with the costs of the research being the full responsibility of the researcher.

RESULTS

The study included 138 nursing professionals, including nurses, technicians and nursing assistants. There was a predominance of female participants (78.9%), aged up to 40 (65.9%), white (47.8%), who had a partner (68.8%), income/month between four and six minimum wages (46.4%) and who lived in the same environment with two or three people (51.4%).

Considering the occurrence of COVID-19 in the study sample, the rate of affected nursing professionals was 30.4%. Gender and the number of people in the same household affected by COVID-19 were associated with the disease in nursing professionals. With regard to moving house,

6 participants (4.3%) reported that they had moved house due to the pandemic (Table 1).

Table 1 - Sociodemographic characterization of the nursing professionals participating in the study (n=138)

Variables	Occurrence of COVID-19 n (%)	No occurrence of COVID-19 n (%)	p-value†
Gender			
Female	38 (34,86)	71 (65,14)	0,028†
Male	4 (13,79)	25 (86,21)	
Age group			
Up to 40 years old	28 (30,77)	63 (69,23)	0,905†
41 or more	14 (29,79)	33 (70,21)	
Marital status			0,741†
With a partner	25 (29,41)	60 (70,59)	
Without a partner	17 (32,08)	36 (67,92)	
Skin color			
White	21 (31,82)	45 (68,18)	0,859‡
Black	11 (32,35)	23 (67,65)	
Yellow	0	1 (100,00)	
Brown	10 (27,03)	27 (72,97)	
Individual monthly income			
1 to 3 MW	16 (41,03)	23 (58,97)	
4 to 6 MW	16 (25,00)	48 (75,00)	0,383‡
7 to 9 MW	8 (30,77)	18 (69,23)	
10 or more MW	2 (25,00)	6 (75,00)	
Monthly family income			
1 to 3 MW	9 (45,00)	11 (55,00)	0,455†
4 to 6 MW	14 (28,00)	36 (72,00)	
7 to 9 MW	8 (25,00)	24 (75,00)	
10 or more MW	10 (29,41)	24 (70,59)	
People in the household			
Even a	12 (35,29)	22 (64,71)	
Two or three	19 (26,76)	52 (73,24)	0,618†
Four or more	11 (33,33)	22 (66,67)	
People in the household with COVID-19			
Zero	1 (1,04)	95 (98,96)	<0,00‡
One	33 (97,06)	1 (2,94)	

Two or more	8 (100,00)	0	
Changed residence			
Yes	3 (50,00)	3 (50,00)	0,293‡
No	39 (29,77)	92 (70,23)	

† Chi-square test. ‡ Fisher's exact test. MW= Minimum wage.

Regarding the clinical variables related to risk for COVID-19, the majority, 109 (78.9%) of the nursing professionals, reported not belonging to any risk group. However, 10 (7.2%) had cardiovascular diseases and 7 (5%) respiratory diseases, both of which were the most frequent among the risk factors reported (Table 2).

Table 2 - Clinical characterization of nursing professionals participating in the study according to risk factors for COVID-19 (n=138)

Variables	Occurrence of COVID-19 n (%)	No occurrence of COVID-19 n (%)	p-value
Risk group			
Yes	4 (13,79)	25 (86,21)	0,028†
No	38 (34,86)	71 (65,14)	
Cardiovascular disease			
No	41 (32,03)	87 (67,97)	0,145‡
Yes	1 (10,00)	9 (90,00)	
Respiratory disease			
No	40 (30,53)	91 (69,47)	0,912‡
Yes	2 (28,57)	5 (71,43)	
Diabetes			
No	41 (30,15)	95 (69,85)	0,545‡
Yes	1 (50,00)	1 (50,00)	
Pregnant women			
No	42 (30,66)	95 (69,34)	0,507‡
Yes	0	1 (100,0)	
Over 60 years old			
No	42 (30,66)	95 (69,34)	0,507‡
Yes	0	1 (100,0)	
Smoking			
No	42 (32,06)	89 (67,94)	
Yes	0	7 (100,0)	0,072‡

Obesity			
No	40 (29,63)	95 (70,37)	0,168‡
Yes	2 (66,67)	1 (33,33)	

† Chi-square test. ‡ Fisher's exact test.

As for work aspects, the majority (55%) were nursing assistants and technicians, about a third of the professionals (29.7%) worked in the exclusive area for COVID-19 patients, with a working day of 36 hours (86.9%), working in only one institution (83.0%). The majority (81.9%) of professionals reported having received training to care for COVID-19 patients. In addition, with regard to the provision of mental health support, 77.5% responded positively, while 16.7% of the sample were unable to confirm whether the institution provided this service. The work sector variable was found to be associated with the occurrence of COVID-19 (Table 3).

Table 3 - Work characterization of the nursing professionals participating in the study (n=138)

Variables	Occurrence of COVID-19 n (%)	No occurrence of COVID-19 n (%)	p-value
Professional category			
Nurse	20 (32,26)	42 (67,74)	0,674†
Nursing assistant and technician	22 (28,95)	54 (71,05)	
Work sector			
Outpatient	1 (10,00)	9 (90,00)	
Surgical Center	11 (68,75)	5 (31,25)	
Material and Sterilization Center	2 (33,33)	4 (6,66)	
Therapeutic Diagnostic Support	3 (60,00)	2 (40,00)	
Adult Inpatient Unit	13 (31,71)	28 (68,29)	0,013‡
Clinical Intensive Care	3 (16,67)	15 (83,33)	
Coronary Intensive Care	1 (100,0)	0	
Other	11 (26,82)	30 (73,18)	
COVID-19 unit performance			
Yes	13 (31,71)	28 (68,29)	0,833†
No	29 (29,90)	68 (70,10)	
Working hours			

30 hours per week	6 (46,15)	7 (53,85)	0,371‡
36 hours per week	34 (28,33)	86 (71,67)	
40 hours per week	2 (40,00)	3 (60,00)	
Received training			
Yes	35 (30,97)	78 (69,03)	0,770†
No	7 (28,00)	18 (72,00)	
Mental health support			
Yes	35 (32,71)	72 (67,29)	0,431‡
No	1 (12,50)	7 (87,50)	
I can't say	6 (26,09)	17 (73,91)	
Works at another institution			
Yes	10 (43,48)	13 (56,52)	0,136†
No	32 (27,83)	83 (72,17)	

† Chi-square test. ‡ Fisher's exact test

With regard to exposure to occupational risk factors, the majority (68.1%) used private transportation to get to work. With regard to PPE, 25 (18.1%) of the professionals reported a lack of it, mainly in relation to surgical masks (10.1%), N95 / PFF2 masks (13.0%) and waterproof aprons (7.2%). No association was found between the variables exposure to risk factors and the occurrence of COVID-19 among professionals (Table 4).

Table 4 - Characterization of exposure to occupational risk factors among nursing professionals participating in the study (n=138).

Variables	Occurrence of COVID-19 n (%)	No occurrence of COVID-19 n (%)	p-value
Transportation: public			
No	31 (28,18)	79 (71,82)	0,254†
Yes	11 (39,29)	17 (60,71)	
Transportation: private car			
No	15 (34,09)	29 (65,91)	0,523†
Yes	27 (28,72)	67 (71,28)	
Lack of PPE			
Yes	7 (28,00)	18 (72,00)	0,873†
No	35 (31,53)	76 (68,47)	
Lack of surgical mask			
Yes	4 (28,57)	10 (71,43)	0,221†
No	38 (30,65)	86 (69,35)	

Lack of N95/PFF2			
Yes	4 (22,22)	14 (77,78)	0,417†
No	38 (31,67)	82 (68,33)	
Lack of face shield			
Yes	0	4 (100,0)	0,179‡
No	42 (31,34)	92 (68,66)	
Lack of safety goggles			
Yes	0	4 (100,0)	0,179‡
No	42 (31,34)	92 (68,66)	
Lack of waterproof apron			
Yes	3 (30,0)	7 (70,0)	
No	39 (30,47)	89 (69,53)	0,975‡
Lack of waterproof apron with cap			
Yes	1 (33,33)	2 (66,67)	
No	41 (30,37)	94 (69,63)	0,912‡
Lack of non-disposable, non-waterproof apron			
Yes	0	1 (100,0)	0,507‡
No	42 (30,66)	95 (69,34)	
Lack of waterproof fabric apron			
Yes	1 (33,33)	2 (66,67)	
No	41 (30,37)	94 (69,63)	0,912‡
Lack of procedure gloves			
Yes	1 (33,33)	2 (66,67)	
No	41 (30,37)	94 (69,63)	0,912‡
Lack of sterile gloves			
Yes	1 (50,00)	1 (50,00)	0,545‡
No	41 (30,15)	95 (69,85)	

† Chi-square test. ‡ Fisher's exact test.

Of the 138 professionals who took part in the study, 42 (30.5%) contracted COVID-19. For these, the six main clinical manifestations reported were: cough (40.48%), anosmia (30.95%), ageusia (30.95%), tiredness (42.86), myalgia (35.71) and headache (45.24%). When asked about the number of symptoms manifested, 19 (42.24%) reported having had four or more symptoms of the disease at the same time, however, 22 (52.38%) were mild manifestations. In addition, 13 (30.95%) said they had been mentally ill as a result of caring for people affected by COVID-19.

In addition, most of the clinical manifestations regressed thirty days after they began. However, at the time of collection, 8 (19.05%) nursing professionals reported still having clinical repercussions. As for the repercussions on work, 28 (68.3%) were absent from work after diagnosis, for more than ten days (53.57%).

DISCUSSION

This study found that the participants were predominantly white, married and middle-class women. Corroborating this result, another study carried out in a large Brazilian hospital found that the majority of frontline professionals were women with a technical degree in nursing.[7]

The gender variable was associated with the occurrence of COVID-19 in nursing professionals. A study carried out by Ten-Caten[8] with a multidimensional analysis of millions of records of laboratory parameters and diagnostic tests for COVID-19 showed an increase in inflammation biomarkers, such as C-reactive protein (CRP) and ferritin, especially in older men diagnosed with COVID-19, while other markers were common in various age groups and between men and women.

Still on the relationship of the gender variable associated with the occurrence of COVID-19 in nursing professionals, the World Health Organization presented that estimates made over a period of 24 months (2020 and 2021) confirm that the worldwide number of deaths was higher for men than for women (57% of males and 43% of females) and higher among older people.[9]

With regard to the occurrence of COVID-19, the rate of affected nursing professionals was almost 1/3 of those interviewed. There is a higher prevalence of SARS-CoV-2 infection among health professionals compared to the general population, a difference that could be attributed to the exposure that health professionals suffer in the workplace. [10]

In the run-up to the mass vaccination against COVID-19, the contamination rate among frontline workers, especially nursing staff, was high.[11] Although it is not possible to establish a direct cause and effect relationship, nursing staff, as they provide direct and constant care to patients affected by COVID-19, are considered to be more susceptible than other professionals. [12]

This study found that the work sector variable was associated with the occurrence of COVID-19 in nursing professionals. A retrospective study carried out in a hospital in Wuhan with 72 nurses found that professionals working in respiratory, infection, intensive care units (ICU), surgical departments or who perform interventional medical or surgical procedures that generate respiratory aerosols,

called high-risk sectors, are 2.13 times more at risk of developing COVID-19 compared to professionals working in other low-risk areas, called general groups (crude RR = 2.13, 95% CI: 1,45-3,95, *P <0,05*). [13]

With regard to labor aspects, most of the professionals were nursing assistants and technicians, most worked in the exclusive sector for COVID-19 patients, had a 36-hour workday, worked in only one institution, had training to deal with COVID-19 patients and mental support. A nationwide survey carried out by Fiocruz found some contrasting data to the findings of our survey, where the pandemic has changed the lives of 95% of workers, 50% admitted to overwork with working hours exceeding 40 hours a week and 45% need more than one job to survive. They also reported the fear of self-contamination at work, the lack of an adequate structure for carrying out activities, inefficient hospitalization flows and a lack of technical training to deal with the pandemic.[14]

Although the variable exposure to risk factors was not associated with the occurrence of COVID-19 among nursing professionals in this study, shortages of surgical masks, N95/PFF2 masks and waterproof aprons were cited during the pandemic. In this sense, it is worth highlighting the Inspection Reports released in 2020 by the COFEN System, which brought together 4598 complaints that pointed to insufficient supply of PPE and undersizing of teams as the biggest problems faced at the beginning of the pandemic in Brazil. [15]

The shortage of equipment was a reality faced worldwide, due to the high number of hospitalizations and a disproportion between forecasting and supply. A dysfunctional budgeting model was detected in hospital operating systems linked to minimizing costs rather than maintaining adequate stocks. They conclude that the pandemic has generated a major clash between demand and availability, as well as government failures in the distribution of stocks and increased costs due to restrictions on the export of PPE worldwide.[16]

Of the health professionals interviewed, most report not belonging to any risk group for COVID-19, but some have cardiovascular and respiratory diseases. A UK cross-sectional survey of 16,749 patients hospitalized with COVID-19 showed that the risk of death is higher in patients with heart, lung and kidney disease. [17]

With regard to pulmonary diseases, as comorbidities and risk factors related to COVID-19 deaths, SARS-CoV-2 has a high potential to cause pulmonary thromboembolism, acute respiratory distress

syndrome (ARDS), respiratory and systemic symptoms. [18]

The relationship between cardiovascular disease and COVID-19 is highly complex, which has led to various positions being put forward by the Brazilian Society of Cardiology (SBC) to better process this issue, such as guidelines for cardiopulmonary resuscitation of patients with a diagnosis or suspicion of this disease, the use of antiplatelets and anticoagulants and cardiovascular rehabilitation. A history of cardiovascular disease is associated with an almost five-fold increase in mortality rates related to COVID-19. [19]

With regard to kidney disease and COVID-19, there is a correlation of greater kidney impairment in patients undergoing hospital treatment for SARS-CoV-2 infection. The risk of infection is increased by the comorbidities related to kidney disease, added to the need to acquire treatment in collective environments where there is interpersonal contact during the journey between home and the clinics where dialysis procedures and their care are carried out. [20]

With regard to the mental illness of the professionals, around 31% of the participants reported having some kind of mental disorder. Depression and anxiety are prevalent conditions among health professionals, and nurses are the health professionals most prone to these illnesses. The study also found that women are more likely to develop them than men and that the age group between 30 and 39 had the highest prevalence of depression and anxiety.[4]

With regard to the clinical manifestations reported by participants who had been infected with SARS-CoV-2, cough, anosmia, ageusia, tiredness, myalgia and headache were most frequently cited. Most of the participants had four or more symptoms at the same time, and these manifestations were mild. It should be noted that during data collection, some nursing professionals reported that they were still experiencing clinical repercussions from COVID-19, a result also found by another study which revealed that 87.4% of patients persisted with one or more post-COVID symptoms, with the presence of fatigue, dyspnea, joint pain and chest pain being reported. Another worrying issue is the likelihood of mental health problems, as mentioned above, not only as a result of the pandemic, such as social isolation or emotional overload, but also as a result of the infection itself. [12]

The study revealed significant implications for nursing and other health professions. The percentage of 30.4% of nursing professionals affected by COVID-19, together with reports of a shortage of PPE,

highlights the lack of infrastructure, preparation and organization in dealing with a pandemic. This highlights the urgent need for strategic government planning and adequate investment to guarantee the protection of health professionals during the performance of their duties, with a view to preserving the health and safety of these essential professionals.

In addition, it is essential to provide adequate support for the mental health of these professionals, considering the psychological impact of the high workload and the adversities faced in the context of the pandemic.

CONCLUSION

The study assessed the clinical, sociodemographic and work-related factors associated with COVID-19 illness among nursing professionals providing care in the context of the pandemic at a University Hospital in the interior of Minas Gerais.

It was found that only gender, the number of people in the same household affected by COVID-19 and the sector of work were associated with the illness of these professionals. However, it is important to note that the research identified a consistency between the results and the studies available in the literature, considering that COVID-19 is a recently discovered disease that is still being dealt with.

One limitation is that this is a cross-sectional study which looks at data in a specific context. In addition, the study was carried out in only one Brazilian health institution and the answers were obtained through a self-report questionnaire, which contributes to subjective bias in the answers obtained.

It is recommended that future research be conducted to investigate other factors associated with the disease and over time, in order to deepen our understanding of the problem.

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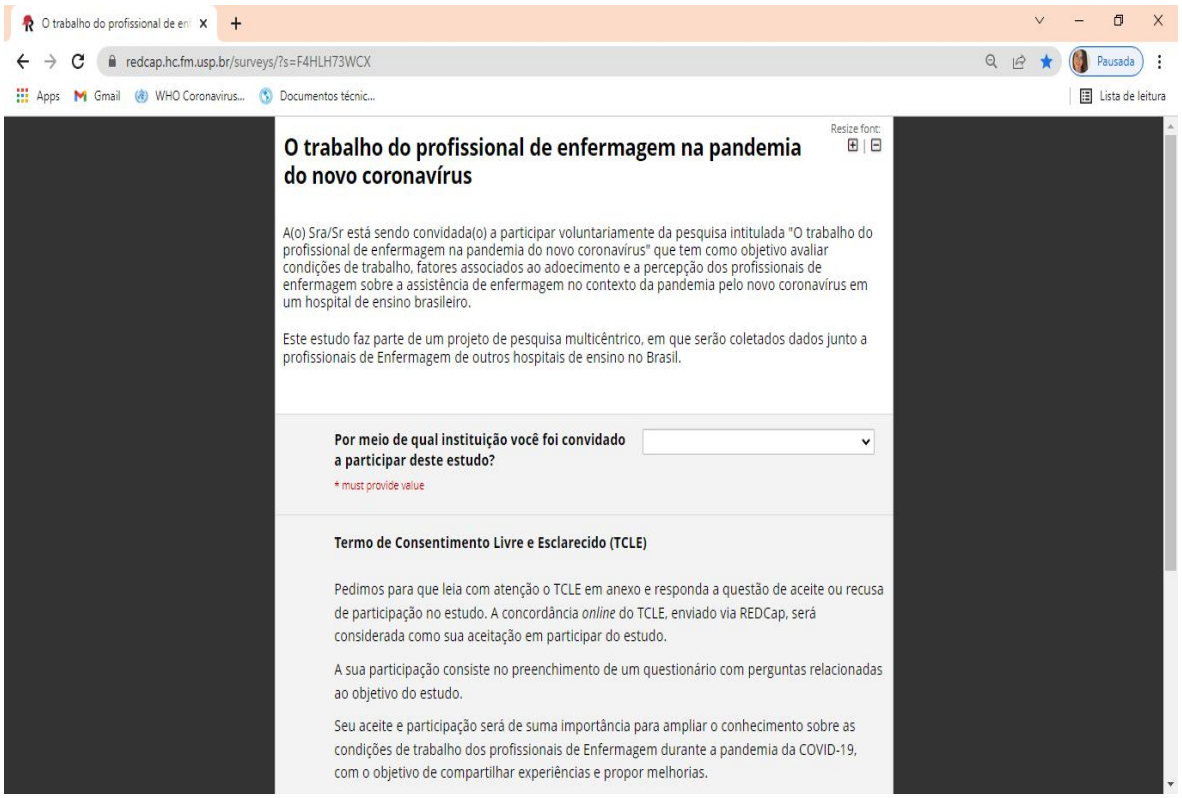
APPENDIX A - Data Collection Questionnaire

Search link: https://redcap.hc.fm.usp.br/surveys/?s=F4HLH73WCX



PART 1 - Sociodemographic data
Gender: ( ) Female ( ) Male ( ) Prefer not to answer
Date of birth: __/__/____
Marital status: ( ) With partner ( ) Without partner
Religion: ( ) Yes. Which one?_____ ( ) No ( )I prefer not to answer
Color/race: ( ) White ( ) Black ( ) Yellow ( )Brown ( ) Indigenous ( )Prefer not to answer
Education: ( ) Complete elementary school ( ) Secondary school incomplete ( ) Completed high school ( ) Incomplete higher education ( ) Higher education completed ( ) Postgraduate Latu-Sensu (Specialization) Incomplete ( ) Postgraduate Latu-Sensu (Specialization) Completed ( ) Master's Degree Incomplete ( ) Completed Master's Degree ( ) Doctorate Incomplete ( ) PhD completed ( ) Post-doctorate Incomplete

( ) Completed post-doctorate

Course you took in Nursing
( ) Auxiliary
( ) Technical
( ) Graduation
( ) Specialization - Specify_____
( ) Master's Degree - Specify_____
( ) Doctorate - Specify _____
( ) Post-doctorate - Specify _____

Individual monthly income	**Monthly family income:**
( ) From 1 to 3 minimum wages (MW*)	( ) From 1 to 3 minimum wages (MW*)
( ) From 4 to 6 minimum wages	( ) From 4 to 6 minimum wages
( ) From 7 to 9 minimum wages	( ) From 7 to 9 minimum wages
( ) 10 or more minimum wages	( ) 10 or more minimum wages
*SM in August 2020 in SP: R$1,183.33	*SM in August 2020 in SP: R$1,183.33

Municipality of residence: _____ **Neighborhood:** _____

Number of people living in your household (including you): _____

Distribute the number of people who share a house with you according to the age group described below:
0 to 9 years (Number of people: ___)
10 to 19 years old (Number of people: ___)
20 to 29 years old (Number of people: ___)
30 to 39 years old (Number of people: ___)
40 to 49 years old (Number of people: ___)
50 to 59 years old (Number of people: ___)
60 to 69 years (Number of people: ___)
70 to 79 years old (Number of people: ___)
80 to 89 years old (Number of people: ___)
Over 90s (Number of people: ___)

Have you moved elsewhere because of COVID-19?
( ) Yes ( ) No

Health and work profile
Are you in the risk group for COVID-19? ( ) Yes ( ) No
If so, which one? ( ) Cardiovascular disease. Qual?_____ ( ) Respiratory disease. Qual?_____ ( ) Diabetes ( ) Neoplasm

( ) Immunosuppression by medication. Which medication:_____ ( ) Autoimmune disease. Which one?_____ ( ) Pregnant woman ( ) Age over 60 ( ) Overweight ( ) Obesity ( ) Other. Please specify:_____
Which institution do you work at (select the institution where you were invited to take part in this survey)? ( ) Hospital 1 ( ) Hospital 2 ( ) Hospital 3
How long have you worked at this institution (in months): _____
Have you worked in an exclusive care unit for COVID-19 patients? ( ) Yes: please specify: _____ ( ) No
Working hours: ( ) 30 hours per week ( ) 36 hours a week ( ) 40 hours a week ( ) 44 hours a week ( ) Other. Please specify
What is your professional category? ( ) Nurse ( ) Nursing technician ( ) Nursing assistant
Are you a unit manager/leader? ( ) Yes ( ) No
Form of transportation to the hospital (you can choose more than one option): ( ) Public transport ( ) Private car ( ) Transportation by app ( ) Walking ( ) Other. Especificar:_____
Have you had any training in caring for COVID-19 patients at the institution? ( ) Yes ( ) No
Does the institution provide any mental health support services for professionals? ( ) Yes ( ) No ( ) Don't know
Do you work in another health institution besides this one? (second job title) ( ) Yes ( ) No If YES: What type of sector is the other institution? ( ) Public ( ) Private
What other type of institution do you work for? ( ) Basic Health Unit ( ) Specialty Medical Clinic ( ) Hospital ( ) Long-stay institution ( ) Other. Please specify: _____

If hospital, the main sector of the hospital that operates in the other institution: ( ) Emergency room ( ) Adult Intensive Care Unit ( ) Pediatric/Newborn Intensive Care Unit ( ) Medical Clinic ( ) Surgical Clinic ( ) Surgical Center ( ) Material and Sterilization Center ( ) Other. Especificar:_____
Municipality(ies) of work of the other institution: _____
Form of transportation to the hospital (you can choose more than one option): ( ) Public transport ( ) Private car ( ) Transportation by app ( ) Walking ( ) Other. Especificar:_____
Is the other institution you work with a reference for the care of patients with COVID-19 (suspected or confirmed)? ( ) Yes ( ) No
Did you have any training in caring for COVID-19 patients at the other institution you work at? ( ) Yes ( ) No
Does the other institution provide any mental health support services for professionals? ( ) Yes ( ) No ( ) Don't know
Do you work in another health institution apart from this one? (third job) ( ) Yes ( ) No **If YES:** What type of sector is the other institution? ( ) Public ( ) Private
What other type of institution do you work for? ( ) Basic Health Unit ( ) Specialty Medical Clinic ( ) Hospital ( ) Long-stay institution ( ) Other. Please specify: _____
If hospital, the main sector of the hospital that operates in the other institution: ( ) Emergency room ( ) Adult Intensive Care Unit ( ) Pediatric/Newborn Intensive Care Unit ( ) Medical Clinic ( ) Surgical Clinic ( ) Surgical Center ( ) Material and Sterilization Center ( ) Other. Please specify:_____
Municipality(ies) of work of the other institution: _____
Form of transportation to the hospital (you can choose more than one option): ( ) Public transport ( ) Private car ( ) Transportation by app ( ) Walking

( ) Other. Please specify:_____
Is the other institution you work with a reference for the care of patients with COVID-19 (suspected or confirmed)? ( ) Yes ( ) No
Did you have any training in caring for COVID-19 patients at the other institution you work at? ( ) Yes ( ) No
Does the other institution provide any mental health support services for professionals? ( ) Yes ( ) No ( ) Don't know

Aspects related to the care of patients with COVID-19 **When answering the following questions, consider the institution where you were invited to take part in the survey**
In the case of caring for a patient with COVID-19 (suspected or confirmed), please select the type of personal protective equipment (PPE) you usually use in the service (you can select more than one PPE). When answering, consider the institution where you were invited to take part in the survey ( ) Surgical mask ( ) N95/PFF2 mask ( ) *Face shield* ( ) Goggles ( ) Cap ( ) Waterproof apron ( ) Waterproof apron with cap ( ) Non-waterproof disposable apron ( ) Fabric apron ( ) Waterproof apron ( ) Procedure glove ( ) Surgical glove (sterile)
Was there a shortage of PPE in the institution? ( ) Yes ( ) No **If so, which one?** ( ) Surgical mask ( ) N95/PFF2 mask ( ) *Face shield* ( ) Goggles ( ) Cap ( ) Waterproof apron ( ) Waterproof apron with cap ( ) Non-waterproof disposable apron ( ) Fabric apron ( ) Waterproof apron ( ) Procedure glove ( ) Surgical glove (sterile)
Have you (or have you) experienced any psychological distress that can be attributed to nursing care for patients affected by COVID-19? ( ) Yes ( ) No

Did you need time off for emotional reasons related to nursing care for COVID-19 patients? ( ) Yes. How many days: _____ ( ) No

PART 2: Health conditions and illness due to COVID-19
Have you fallen ill with COVID-19? ( ) Yes ( ) No **If YES, answer the following questions:**
Which test confirmed the diagnosis of COVID-19? ( ) Rapid test (blood sample) ( ) RT-PCR SARS-CoV-2 detection (airway swab sample) ( ) Serology (identification of IgA, IgM and IgG antibodies)
How severe were your symptoms? ( ) Asymptomatic ( ) Mild symptoms ( ) Severe symptoms
If symptomatic, were you working in person at the institution 14 days before the onset of symptoms? ( ) Yes ( ) No
Has a chest CT scan been performed? ( ) Yes ( ) No
Did you need to take time off work due to COVID-19? ( ) Yes ( ) No If so, for how many days? _____ days
Select the symptoms: ( ) Fever ( ) Cough ( ) Chest pain ( ) Anosmia (absence of smell) ( ) Ageusia (diminished or lost sense of taste) ( ) Diarrhea ( ) Shortness of breath/Difficulty breathing ( ) Tiredness ( ) Cyanosis ( ) Tachypnea ( ) Hypotension ( ) Confusion or lethargy ( ) Myalgia ( ) Fatigue ( ) Headache ( ) Other. Please specify: _____
Did you need to be admitted to hospital? ( ) Yes ( ) No
If you answered YES to the previous question, which hospital were you admitted to? ( ) Public ( ) Private
Did you have to be admitted to an Intensive Care Unit? ( ) Yes ( ) No **If you answered YES, how long (days) did you stay in the Intensive Care Unit? _____**
What is the total time (days) spent in hospital? _____
Did you need to be intubated?

( ) Yes ( ) No **If you answered YES, how long (days) were you intubated? _____**
Did you need another hospitalization? ( ) Yes ( ) No **If you answered YES, how long (days) did you have to stay in the second hospital?** **_____**
Do you currently have any clinical manifestations of COVID-19? ( ) Yes ( ) No **If you answered YES, please select the symptoms:** ( ) Fever ( ) Cough ( ) Chest pain ( ) Anosmia (absence of smell) ( ) Ageusia (diminished or lost sense of taste) ( ) Diarrhea ( ) Shortness of breath/Difficulty breathing ( ) Tiredness ( ) Cyanosis ( ) Tachypnea ( ) Hypotension ( ) Confusion or lethargy ( ) Myalgia ( ) Fatigue ( ) Headache ( ) Other. Please specify: _____