







# Mental disorders in nursing professionals in the pre-vaccination period of the COVID-19 pandemic

*Transtornos mentais em profissionais de enfermagem na pré-vacinação da pandemia COVID-19*

*Trastornos mentales en profesionales de enfermería antes de la vacunación de la pandemia COVID-19*

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## ABSTRACT

**Objective:** to identify factors associated with the occurrence of mental disorders in nursing professionals working in hospitals in the pre-vaccination period during the COVID-19 pandemic. **Method:** multicenter study with a quantitative, cross-sectional, descriptive and analytical approach, developed with 859 nursing professionals, working in three Brazilian teaching hospital institutions, who answered the data collection form, between November 2020 and February 2021. **Results:** the occurrence of 358 (41.9%) professionals diagnosed with COVID-19 was evidenced, with 128 (44.14%) reporting the occurrence of mental disorders ( $p < 0.05$ ). **Conclusion:** diabetes and autoimmune disease, as well as direct assistance to patients with COVID-19, were associated with the occurrence of symptoms of mental disorders in nursing professionals.

**Descriptors:** COVID-19; Mental Health; Mental Disorders; Nursing, Team.

## RESUMO

**Objetivo:** identificar os fatores associados à ocorrência de transtornos mentais em profissionais de enfermagem atuantes em instituições hospitalares no período de pré-vacinação na pandemia COVID-19. **Método:** estudo multicêntrico de abordagem quantitativa, transversal, descritivo e analítico, desenvolvido com 859 profissionais de enfermagem, atuantes em três instituições hospitalares de ensino brasileiras, que responderam ao formulário de coleta de dados, entre novembro de 2020 e fevereiro de 2021. **Resultados:** evidenciou-se a ocorrência de 358 (41,9%) profissionais diagnosticados com COVID-19, sendo que 128 (44,14%) relataram a ocorrência de transtornos mentais ( $p < 0,05$ ). **Conclusão:** diabetes e doença autoimune, assim como a assistência direta a pacientes com COVID-19, estiveram associadas à ocorrência de sintomas de transtornos mentais em profissionais de enfermagem.

**Descritores:** COVID-19; Saúde Mental; Transtornos Mentais; Equipe de Enfermagem.

## RESUMEN

**Objetivo:** identificar los factores asociados a la incidencia de trastornos mentales en profesionales de enfermería que trabajan en hospitales en el período previo a la vacunación durante la pandemia de COVID-19. **Método:** estudio multicéntrico con enfoque cuantitativo, transversal, descriptivo y analítico, desarrollado junto a 859 profesionales de enfermería que trabajan en tres instituciones hospitalarias brasileñas de enseñanza y que respondieron el formulario de recolección de datos, entre noviembre de 2020 y febrero de 2021. **Resultados:** Se evidenció la incidencia de 358 (41,9%) profesionales diagnosticados con COVID-19, siendo que 128 (44,14%) informaron la aparición de trastornos mentales ( $p < 0,05$ ). **Conclusión:** la diabetes y las enfermedades autoinmunes, así como la asistencia directa a pacientes con COVID-19, se asociaron con la aparición de síntomas de trastornos mentales en profesionales de enfermería.

**Descriptores:** COVID-19; Salud Mental; Trastornos Mentales; Grupo de Enfermería.

## INTRODUCTION

On December 31, 2019, the World Health Organization (WHO) reported several cases of pneumonia of unknown cause detected in the city of Wuhan, China, in the province of Hubei. Four days after this discovery, authorities in China reported 44 cases of patients with pneumonia of unknown etiology to the WHO, which was later attributed to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), a disease designated as COVID-19<sup>1</sup>. The most common symptoms are: fever, dry cough, tiredness, runny nose, nasal congestion, sore throat and diarrhea, with 14% of patients having severe symptoms (dyspnea and shortness of breath), requiring hospitalization for the use of oxygen therapy<sup>2</sup>.

According to the WHO, the cumulative number of confirmed cases of SARS-CoV-2 by the end of November 2021 was 330 million, with the highest number in regions of Europe and the Americas. Among the most affected countries were the United States with almost 60 million cases, followed by India with more than 30 million, and Brazil with just over 20 million. According to information from the Federal Nursing Council Observatory (*Conselho Federal de Enfermagem - COFEN*), more than 64,000 nursing professionals had contracted SARS-CoV-2 in Brazil by the end of November 2022, with a total of 872 deaths<sup>3</sup>.

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Faced with this critical situation, health professionals found themselves in a context of insecurity, in which they had to work every day in the workplace with a constant risk of infection, countless daily deaths, disease burden and overcrowding of health services; and above all, a scarcity of information about what they would really face, in addition to a feeling of impotence<sup>4</sup>.

With regard to the global situation, there was an increase in the demand for health services in the period prior to vaccination, in addition to the loss of control over events. This led to a feeling of vulnerability, which, associated with fear, caused psychological and cognitive disorders in professionals<sup>5-7</sup>. Depression, anxiety, insomnia and psychological distress are symptoms of the most common mental health disorders which can occur during a global health crisis<sup>7</sup>.

It was inevitable that professionals working tirelessly on the front lines during the pandemic would be vulnerable to emotional issues. These professionals reported difficulty in dealing with the feeling of impotence and failure, in addition to stress due to the conditions and work overload, uncertainties about the disease and treatment, as well as fear of contracting and transmitting the virus<sup>6</sup>.

Still in the national context, there is a high rate of people suffering from anxiety disorders, with a prevalence of around 10 to 20% in the general population, often accompanied by symptoms such as fear, malaise, fatigue, restlessness, palpitations, among others. The etiology of anxiety disorders is idiopathic and individualized, involving genetic, hereditary, environmental, psychological, social and biological factors<sup>5</sup>.

In view of the global situation that preceded the vaccination against COVID-19 regarding the increased demand for health services, combined with the loss of control over morbidity and mortality, feelings of vulnerability and psychological implications emerged. A systematic review<sup>8</sup> indicated a growing relationship between cyberchondria and emotional disorders, such as anxiety, hypochondria, and obsessive-compulsive disorder resulting from easy access to information.

Along this line, another systematic review with meta-analysis reported that nurses showed signs and symptoms during the COVID-19 pandemic such as anxiety (32%), stress (40.6%), depression (32%), post-traumatic stress disorder (18.6%) and insomnia (38.3%)<sup>9</sup>. A national cross-sectional study carried out with 1,609 health professionals also described a high prevalence of symptoms of anxiety, depression and stress among nurses. They conclude that psychological support for health professionals during and after the pandemic is essential<sup>10</sup>.

Considering the atypical scenario in Brazil when facing the pandemic in the pre-vaccination period, added to the working conditions of health professionals<sup>10</sup>, this study is justified, which has the following as its guiding question: What are the factors associated with the occurrence of mental disorders in nursing professionals in the pre-vaccination period during the COVID-19 pandemic?

Therefore, the objective of this study was to identify the factors associated with the occurrence of mental disorders in nursing professionals working in hospital institutions in the pre-vaccination period during the COVID-19 pandemic.

## METHOD

This is a multicenter study with a quantitative, cross-sectional, descriptive and analytical approach, developed with nursing professionals working in three Brazilian teaching hospital institutions, between November 2020 and February 2021.

The first institution evaluated was a university hospital in the interior of Minas Gerais, which has an installed and occupied capacity of 126 inpatient beds for patients financed by the Unified Health System (*Sistema Único de Saúde - SUS*). The beds are distributed among clinical, surgical, medium-complexity pediatric care, adult intensive care (9 beds) and treatment related to SARS-Cov-2 due to COVID-19 (13 beds), in addition to 17 day-hospital beds and outpatient care.

The second institution, a university hospital in the city of São Paulo, is characterized as a highly complex public university institution, specialized in cardiology, pulmonology and cardiac and thoracic surgery, financed by a private entity. It has 485 beds, 430 with hospitalizations financed by the *SUS*, distributed in 185 intensive care beds, including the adult (n=119), pediatric (n=23), neonatal (n=3) population and those diagnosed with COVID-19 (n=40 beds). In addition to ICU beds, those for surgical, clinical and pediatric specializations are included.

Finally, the third institution was a university hospital located in the central area of Recife, the capital of Pernambuco State. It has 404 beds, 366 of which are funded by the *SUS*, divided into adult ICUs (27 beds), adult COVID-19 ICUs (51 beds), pediatric SARS (10 beds), pediatric ICUs (10 beds) and isolation ICUs (12 beds). The institution also includes beds for surgical specializations, clinics, as well as day hospitals and pediatrics.

This study involved non-probabilistic sampling by convenience. Nurses, technicians and nursing assistants working in healthcare during the data collection period were included. It was limited to collection until January 2021, considering it to be the month in which the broad vaccination of health professionals in Brazil began. Professionals who were not active on the

frontline of COVID-19, who partially responded to the data collection form, who had already been vaccinated or who were away from care functions for any reason during data collection were excluded.

The Research Electronic Data Capture (REDCap) platform was used to elaborate the interview script, data collection and organization. To address the research aim, the researchers designated the occurrence or not of mental disorders related to professional practice during the COVID-19 pandemic was established as a dependent variable. In addition, the sociodemographic, clinical, and work conditions of nursing professionals working in hospital institutions were the independent variables.

The final version of the database was transferred to the STATA version 15.0 software program, in which the analyzes were performed. Sociodemographic, clinical and work variables were initially analyzed by calculating raw numbers and frequencies for their categories. The occurrence of mental disorders in the participants was considered as an outcome for the hypothesis tests, which used the chi-squared test.

Next, a multivariable analysis of the multiple logistic regression type was performed in order to identify which sociodemographic, clinical and work-related variables were predictors for the outcome under analysis, as well as their chances of occurrence. Models were initially estimated containing variables that had a p-value less than 0.25 in the bivariate analysis. The evaluation of the final model fit was performed using the likelihood ratio statistics, the Wald test and the coefficient of determination ( $R^2$ ). As reference categories, those representing absence (yes/no binary variables), color, hospital, professional category, the work sector "Others", and working hours of more than 40 hours per week were used.

The study was approved by the Research Ethics Committees of the institutions involved. All participants read and signed the Informed Consent Form.

## RESULTS

A total of 859 nursing professionals participated in the study. The characterization of professionals is presented in Table 1.

**TABLE 1:** Sociodemographic characterization of nursing professionals participating in the study in relation to the occurrence of mental disorders (n=859). Juiz de Fora Minas Gerais, Sao Paulo and Recife, Brazil, 2021

Variables	Occurrence of mental disorders n (%)	Non-occurrence of mental disorders n (%)	p-value <sup>†</sup>
<b>Sex</b>			0.230
Female	257 (85.60)	476 (81.30)	
Male	37 (14.40)	89 (18.70)	
<b>Age range</b>			0.169
Up to 30 years	72 (35.82)	129 (64.18)	
Between 31 and 59 years	205 (33.94)	399 (66.06)	
60 years or more	13 (23.21)	43 (76.79)	
<b>Civil status</b>			0.745
With companion	168 (58.54)	323 (56.46)	
No companion	119 (41.46)	249 (43.54)	
<b>Skin color</b>			0.247
White	117 (34.01)	227 (65.99)	
Black	51 (38.06)	83 (61.94)	
Yellow	8 (26.67)	22 (73.33)	
Brown	107 (32.23)	225 (67.77)	
Indigenous	3 (75.00)	1 (25.00)	
Prefer not to answer	8 (53.30)	7 (46.70)	
<b>Number of people living in the household</b>			0.391
None	3 (0.83)	7 (1.40)	
One to three	238 (66.11)	346 (69.34)	
Four or more	119 (33.06)	146 (29.26)	
<b>Number of people in the household affected by COVID-19</b>			0.795
Zero	151 (33.19)	304 (66.81)	
One to three	130 (35.14)	240 (64.86)	
Four or more	9 (26.47)	25 (73.53)	
<b>Changed place of residence due to COVID-19</b>			0.149
Yes	30 (10.06)	31 (5.52)	
No	268 (89.94)	530 (94.48)	

**Note:** <sup>†</sup> Chi-squared test.

There was a predominance of female individuals (85.33%), aged between 31 and 59 years (70.30%), white (40.05%), who had a partner (57.16%), with individual monthly income of one to three minimum monthly salaries (54.56%), and who lived in the same environment with one to three people (67.98%). A total of 48 participants (5.58%) reported changing their homes due to the pandemic.

Furthermore, 361 (42.02%) participants reported having been diagnosed with COVID-19. The majority 636 (74.04%) of nursing professionals reported not being in the risk group. Table 2 presents the clinical characterization of the participants.

**TABLE 2:** Clinical characterization of the nursing professionals participating in the study in relation to the occurrence of mental disorders (n=859). Juiz de Fora Minas Gerais, Sao Paulo and Recife, Brazil, 2021

Variables	Occurrence of mental disorders n (%)	Non-occurrence of mental disorders n (%)	p-value <sup>†</sup>
<b>Diagnosed with COVID-19</b>			0.246
Yes	128 (44.14)	233 (40.95)	
No	162 (55.86)	336 (59.05)	
<b>Cardiovascular disease</b>			0.429
No	269 (92.76)	533 (93.70)	
Yes	21 (7.24)	36 (6.30)	
<b>Respiratory disease</b>			0.131
No	272 (93.79)	545 (96.10)	
Yes	18 (6.21)	24 (3.90)	
<b>Diabetes</b>			0.026
No	275 (94.83)	551 (95.70)	
Yes	15 (5.17)	13 (2.30)	
<b>Neoplasm</b>			0.497
No	288 (99.31)	567 (99.65)	
Yes	2 (0.69)	2 (0.35)	
<b>Autoimmune disease</b>			0.015
No	283 (97.59)	566 (99.47)	
Yes	7 (2.41)	3 (0.53)	
<b>Pregnant</b>			0.455
No	288 (99.31)	564 (98.77)	
Yes	2 (0.69)	7 (1.23)	
<b>Smoking</b>			0.424
No	280 (96.55)	551 (96.83)	
Yes	10 (3.45)	18 (3.17)	
<b>Obesity</b>			0.212
No	272 (93.79)	545 (95.78)	
Yes	18 (6.21)	24 (4.22)	

Note: <sup>†</sup> Chi-squared test.

It was found that diabetes and autoimmune disease were associated with the occurrence of mental disorders in nursing professionals; on the other hand, the variables of risk group, cardiovascular and respiratory diseases, cancer, pregnancy, smoking and obesity were not associated with mental illness.

Regarding the characterization of work and the occurrence of mental disorders, it was found that 290 (33.76%) of the professionals from the three institutions reported the occurrence of mental disorders, 483 (56.22%) were nursing technicians, 456 (53.08%) worked directly assisting patients with COVID-19, 667 (77.65%) had a workload at the institution between 30 and 36 hours per week, 659 (76.70%) received training to act in the care of patients diagnosed with COVID-19, and 397 (46.21%) reported having received mental support at the institution.

The variables professional category and mental health support were associated with the occurrence of mental disorders in nursing professionals, as shown in Table 3.

**TABLE 3:** Reduced and adjusted logistic regression model considering the occurrence of mental disorders in nursing professionals during the COVID-19 pandemic, considering significant sociodemographic, clinical and work characteristics (n=859). Juiz de Fora Minas Gerais, Sao Paulo and Recife, Brazil, 2021.

Variables	OR (95%CI) <sup>  </sup>	p-value <sup>  </sup>
Autoimmune disease	4.85 (1.22; 19.25)	0.024
Working in an exclusive unit for COVID-19	1.29 (1.02; 1.74)	0.040
Nurse profession	1.68 (1.24; 2.28)	0.001
Receiving mental health support	1.68 (1.24; 2.28)	0.002
Less than 40 hours per week	0.62 (0.41; 0.92)	0.025

Notes: <sup>||</sup>R<sup>2</sup>= 2.82%; p<0.001.

From the logistic regression model, it was detected that having an autoimmune disease increases the chance of developing mental disorders four fold. Working in an exclusive COVID-19 unit, being a nurse, and not receiving psychological support increased the chance of having a mental disorder once. On the other hand, working below 40 hours a week appeared as a protective factor.

## DISCUSSION

This study showed that the critical period of the COVID-19 pandemic, which preceded the mass vaccination of the population, had repercussions on the physical and mental health of nursing professionals. Added to the risks inherent to the profession, the increased workload, high patient mortality rate, illness and death of co-workers were decisive for the occurrence of mental disorders.

More than 60% of health workers in Brazil are nursing professionals, totaling more than 2.5 million nurses, technicians and nursing assistants. As identified in this study, most professionals in this category are women and nursing technicians<sup>11</sup>. In the on-screen investigation, the incidence of contaminated professionals is compatible with the literature, which describes a variation from 14% for health professionals in general to 68.2% for nursing assistants<sup>12,13</sup>.

An association was found regarding pre-existing comorbidities between having diabetes and an autoimmune disease with the onset of mental disorders. This finding is consistent, as people with diabetes and an autoimmune disease are at greater hospitalization and mortality risk from infections, and as a new serious disease, COVID-19 increases stressors and produces negative emotional and behavioral reactions<sup>14,15</sup>.

On the other hand, the study identified that intolerance to uncertainty, fear of contamination and lack of support were more predictors of psychological distress in health professionals in the pre-vaccination period than having a previous illness<sup>16</sup>. In the present study, most professionals who reported psychological disorders worked directly with patients infected with COVID-19, such as nursing technicians. Despite the training received to deal with infected patients, the professional category variable and whether or not they received mental health support were associated with the occurrence of mental disorders.

In line with these findings, a systematic review highlighted the importance of intensifying proactive psychological interventions for nursing professionals as a strategy to avoid an overall collapse of the health system. The main disorders observed were anxiety, stress, depression, post-traumatic stress disorder<sup>9</sup>.

A study conducted with 3,700 Canadian nurses identified prevalence rates of post-traumatic stress disorder (47%), anxiety (38%), depression (41%) and high emotional exhaustion (60%). The investigation verified the occurrence of an association of mental disorders in this group with organizational support, organizational preparation, safety in the workplace and access to supplies and resources<sup>17</sup>.

Regarding the results obtained with the logistic regression analyses, a cross-sectional study carried out with 264 American nurses identified that more than 50% of the professionals had a related worsening of mental and/or physical health during the COVID-19 pandemic. Support for well-being in the workplace and shorter shifts positively impacted nurses' mental/physical health and quality of professional life in the critical phase of the pandemic<sup>18</sup>.

It is important to highlight that data collection for this study took place in a period prior to vaccination implementation in Brazil. Nursing professionals were included in February 2021 as a priority group for immunization against the SARS-Cov-2.



The main advance in knowledge achieved with this study was to identify factors associated with the occurrence of mental disorders in nursing professionals due to COVID-19. The results can be used in other studies to compare the mental health risk factors of frontline nursing professionals in the current context and in future pandemic contexts.

### Study limitations

The study design stands out as a limitation, as it was not able to assess the prevalence of mental disorders during the pre-vaccination period and the method of classification of mental disorders. Non-probabilistic sampling limits being able to generalize results.

### CONCLUSION

This study allowed identifying some factors associated with the occurrence of mental disorders in frontline nursing professionals during the COVID-19 pandemic. Diabetes and autoimmune disease, as well as care for patients with COVID-19, professional category and mental health support were associated with the occurrence of mental disorders in nursing professionals.

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**Authors' contributions:**

Conceptualization, F.C.C. and W.J.G.; methodology, S.A.S.; W.J.G.; A.L.S.A.; N.G.B.; E.P.P. and F.C.C.; software, F.C.C. and W.J.G.; validation, F.C.C. and W.J.G.; investigation, S.A.S. and W.J.G.; formal analysis, S.A.S.; W.J.G.; A.L.S.A.; N.G.B.; E.P.P. and F.C.C.; resources, S.A.S. and W.J.G.; data curation, S.A.S. and W.J.G.; manuscript writing, S.A.S.; W.J.G.; A.L.S.A.; N.G.B.; E.P.P. and F.C.C.; writing—review and editing, S.A.S.; W.J.G.; A.L.S.A.; N.G.B.; E.P.P. and F.C.C.; visualization, S.A.S.; W.J.G.; A.L.S.A.; N.G.B.; E.P.P. and F.C.C.; supervision, F.C.C. and W.J.G.; project administration, F.C.C. and W.J.G.; All authors have read and agreed to the published version of the manuscript.