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ORIGINAL

Evaluation of the impact of SARS-CoV-2 on licensed nursing professionals in southern Santa Fe

Evaluación de impacto por SARS-CoV-2 en enfermeros matriculados del sur de la provincia de Santa Fe

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ABSTRACT

Introduction: the COVID-19 pandemic has left long-term sequelae, known as residual or prolonged COVID-19, which affect multiple organ systems and mental health. Nursing staff, being on the front line of containment, constitute a particularly vulnerable population. However, there are few studies that comprehensively address this problem in nursing professionals in Argentina.
Objective: to analyze the health problems reported by registered nurses in the southern province of Santa Fe and their possible link to residual COVID-19.
Method: a cross-sectional study with a mixed approach was conducted during the second half of 2025. A validated survey was administered to 358 nurses, assessing variables of mental and physical health, risk perception, and contextual characteristics. The analysis included descriptive statistics and a contextualized qualitative approach.
Results: a high prevalence of mental health problems was identified: 48,3 % reported chronic fatigue, 34,6 % reported distressing memories, and 32,7 % reported excessive worries, with low treatment rates (≤9,2 %). In terms of physical health, difficulty concentrating (36,8 %), acid reflux (21,7 %), and high blood pressure (13,6 %) stood out. Paradoxically, 70,1 % did not express fear of reinfection. The study population was predominantly female (83,5 %) and had a high prevalence of multiple jobs (37,2 %).
Conclusions: nurses have a significant burden of physical and mental morbidity consistent with residual COVID-19, exacerbated by critical healthcare neglect and precarious working conditions. These findings call for the urgent development of specific public policies for surveillance, comprehensive care, and occupational protection for this group.

Keywords: Nursing Staff; COVID-19; Mental Health; Occupational Diseases; Professional Burnout.

RESUMEN

Introducción: la pandemia de COVID-19 ha dejado secuelas a largo plazo, conocidas como COVID-19 residual o prolongado, que afectan múltiples sistemas orgánicos y la salud mental. El personal de enfermería, siendo la primera línea de contención, constituye una población particularmente vulnerable. Sin embargo, existen escasos estudios que aborden integralmente este problema en profesionales de enfermería de Argentina.
Objetivo: analizar los problemas de salud notificados por enfermeros matriculados en el sur de la provincia de Santa Fe y su posible vinculación con el COVID-19 residual.
Método: se realizó un estudio transversal con enfoque mixto durante el segundo semestre de 2025. Se aplicó una encuesta validada a 358 enfermeros, evaluando variables de salud psíquica, física, percepción

de riesgo y características contextuales. El análisis incluyó estadística descriptiva y un enfoque cualitativo contextualizado.
Resultados: se identificó una alta prevalencia de problemas de salud psíquica: el 48,3 % reportó fatiga crónica, el 34,6 % recuerdos angustiantes y el 32,7 % preocupaciones desmedidas, con bajas tasas de tratamiento (≤9,2 %). En salud física, destacaron la dificultad para concentrarse (36,8 %), el reflujo ácido (21,7 %) y la hipertensión arterial (13,6 %). Paradójicamente, el 70,1 % no manifestó temor a reinfectarse. La población de estudio fue mayoritariamente femenina (83,5 %) y con alta prevalencia de multiempleo (37,2 %).
Conclusiones: los enfermeros presentan una carga significativa de morbilidad física y mental compatible con COVID-19 residual, agravada por una crítica desatención sanitaria y condiciones laborales precarias. Estos hallazgos exigen el desarrollo urgente de políticas públicas específicas de vigilancia, atención integral y protección laboral para este colectivo.

Palabras clave: Personal de Enfermería; COVID-19; Salud Mental; Enfermedades Profesionales; Agotamiento Profesional.

INTRODUCTION

The COVID-19 pandemic significantly affected the health of the world's population due to its rapid spread and high infection rate. This speed, combined with a complete lack of knowledge about the disease, forced the WHO to adopt initial guidelines, including social distancing and isolation, as well as the use of masks (face coverings, face masks) and handwashing. In Argentina, the first case of COVID-19 was reported in March 2020, identified in an Argentine tourist from Turin, Italy. Within a few weeks, the virus spread from the AMBA area to the rest of the country, overwhelming the health system's response capacity, particularly critical care services.

Among the first findings recognized by the scientific community was a higher mortality rate among the elderly population, as well as among people with comorbidities, especially those with a personal history of respiratory and cardiovascular diseases. This complex, multifactorial scenario led to an increase in the excess mortality rate — the number of deaths exceeding the expected number for a given situation. This excess mortality was observed in hospitals, with a dramatic increase in the number of deaths.[1]

The disease's impact continues to be studied due to its complex effects on the population.[2] Based on all of this, we are now forced to talk about a phenomenon that science refers to as "residual," "prolonged," or "post-COVID" COVID.[3] This new way in which the disease reappears, months or years after the infection occurred, shows that the problem is not solved and that the consequences continue to be significant. Recent studies demonstrate the continuity of the process, as evidenced by consultations around the world from people affected in their immune, cardiovascular, respiratory, neurological, and endocrine systems.[4]

This damage is not only studied in terms of physical and mental health, but also in its impact on social, economic, cultural, and academic aspects.[5] For example, current studies on the perceptions of healthcare workers identify that they consider their mental health to be more affected than their physical health, with greater fatigue than usual and increased anxiety and sadness. Reality raises new questions about the evolution of this disease.[6]

We also know that, with the advent of COVID-19 vaccines and changes in the virus's RNA, the mortality rate has dropped significantly, though this does not mean the disease has ceased to exist or that it is no longer essential to prevent. As for vaccines, new research suggests they may cause serious side effects that harm the population's health.[7] Some laboratories have already accepted this impression.

Reality raises new questions about the evolution of this disease, which forces us to remain vigilant and deepen our research into the phenomenon, recognizing that, although it is biological in nature, we cannot ignore the social processes that gave rise to it and helped spread it. However, there is a shortage of studies that comprehensively address the health problems associated with residual COVID among nursing professionals in Argentina, particularly in the southern region of Santa Fe, and that explore their physical and mental health and perceptions of risk.

In this latter sense, it is essential to highlight the role of nursing staff as the first line of defense against COVID-19. Taking the above into account, it is clear that the slogan "who cares for the caregivers?" is more relevant than ever, and that it is the obligation of the state and society as a whole to strive to provide such care. For this reason, the purpose of this research is to visualize the phenomenon experienced by healthcare personnel, explain it, assess its impact on the health of professionals and workers in the sector, and examine their perceptions of the disease's severity. In this sense, the research aims to contribute to the implementation of public policies that promote prevention and health among healthcare workers, as part of a return on their services during the pandemic.

Therefore, the objective of the research was to analyze the health problems reported by nurses registered

with the "College of Nursing Professionals of the South of the Province of Santa Fe" during the first half of 2025, and their link to "residual" or "prolonged" COVID.

METHOD

Study design

A mixed-method study was conducted, with a predominance of the quantitative approach. The design was descriptive and cross-sectional, involving nurses registered with the College of Nursing Professionals of the Southern Province of Santa Fe during the first half of 2025.

Population and sample

The study population consisted of all nurses registered with the College of Nursing Professionals of the South of the Province of Santa Fe; the entire population was analyzed, so it was not necessary to extract a sample. The inclusion criteria were: 1) being registered with the aforementioned college and 2) having practiced the profession during the COVID-19 pandemic.

Unit of analysis

The unit of analysis was the registered nurse who met the inclusion criteria. The object of study was self-reported health problems and their potential link to a previous episode of COVID-19.

Information collection

A structured survey, designed *ad hoc* for this research, was used to collect the information. The survey contained 16 items with limited response formats (dichotomous, polytomous, and Likert scales). To ensure the content validity of the questionnaire, it was reviewed by experts and validated using the Delphi methodology.

Variables

Four main variables were studied with their respective dimensions, which are listed in table 1.

Table 1. Matrix of variables and their dimensions

Variable	Classification	Dimensions
V1: Mental health problems.	Qualitative (Nominal Polytomous)	D1-1 Anxiety: Excessive worry, intense fears, nervousness. D1-2 Depression: Depression: Feelings of sadness, loss of interest, constant fatigue D1-3 Post-traumatic stress: Distressing memories, flashbacks, nightmares
V2: Physical health problems.	Qualitative (Nominal Polytomic)	D2-1 Gastrointestinal: Loss of appetite, nausea, diarrhea, reflux. D2-2 Respiratory: Dyspnea on exertion or at rest. D2-3 Cardiovascular: Arrhythmias, hypertension, myocarditis, heart failure. D2-4 Renal/hepatic: Impaired liver function, renal failure. D2-5 Perception: Loss or distortion of taste and smell. D2-6 Cognitive: Memory loss, difficulty concentrating.
V3: Perception regarding fear or anxiety about becoming infected or reinfected	Qualitative (Dichotomous)	A) Yes B) No
V4: Supra-Unitary Level (contextual) with the same indicators for all variables and their dimensions	Context (Supra-Unitary Level)	D4-1 Age (discrete quantitative) D4-2 Gender (nominal) D4-3 Years of professional activity (discrete quantitative) D4-4 Employment characteristics (nominal) D4-5 Health subsector (nominal) D4-6 Year and method of COVID-19 diagnosis (nominal) D4-7 Vaccination schedule (nominal)

Data analysis

IBM SPSS Statistics V. 27 was used for quantitative analysis of the data. Descriptive statistics were used to calculate absolute and relative frequencies as percentages.

For qualitative analysis and comprehensive interpretation, the data were analyzed in context following the logical strategy proposed by Castellanos[8], which allows for an analysis that goes from the general (macro-

spatial: health system context) to the particular (meso-spatial: work environment) and to the singular (micro-spatial: the individual professional), thus integrating the different dimensions of the phenomenon.

Ethical considerations

The study was conducted in accordance with the principles of bioethics for research involving human subjects. The anonymity and confidentiality of the data were guaranteed. Participation was voluntary, and informed consent was obtained from all respondents before the survey began.

RESULTS

Analysis of variable 1 "Psychological health problems"

Table 2 shows the results for variable 1, "Mental health problems." In the Anxiety dimension (D1-1), 32,7 % of respondents reported excessive worries and 15,5 % reported intense fears. However, only 9,2 % were undergoing treatment. For the Depression dimension (D1-2), the most frequent symptoms were fatigue or tiredness (48,3 %) and loss of interest (21,2 %), with only 7,3 % undergoing treatment. In the Post-Traumatic Stress dimension (D1-3), 34,6 % reported distressing memories and 23,6 % reported emotional distress, while only 5,2 % were receiving treatment for this condition.

Table 2. Survey results for variable 1: "Mental health problems"

Dimension	Category	No	%
D1-1 Anxiety	Excessive worries	114	32,7
	Intense fears	54	15,5
	I am undergoing treatment	32	9,2
	I am not undergoing treatment	88	25,2
	No symptoms	162	46,4
D1-2 Depression	Anger and outbursts	65	18,4
	Feelings of worthlessness	40	11,3
	Constant sadness	56	15,8
	Loss of interest	75	21,2
	Fatigue/Tiredness	171	48,3
	I am undergoing treatment	26	7,3 %
	I am not undergoing treatment	95	26,8
	No symptoms	131	37
D1-3 Post-traumatic stress	Distressing memories	120	34,6
	Flashbacks	22	6,3
	Nightmares	13	3,7
	Emotional distress	82	23,6
	I am undergoing treatment	18	5,2
	I am not undergoing treatment	79	2,8
	No symptoms	147	42,4

Analysis of variable 2 "Physical health problems"

The most commonly reported gastrointestinal problems (D2-1) were acid reflux (21,7 %) and nausea (6,7 %). Among respiratory problems (D2-2), exertional dyspnea was the most significant (14,7 %). Among cardiovascular problems (D2-3), high blood pressure (13,6 %) and arrhythmias (10,1 %) were the main findings. Kidney and liver problems (D2-4) were rare, with liver function impairment (2,1 %) being the most frequently mentioned. In the perception dimension (D2-5), loss of smell (13,6 %) and taste distortion (11,0 %) persisted. Finally, in cognitive problems (D2-6), difficulty concentrating (36,8 %) and memory loss (18,7 %) were the most relevant data.

Variable analysis 3 "Perception of fear or anxiety about becoming infected or reinfected"

Perceptions regarding fear or anxiety about becoming infected or reinfected were analyzed, with 70,1 % reporting no fear (figure 1).

Table 3. Survey results for variable 2: *"Physical health problems"*

Dimension	Category	No.	%
D2-1 Gastrointestinal problems	Loss of appetite	15	4,3
	Nausea	23	6,7
	Diarrhea	20	5,8
	Acid reflux	75	21,7
	I am undergoing treatment	15	4,3
	I am not undergoing treatment	52	15,1
	No symptoms	217	62,9
D2-2 Respiratory problems	Exertional dyspnea	51	14,7
	Dyspnea at rest	10	2,9
	Lack of oxygen/Dizziness	18	5,2
	Permanent use of oxygen	0	0,0
	I am undergoing treatment	11	3,2
	I am not undergoing treatment	56	16,1
	No symptoms	241	69,5
D2-3 Cardiovascular problems	Arrhythmias	35	10,1
	Coagulation problems	5	1,4
	Myocarditis	0	0,0
	Heart failure	5	1,4
	Stroke	0	0
	High blood pressure	47	13,6
	I am undergoing treatment	29	8,4
	I am not undergoing treatment	50	14,5
	No symptoms	231	67,0
D2-4 Kidney and liver problems	Chronic renal failure	1	0,3
	Acute kidney injury (AKI)	2	0,6
	Impaired liver function	7	2,1
	Liver cirrhosis	0	0,0
	Hepatomegaly	1	0,3
	Liver fibrosis	0	0,0
	I am undergoing treatment	4	1,2
	I am not undergoing treatment	47	13,8
	No symptoms	289	85,0
D2-5 Perception problems	Loss of smell	47	13,6
	Loss or distortion of taste	38	11,0
	I am undergoing treatment	0	0
	I am not undergoing treatment	52	15,1
	No symptoms	253	73,3
D2-6 Cognitive problems	Memory loss	65	18,7
	Difficulty concentrating	128	36,8
	I am undergoing treatment	2	0,6
	I am not undergoing treatment	73	21,0
	No symptoms	181	52,0

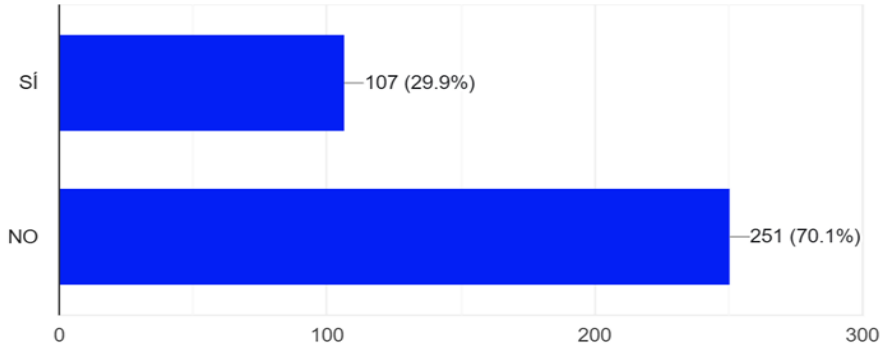

Figure 1. Survey results for variable 3: *"Perception of fear or anxiety about becoming infected or reinfected"*

Analysis of variable 4 "Contextual or supra-unit level"

The study population was predominantly female (83,5 %), with an age distribution concentrated in the 31-40 (39,1 %) and 41-50 (35,2 %) age groups. In terms of professional experience, most respondents had between 6-10 years (24,0 %) and 0-5 years (20,4 %) of experience. Regarding employment, 62,8 % reported having a single job in healthcare, while 21,8 % stated that they worked in two or more healthcare settings. The majority worked in the public subsector (56,1 %), and 88,0 % had completed a regular vaccination schedule. Regarding COVID-19 infection, the highest proportion was infected in 2020 (32,1 %) and 2021 (33,5 %), with nasopharyngeal swabbing being the most common diagnostic method (59,8 %).

Table 4. Survey results for variable 4: *"Contextual or supra-unit level"*

Dimension	Category	n	%
D4-1 Age	18 to 30 years old	34	9,5
	31 to 40 years old	140	39,1
	41 to 50 years old	126	35,2
	51 years old or older	59	16,5
D4-2 Gender	Male	58	16,2
	Female	299	83,5
	Other (non-binary identities)	1	0,3
D4-3 Years of professional activity	0 to 5 years	73	20,4
	6 to 10 years	86	24
	From 11 to 15 years old	70	19,6
	16 to 20 years old	58	16,2
	21 to 25 years old	26	7,3
	Over 25 years old	46	12,8
D4-4 Employment characteristics	In a single health facility	225	62,8
	In two or more health facilities	78	21,8
	In one healthcare provider and another non-healthcare job	34	9,5
	Self-employed	14	3,9
	Currently not practicing	19	5,3
D4-5 Health subsector	Public	201	56,1
	Private	163	45,5
	Social security	16	4,5
	Any of the subsectors	8	2,2
	Self-employed only	13	3,6
D4-6 Year of infection and method of diagnosis	2020	115	32,1
	2021	120	33,5
	2022	63	17,6
	2023	17	4,7
	Verification by assessment	67	18,7
	Verification by swab test	214	59,8
	Verification by examination	15	4,2
	I did not become infected	79	22,1
D4-7 Vaccination schedule	I followed a regular vaccination schedule	315	88,0
	I did not follow a regular vaccination schedule.	39	10,9
	I never got vaccinated	6	1,7

DISCUSSION

Mental health problems

This first variable allows us to estimate the respondents' mental health problems approximately.

The high percentage of mental health problems (anxiety, depression, post-traumatic stress) reflects a critical situation. These findings, as noted in the analysis, can be linked to the physical and mental exhaustion of being on the front line during the pandemic, a phenomenon documented in similar studies internationally.[9,10] One example is the study by Rolle Fernández[11], who states that, as bio-psycho-social and emotional beings, nursing staff and healthcare workers in general are prone to developing symptoms of stress, anxiety, and depression in destabilizing situations such as the COVID-19 pandemic, and may even develop post-traumatic stress disorder.

This situation is aggravated by contextual factors such as exploitation, low wages, and a lack of recognition for their professional work, which act as psychosocial risk factors. The low rate of treatment and potential self-medication are indicators of a serious problem of neglect in mental health care for this group.

Physical health problems

This variable reflects the detriment to the physical health of nursing staff. The diversity and severity of the physical health problems reported (gastrointestinal, respiratory, cardiovascular, etc.) coincide with the symptoms of so-called prolonged or residual COVID. This is supported by international studies, such as the one conducted by García Grau et al.[12], who identified the presence of symptoms such as sleep disorders, memory disorders, arthralgia, headaches, and others in healthcare personnel as part of residual COVID.

Under these health conditions, it is more than evident that not only is the work and professional capacity of nursing staff affected, but also their social and family life, which can lead to the breakdown of emotional bonds and a destructuring of personality as part of a self-defense mechanism. As with the data collected in variable 1, the rate of medical treatment is very low, a circumstance that could potentially increase health damage.

Perception of fear or anxiety about becoming infected or reinfected

The finding that 70,1 % do not fear contagion is counterintuitive. The arithmetic analysis is simple, but the issue becomes more complex when approached from a sociological perspective. The question that inevitably arises is: What prevents our professionals from fearing, given that we have already seen the psychological and physical damage caused by the disease?

According to estimates reported by nursing schools and associations in Argentina, more than 60 nurses died during the first half of 2020, that is, since the first outbreaks in Argentina, which shows the level of exposure and vulnerability they faced.

This lack of fear should not and cannot be associated with any courage or heroism on the part of nursing staff; it is an adaptation mechanism resulting from extreme exhaustion (severe burnout syndrome). This absence of fear poses a health hazard for professionals themselves, who may neglect protective measures, and for patients, thereby increasing the risk of in-hospital transmission.

Contextual or supra-unit level

At the contextual level, the results provide a socio-demographic, economic, and health snapshot of the composition of nursing staff, which, in turn, establishes the profile of a vulnerable population.

The characterization of the population using variable (V4) allows us to understand the magnitude of the impact. The predominantly female profile (83,5 %) and working-age population (74,2 % between 31 and 50 years old) indicate that the consequences affect breadwinners and those at the peak of their productivity. The high percentage of multiple jobholding (37,2 %) is an indicator of job insecurity, which undoubtedly exacerbated their vulnerability during the pandemic and hinders their recovery.

Similar results were reported by Cruz Callejas[13], who found effects mainly in women (72,4 %), nursing staff (63,8 %), and those of working age.

Practical implications and recommendations

The results show the need for greater intervention and active involvement by health authorities, who must implement programs for diagnosis, monitoring, and specific care for physical and mental health problems arising from COVID-19 in nursing and healthcare personnel in general.

Actions and public policies must be developed to address structural determinants, including those that make the work environment precarious and trigger the need for multiple jobs, as key factors in protecting those who work in the care profession.

Limitations of the study

Despite being one of the few studies to analyze the problem from multiple angles and its impacts, it is not free of bias. As it relies on self-reporting tools, there is a risk of memory bias. Similarly, analysis based solely on descriptive statistics can identify regularities but not causality. In the future, studies should be conducted to determine the factors causing physical and mental effects, as well as studies with older populations, to allow for the generalization of these results.

CONCLUSIONS

The results of this study reveal a high burden of physical and mental morbidity in nursing staff after COVID-19. Without urgent intervention, these conditions could worsen, severely compromising work capacity and the quality of healthcare. It is necessary to develop diagnostic, treatment, and follow-up programs to ensure the health of nursing staff, as well as state strategies and policies to improve their quality of life.

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CONFLICT OF INTEREST

The author declares that there is no conflict of interest.

AUTHOR CONTRIBUTION

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