Research Article
Artigo de Pesquisa
Artículo de Investigación

DOI: http://dx.doi.org/10.12957/reuerj.2023.76901

PRECEDE-PROCEED model as a tool for social and epidemiological diagnoses of health workers with COVID-19

Modelo PRECEDE-PROCEED como ferramenta para diagnósticos social e epidemiológico de trabalhadores da saúde com COVID-19

Modelo PRECEDE-PROCEED como herramienta para el diagnóstico social y epidemiológico de los trabajadores de la salud con COVID-19

Maria Helena Mendonça de Araújo[I]; Donizete Vago Daher[I]; Irma da Silva Brito[II]; Vera Maria Sabóia[I]; Enéas Rangel Teixeira[I]; Magda Guimarães de Araújo Faria[III]; Carlos Henrique de Morais[VII]; Cláudio Alberto Gellis de Mattos Dias[IV]

[I]Universidade Federal Fluminense. Niterói, Brazil; [II]Escola Superior de Enfermagem de Coimbra. Coimbra, Portugal; [III]Universidade do Estado do Rio de Janeiro. Rio de Janeiro, Brazil; [IV]Instituto Federal de Educação, Ciência e Tecnologia do Amapá. Macapá, Brazil

ABSTRACT

Objective: to highlight the social and epidemiological diagnoses of health workers working in the pandemic and affected by COVID-19, applying the PRECEDE-PROCEED model. **Methods:** documentary, quantitative, observational, retrospective study, developed based on the PRECEDE-PROCEED model, which guides interventions, starting from phased diagnosis to implement actions. Data obtained from 215 medical records of workers with COVID-19, treated at the hospital occupational service in Macapá, between 2020 and 2021. **Results:** social diagnosis: women (81.9%), brown/black (79%), aged between 40/ 55 years old (53.4%), nursing technicians (40%), nephrology (10.2%), state/federal employment (91.6%) for more than 10 years (60.4%). Epidemiological Diagnosis: headache (53.5%), cough (51.6%), fever (47.9%). Rapid test (76.3%), outpatient care (90.2%), sick leave of 8 to 14 days (45.1%), 100% cured, sequelae in 12.6%. No significant difference in terms of leave by function performed. Dyspnea, chest pain and sequelae of the disease have a greater chance of sick leave. **Conclusion:** the application of the model makes it possible to plan awareness/prevention actions regarding risk, illness, occupational accidents and workers' health care.
Descriptors: Pandemics; SARS-CoV-2; COVID-19; Health Personnel; Planning Methodology.

RESUMO

Objetivo: evidenciar os diagnósticos social e epidemiológico de trabalhadores da saúde atuantes na pandemia e acometidos por COVID-19, aplicando modelo PRECEDE-PROCEED. **Métodos:** estudo documental, quantitativo, observacional, retrospectivo, desenvolvido a partir do modelo PRECEDE-PROCEED, que norteia intervenções, partindo do diagnóstico faseado para implementar ações. Dados obtidos em 215 prontuários de trabalhadores com COVID-19, atendidos no serviço ocupacional hospitalar em Macapá, entre 2020 e 2021. **Resultados:** diagnóstico social: mulheres (81,9%), pardas/pretas (79%), idade entre 40/55 anos (53,4%), técnicas de enfermagem (40%), da nefrologia (10,2%), vínculo estadual/federal (91,6%) superior a 10 anos (60,4%). Diagnóstico Epidemiológico: cefaleia (53,5%), tosse (51,6%), febre (47,9%). Teste rápido (76,3%), atendimento ambulatorial (90,2%), afastamento de 8 a 14 dias (45,1%), 100% curados, sequelas em 12,6%. Sem diferença significativa quanto ao afastamento por função exercida. Dispneia, dor torácica e sequelas da doença tem maior chance de afastamento. **Conclusão:** a aplicação do modelo possibilita planejar ações de conscientização/prevenção sobre risco, adoecimento, acidente laboral e cuidados à saúde dos trabalhadores.
Descritores: Pandemias; SARS-CoV-2; COVID-19; Pessoal da Saúde; Métodos de Planejamento.

RESUMEN

Objetivo: visibilizar los diagnósticos social y epidemiológico de los trabajadores de la salud que trabajan en la pandemia y afectados por el COVID-19, aplicando el modelo PRECEDE-PROCEED. **Métodos**: estudio documental, cuantitativo, observacional, retrospectivo, desarrollado con base en el modelo PRECEDE-PROCEED, que orienta las intervenciones, a partir del diagnóstico por fases para implementar de acciones. Los datos se obtuvieron de 215 historias clínicas de trabajadores con COVID-19, atendidos en el servicio ocupacional hospitalario de Macapá, entre 2020 y 2021. **Resultados:** diagnóstico social: mujeres (81,9%), morenas/negras (79%), edades entre 40/ 55 años (53,4%), técnicos en enfermería (40%), del área de nefrología (10,2%), empleo estatal/federal (91,6%) con más de 10 años (60,4%). Diagnóstico Epidemiológico: dolor de cabeza (53,5%), tos (51,6%), fiebre (47,9%). Prueba rápida (76,3%), atención ambulatoria (90,2%), baja laboral de 8 a 14 días (45,1%), 100% curados, secuelas en un 12,6%. No hay diferencia significativa en términos de licencias por función desempeñada. La disnea, el dolor torácico y las secuelas de la enfermedad tienen mayor probabilidad de ocasionar la baja laboral. **Conclusiones:** la aplicación del modelo permite planificar acciones de concienciación/prevención en cuanto al riesgo, enfermedades, accidentes laborales y atención de la salud de los trabajadores.
Descriptores: Pandemias; SARS-CoV-2; COVID-19; Personal de Salud; Técnicas de Planificación.

INTRODUCTION

Since the start of the coronavirus type 2 (COVID-19) pandemic in March 2020, health workers around the world have been at the forefront of the fight against an invisible enemy that emerged in late 2019 in Wuhan,

This study was financed in part by the *Coordenação de Aperfeiçoamento de Pessoal de Nível Superior* – Brzsil (CAPES).
Corresponding author: Maria Helena Mendonça de Araújo. E-mail: ma.helenama@gmail.com
Editor in chief: Cristiane Helena Gallasch; Associate Editor: Mercedes Neto

Received: June 11th 2023 – Accepted: Dec 4th 2023

Research Article
Artigo de Pesquisa
Artículo de Investigación

DOI: http://dx.doi.org/10.12957/reuerj.2023.76901

China, as the cause of an unusual pneumonia in workers and consumers of products sold at a seafood and wildlife market[1,2].

Occupational exposure to a virus that spreads rapidly and has a varied clinical picture has had its transmission accentuated in healthcare workers who have shown greater vulnerability to infection by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) than society in general, due to the need for close contact (less than one meter) during clinical examinations, manipulations, procedures and exposure to contaminated secretions and excretions[3,4]. It should be noted that "the greater the employee's exposure to environmental risks at work, the greater the care and prevention of accidents must be"[5:242].

Global epidemiological data from the World Health Organization (WHO) Coronavirus Dashboard platform, on 19/04/2023, showed 763,740,140 confirmed cases and 6,908,554 deaths. On the same date, the Coronavirus/Brazil Dashboard revealed 37,319,254 confirmed cases and 700,556 deaths in Brazil. It also highlighted the country's Northern Region with 2,893,450 cases and 51,594 deaths, and the state of Amapa with 185,902 confirmed records and 2,169 deaths. Epidemiological Week 52, from 25/12/2022 to 31/12/2022, recorded 380 cases of Severe Acute Respiratory Syndrome (SARS) caused by SARS-CoV-2 in hospitalized health workers, of which 88 died[6-8].

Carrying out a situational diagnosis in a public hospital, identifying who the health workers affected by the coronavirus are and where they work, is imperative for developing preventive and health-promoting strategies. For this study, the PRECEDE-PROCEED model was used, which guides the planning of complex health interventions and is based on health promotion through the participation of the people involved in the problem, with a view to improving quality of life[9-11].

This topic is current and relevant because COVID-19 is an emerging disease in which, during the pandemic determined by this disease that occurred between 2020 and 2022 in Brazil, there were about 9.8 thousand absences of workers, reported with ICD 10: B34 (Virus diseases, unspecified location or U07 (COVID-19).[12]. In the health sector, a lot of data has not been recorded in hospital occupational services, leaving a gap in the investigation and conduct that was needed.

Another motivation is the content, which appears in the Brazilian Ministry of Health's Agenda of Research Priorities, as part of thematic axis 1 (Environment, work and health), sub-axis 1.1 - Evaluation of the economic impact on the National Health System (SUS) of work-related accidents, diseases and illnesses[13].

Thus, the objective was to highlight the social and epidemiological diagnoses of health workers working in the pandemic and affected by COVID-19, applying the PRECEDE-PROCEED model.

THEORETICAL FRAMEWORK

The PRECEDE-PROCEED model emphasizes the importance of using evidence found in the daily practices of the points/problems to be transformed, taking into account the knowledge and experiences of the actors involved. Therefore, community intervention research has the subject as an active participant in all the chained phases of this model[9].

This model has been developed since the 1970s by Lawrence Green, Marshall Kreuter and collaborators[9-11]. PRECEDE-PROCEED stands for an acronym: PRECEDE - Predisposing, Reinforcing and Enabling, Constructs in Educational/Ecological Diagnosis and Evaluation; PROCEED - Policy, Regulatory and Organizational, Constructor in Educational and Environmental Development[9-11].

It is developed in several chained phases, directing attention to the expected results (diagnoses) and their determining factors, and then planning how to achieve this goal with the active participation of the population studied. The focus for this study was the PRECEDE stage of the model, where the social context of health workers is identified and analyzed, and the clinical health condition of the workers is also described[9-11].

This model, used as a methodological strategy in this study, is made up of two stages: 1) PRECEDE - which is made up of four phases and produces the following diagnoses: 1) Social, 2) Epidemiological, 3) Educational and Ecological, and 4) Health Programs and Policy Development. 2) PROCEED - made up of the four subsequent phases of evaluations: 5) Process Evaluation, 6 to 8) Short-, medium- and long-term Evaluations[9].

This study used the two initial phases of the PRECEDE Stage (social and epidemiological diagnoses), which are integral parts of a more comprehensive study that analyzes workers' health by producing diagnoses, intervention and evaluation actions. To this end, the PRECEDE-PROCEED model will be operationalized in a practical context from the perspective of participatory action research in health.

Research Article
Artigo de Pesquisa
Artículo de Investigación

DOI: http://dx.doi.org/10.12957/reuerj.2023.76901

METHOD

This is a documentary, quantitative, observational, retrospective study with a descriptive analysis. The data was extracted from 215 medical records of health workers, working in a tertiary public hospital in Macapa, capital of the State of Amapa, affected by SARS-CoV-2 and treated at the Occupational Health and Safety Service, between the years 2020 and 2021. Workers with COVID-19 who were out of the workplace due to vacations, leave of any kind and teleworking were excluded.

This hospital is a reference in the state and has a clinical staff of 1,320 workers who provide outpatient care and inpatient care, with 207 beds in various specialties (medical clinic, surgery, psychiatry, neurology, nephrology, oncology, intensive care unit, laboratories and radiology). It also has an occupational service, with a multi-professional team that carries out health promotion and prevention activities for workers[14,15].

The records were entered into a spreadsheet to create a database and the Statistical Program for Social Science (IBM SPSS®), version 26.0, was used for statistical analysis. The descriptive analysis was based on frequency distributions and statistical calculations. The statistical measure used to estimate risk was the Odds Ratio (OR), whose significance was assessed by the OR 95% confidence interval. As the quantitative variables did not follow a normal distribution, the correlation between two quantitative variables was assessed by Spearman's rank correlation coefficient, which was considered strong (absolute value > 0.7) and moderate (absolute value ≥ 0.5 and ≤ 0.7)[16,17].

As already mentioned, this study is part of a doctoral thesis project, which uses participatory action research in health involving workers from a public hospital in the state of Amapa, who were affected by COVID-19 and, after the causal link, the disease should have been reported as an occupational accident. The research protocol was approved by the Research Ethics Committee and the identification data from the medical records was coded, allowing for anonymity, in accordance with Resolution 466/2012.[18].

RESULTS

A social diagnosis was made based on the sociodemographic profile, work and previous illnesses (Table 1 and 2).

Table 1: Characterization of the social profile of health workers infected with the SARS-CoV-2 virus. Macapa, AP, Brazil, 2021

Variable	Global (n=215)	
	n	f(%)
Gender		
Female	176	81.9
Male	39	18.1
Age group (years)		
25 to 39	57	26.5
40 to 55	115	53.4
56 or over	43	20
Skin color		
White	45	20.9
Brown and black	170	79
With comorbidity	65	30.2
Hypertension	43	20.0
Diabetes Mellitus	13	6.0
Immunosuppression due to diseases (CA, SLE and/or medication)	10	4.7
Chronic respiratory diseases (COPD, asthma, etc.)	8	3.7
Others (heart disease, nephropathy, fibromyalgia, obesity, spondylitis)	15	7
History of contact with a family member with COVID recorded	22	10.2

Note: HCOC: High Complexity Oncology Center; ICU: Intensive Care Unit; NSST: Workers' Health and Safety Center.

Research Article
Artigo de Pesquisa
Artículo de Investigación

DOI: http://dx.doi.org/10.12957/reuerj.2023.76901

Table 2: Characterization of the social profile of health workers infected with the SARS-CoV-2 virus. Macapa, AP, Brazil, 2021

Variable	Global (n=215)	
	n	f(%)
Position		
Administrative worker	24	11.1
Nurse	42	19.5
Nursing technician	86	40
Others (doctor. physiotherapist. radiology and laboratory technician)	63	29.3
Department		
Outpatient Clinics	14	6.5
Nephrology	22	10.2
ICU	20	9.3
HCOC	19	8.8
Others (administration, clinics, pharmacy, laboratory, NSST, etc.)	140	65.1
Type of employment relationship		
Contracts	18	8.4
State and federal	197	91.6
Length of Service (years)		
Less than 5	20	9.3
6 to 10	65	30.2
10 or more	130	60.4

Note: CA: Cancer: SLE: Systemic Erythematosus Lupus; COPD: Chronic Obstructive Pulmonary Disease.

Of the 215 workers, 81.9% were women, aged ≥ 40 and < 55 years (53.4%), brown and black (79%). The highest incidence was among nursing technicians (40%), working in the nephrology (10.2%), ICU (9.3%) and HCOC (8.8%) units, with statutory and federal employment contracts (91.6%) and more than 10 years' service (60.4%). As for their previous state of health, 30.2% had comorbidities: hypertension (20.0%) and diabetes mellitus (6.0%). There were 10.2% family members of workers with COVID-19. The epidemiological diagnosis is shown in Table 3.

A total of 9.3% were asymptomatic. Among those with symptoms, the following prevailed: headache (53.5%), cough (51.6%) and fever (47.9%). The presence of other symptoms was of very low significance. Diagnosis was mainly by rapid antigen test (76.3%) and predominantly by outpatient care (90.2%). Hospitalizations (9.3%) lasted up to seven days (2.3%), with work absences of between eight and 14 days (45.1%). However, 13.0% were not absent from work. 100% were cured and the predominant sequela was diabetes mellitus (8.4%).

Absence from work for more than 14 days occurred in 32.5%. Analyzing the number of symptoms according to the job they did, there was no statistically significant difference (t=-0.086; df= 213; p=0.932). There was also no statistically significant difference in the average number of days off work depending on their job (t= -0.182; df=206; p=0.856). These data show that direct exposure was not related to days away from work.

When considering the frequency of days off work for more than 14 days in the groups with and without the factor (if it was greater than 10%), the analysis of risk factors significantly associated with the need to be off work for more than 14 days showed: dyspnea (48.6%, OR= 3.6); chest pain (46.7%, OR= 2.8); and sequelae of the disease (59.3%, OR= 4.1). Workers with these factors were significantly more likely to be off work for more than 14 days.

Research Article
Artigo de Pesquisa
Artículo de Investigación

DOI: http://dx.doi.org/10.12957/reuerj.2023.76901

Table 3: Epidemiological characterization of health workers infected with SARS-CoV-2 (n=215). Macapá, AP, Brazil, 2021.

Variable		n	f(%)
Symptoms	No symptoms	20	9.3
	Headache	115	53.5
	Cough	111	51.6
	Fever	103	47.9
	Sore throat	82	38.1
	Dyspnea	72	33.5
	Body pain	67	31.2
	Chest pain	60	27.9
RT-PCR	Not detectable	12	12.2
	Detectable	78	79.5
	No result	8	8.2
Rapid Test (IGM/IGG)	Not Reagent	33	20.1
	Reagent	129	78.7
	No result	2	1.2
Serological Test (IGM/IGG)	Non-reactive	9	36.0
	Reactive	16	64.0
Chest CT	No commitment (0)	12	20.7%
	5 to 10	11	19.0%
	15 to 20	2	5.1%
	25 to 50	15	25.9%
	50 to 75	1	1.7%
Service	Outpatient	194	90.2
	Hospitalization	20	9.3
	ICU	1	0.5
Length of stay (days)	0	206	95.8
	1 to 7	5	2.3
	8 or more	4	1.8
Sick leave (days)	0	27	13.0
	1 to 7	19	9.08.8
	8 to 14	97	45.1
	15 or more	70	32.5
Cure outcome		215	100.0
Had COVID sequelae	Diabetes mellitus	18	8.4
	Difficulty breathing	17	7.9
	Residual cough	11	5.1
	Other (recent memory loss, high blood pressure, anxiety, others)	6	2.7

Since the variables did not follow a normal distribution, the correlation matrix was evaluated using Spearman's rank correlation coefficient (Table 4).

Table 4: Correlation matrix between the quantitative variables of the study among health workers infected with SARS-CoV-2. Macapa, AP, Brazil, 2021.

	Age	Length of service	Total Comorbidities	Total symptoms	Hospitalization time	Sick leave	Total sequelae
Age	1.00						
Length of service	**0.66**	1.00					
Total Comorbidities	0.30	0.25	1.00				
Total symptoms	0.12	0.15	0.19	1.00			
Hospitalization time	-0.02	0.00	-0.03	0.09	1.00		
Sick leave	0.04	0.11	0.08	0.24	0.31	1.00	
Total sequelae	0.10	0.09	0.15	0.25	0.28	0.21	1.00

The only moderate correlation found was the correlation between length of service and age (0.66), which was naturally expected. No strong correlation was found between the quantitative variables in this study.

Research Article
Artigo de Pesquisa
Artículo de Investigación

DOI: http://dx.doi.org/10.12957/reuerj.2023.76901

DISCUSSION

Using the PRECEDE-PROCEED model, it was possible to identify factors that determine illness and can interact with social factors and influence workers' health. In hospitals, biological (micro-organisms), physical (noise, radiation), chemical (chemicals, gases and vapours), ergonomic (postures, overloads, fatigue, work organization) and accident risk factors can cause harm, depending on the nature, concentration and time of exposure to the risk. Regulatory Standard 32 sets out the guidelines for implementing measures to protect workers' health and safety[19].

This study showed a higher number of infected women, most likely due to the high number of women in the health sector. It is a fact that the COVID-19 pandemic has revealed the social repercussions of inequality between men and women in the labor market, with indicators showing that in Brazil the labor participation rate was higher among men (65.5%). However, when the sectors are stratified, in health, 73.2% are women working on the front line of the pandemic and more exposed to the virus, confirming the results of this research[20,21].

The predominant age group in this study is the same as in others, which show that health workers are in the midst of developing their professional careers, acquiring in-depth knowledge of the work they do[22].

In terms of skin color, black Brazilian workers (black and brown) are more numerous and have had their job opportunities reduced, with job losses generated by fragile contracts such as fixed-term contracts during the pandemic, as studies show[23,24]. This data contradicts the findings of this study, as the majority of the workers declared themselves to be black, but with a permanent contract through a public examination.

Another relevant finding of this study, similar to many published studies, was the fact that the majority of workers with a nursing degree were affected, given that there was contact with biological material, stressful environments, long hours working in different sectors caring for patients with COVID-19[3,25]. It also draws attention to the possible underreporting of records from other professional categories.

It was found that within the hospital environment, some sectors (Nephrology, HCOC, ICU) had a higher number of SARS-CoV-2 positive workers. As mentioned[26] occupations in these sectors were classified according to their risk of contracting COVID-19 (very high and high risk), type of contact with patients (direct) and procedures performed (invasive and aerosol-generating). In addition to these risks, during the pandemic workers were exposed to psychological suffering: fear of the unknown, of becoming infected and transmitting it to family members, long working hours, work overload, causing absenteeism, Bournout and presenteeism[27,28].

As for the presence of comorbidities, the most prevalent among those affected in this study were hypertension and diabetes. These are a public health problem in the world as well as in Brazil. National epidemiological data show that 32.5% of adults and 60% of the elderly suffer from hypertension and 8.9% of the population from diabetes mellitus[29]. Similarly, SAH (n=45) was found to be a priority comorbidity among health professionals in Nigeria[30].

Exposure to SARS-CoV-2 can occur through health workers' contact with patients, with other workers in the workplace, with family members and also in social interaction[27,30]. In the study, the history of contact with COVID-19 cases in family members was minimal, contrary to what was found in Portugal, where the main source of infection was community-based (85%)[31].

COVID-19 can have a variety of clinical manifestations: a) asymptomatic case (positive test in the absence of symptoms); b) mild (non-specific symptoms); c) moderate (mild signs and symptoms with progressive worsening); d) severe (Severe Acute Respiratory Syndrome with respiratory distress, saturation less than 95%); e) critical (severe respiratory failure, multiple organ dysfunction, respiratory support and admissions to intensive care units)[32].

These symptoms can develop between 2 and 14 days after exposure to the coronavirus and the diagnosis can be clinical, clinical-epidemiological, laboratory and radiological imaging, with outpatient and/or inpatient care[32]

In this study, laboratory tests were carried out with a predominance of antigen research by rapid test, which was available to health workers in 2020 and, at the same time, scarce because there was a worldwide shortage of supplies and, in Brazil, there was a rationalization of the use of the swab in the nasal collection of upper respiratory tract samples[32,33].

RT-PCR (real-time reverse transcription polymerase chain reaction), the gold standard for diagnosis and, at the time, expensive, was the main test used in research with healthcare workers at a public hospital in Madrid, Spain (from

DOI: http://dx.doi.org/10.12957/reuerj.2023.76901

February 24 to April 30, 2020)[34], in Nasarawa, Nigeria, (between January 20 and August 30, 2020), which included confirmed cases of SARS-CoV-2[30] and also at King Saud Medical City (between March and July 2020), Riyadh, Kingdom of Saudi Arabia[35].

Chest CT showed 25% to 50% pulmonary involvement with ground-glass opacity. The guidelines of the American and Brazilian Colleges of Radiology are that chest CT is indicated for hospitalized symptomatic patients and is not recommended as a screening test for suspects[36].

Considering the clinical evolution, the prevalence of outpatient care and the main outcome, which was cure, it can be said that, in this study, the cases are configured as Flu Syndrome (GS), similar to the study with a high recovery rate[35]. There were no records of Severe Acute Respiratory Syndrome (SARS)[37], which is aggressive (especially in the elderly) with a high rate of ICU admissions[33].

In order to prevent spread and contamination, the Ministry of Health recommended that symptomatic individuals take 14 days off work from the onset of symptoms or a positive test[37]. The longest time off work among those analyzed was between 8 and 14 days, and it should be noted that 13% of those infected did not take time off work because they were asymptomatic, were unaware of being carriers of the coronavirus and only after laboratory tests were carried out were they diagnosed with the disease.

The literature shows this clinical variation and, at the time, recommended that isolation and precautionary measures be started immediately after a positive test and suspended after 10 days if the worker was afebrile and not taking antipyretics. Exceptionally, due to work overload, workers could return to work 7 days after the first test if they were afebrile and without medication. As reported in this study[38] that many workers were infected and showed no symptoms, which demonstrated the need for continuous surveillance in order to minimize viral transmissionl[32,37,38].

Although most workers recover completely, some are left with sequelae, characterizing Post-COVID-19 Syndrome, whose symptoms are fatigue, persistent cough, post-exertion dyspnea, sleep disorders, headache, anosmia and vertigo[39]. Some of these manifestations were similar to those found in this study, in addition to Diabetes Mellitus.

In the analysis of risk factors significantly associated with the need to take time off work for more than 14 days in workers with COVID-19, it was found that the chances were higher. The chance of having to take time off work for more than 14 days for those with: dyspnea symptoms was 3.6 times; chest pain was 2.8 times; and sequelae of the disease was 4.1 times. These data are in line with the epidemiological evidence of this pandemic[32].

It is worth noting that in the initial period of the pandemic, when hospitals were overcrowded with patients, there was a shortage of Personal Protective Equipment (PPE) or inadequate use. According to WHO guidelines, PPE should be used during the entire period of care. To this end, there should be safe provision, training in dressing and undressing and PPE should not be reused and should be disposed of correctly to avoid contamination and the spread of the disease[38].

Study limitations

Considering that data was only collected from the medical records of workers at a single hospital that had an occupational health service, the number of workers surveyed who had been affected by COVID-19 in the entire municipality was limited. It is recommended that this be extended to other public hospitals in Macapa that have received health workers affected by the coronavirus. It should also be noted that this study is a specific analysis, whose data capture was limited to the period 2020 and 2021 and does not extend to the year 2022.

CONCLUSION

Knowing the social and epidemiological diagnoses of health workers in a public institution that has been a reference for the care of workers with COVID-19, using the PRECEDE-PROCEED intervention and evaluation model, was fundamental because it made it possible to expand the adoption of health-promoting measures, with educational actions and indications of public policies for local management. It also made it possible to adopt preventive behavioural practices, minimizing existing environmental risks and creating a collaborative, pleasant, healthier health environment with a better quality of life.

The multi-professional team in the occupational health and safety service can develop promotion and prevention actions: guidance on risk factors, illnesses, accidents at work and care related to workers' health.

Research Article
Artigo de Pesquisa
Artículo de Investigación

DOI: http://dx.doi.org/10.12957/reuerj.2023.76901

As contributions to the field of nursing and health, in the last two years many studies on COVID-19 have been published in national and international journals because it is an emerging disease. However, studies using the PRECEDE-PROCEED model involving health workers affected by coronavirus are minimal and can contribute because interventions can be made in certain communities, aiming to promote health and improve quality of life. It should be noted that this model has already been used in several countries because it incorporates factors that reorganize the practice of preventive behaviors that will involve the population as a whole and not just people exposed to specific risks.

REFERENCES

1. Spagnolo L, Vimercati L, Caputi A, Benevento M, Maria LD, Ferorelli D, et al. Role and tasks of the occupational physician during the COVID-19 pandemic. Medicina. 2021 [cited 2023 May 12]; 57(5):479. DOI: http://dx.doi.org/10.3390/medicina57050479.
2. Tan-Loh J, Brian BMK. A descriptive analysis of clinical characteristics of COVID19 among healthcare workers in a district specialist hospital. Med J Malaysia. 2021 [cited 2023 May 12]; 76(1):24-8. Available from: https://www.e-mjm.org/2021/v76n1/characteristics-of-COVID-19.pdf.
3. Mandić-Rajčević S, Masci F, Crespi E, Franchetti S, Longo A, Bollina I, et al. Source and symptoms of COVID-19 among hospital workers in Milan. Occup Med. 2020 [cited 2023 May 12]; 70(9):672-9. DOI: http://dx.doi.org/10.1093/occmed/kqaa20.
4. Fernandez JG, Vilches IM, Rodríguez AB, Torres IC, Romay EIC, Arata IG, et al. Impact of SARS-CoV-2 pandemic among health care workers in a secondary teaching hospital in Spain. PLoS ONE. 2021 [cited 2023 May 12]; 16(1):e0245001. DOI: http://dx.doi.org/10.1371/journal.pone.0245001.
5. Belmonte AA, Martinez L, Maranhão N. Normas Regulamentadoras e saúde do trabalhador em tempo de coronavírus. In: Belmonte AA, Martinez L, Maranhão N. O direito do trabalho na crise da COVID-19. Salvador: JusPodivm; 2020 [cited 2023 May 12]. p. 239-56. Available from: https://www.trt1.jus.br/documents/21708/10110171/7_e-Book_O+Direito+do+Trabalho+na+Crise+do+COVID-1.pdf/2dfbda3d-4aac-b530-0c06-ae730f78ec99.
6. World Health Organization. WHO Coronavírus (COVID-19) Dashboard [Site de Internet]. Geneva: WHO; 2023 [cited 2023 May 12]. Available from: https://covid19.who.int/.
7. Brasil. Ministério da Saúde. Painel Coronavírus – DataSUS [Site de Internet]. Brasília: Ministério da Saúde; 2023 [cited 2023 May 12]. Available from: https://covid.saude.gov.br/.
8. Brail. Ministério da Saúde. Secretaria de Vigilância em Saúde. Boletim epidemiológico especial: doença pelo novo coronavírus COVID-19. Brasília: Ministério da Saúde; 2022 [cited 2023 May 12]. Available from: https://www.gov.br/saude/pt-br/centrais-de-conteudo/publicacoes/boletins/epidemiologicos/covid-19/2022/boletim-epidemiologico-no-146-boletim-coe-coronavirus.pdf.
9. Green LW, Gielen AC, Ottoson JM, Peterson DV, Kreuter MW. Health program planning, implementation, and evaluation: creating behavioral, environmental, and policy change. Baltimore: Johns Hopkins University Press; 2022.
10. Ferreira FMPB, Mota LAN, Brito IS, Santos MR. Perfil de saúde dos estudantes de enfermagem: diagnóstico epidemiológico a partir do modelo PRECEDE-PROCEED. Referência. 2017 [cited 2023 May 12]; 4(15):90-103. Available from: https://www.redalyc.org/articulo.oa?id=388255693011.
11. Scoralick GBF, Daher DV. Com a palavra os adolescentes: intervenção participativa em saúde sexual e reprodutiva em território de vulnerabilidade social no município de Paraíba do Sul-RJ [Master thesis]. Niterói: Universidade Federal Fluminense; 2018 [cited 2023 May 12]. Available from: https://app.uff.br/riuff/bitstream/handle/1/8986/Graziela%20Barbosa%20Freitas%20Scoralick.pdf?sequence=1&isAllowed=y.
12. SmartLab. Observatório de Segurança e Saúde no Trabalho. Brasil COVID-19. Brasília: SmartLab; 2023 [cited 2023 May 12]. Available from: https://smartlabbr.org/sst/localidade/0?dimensao=covid.
13. Ministério da Saúde (BR), Secretaria de Ciência, Tecnologia e Insumos Estratégicos, Departamento de Ciência e Tecnologia. Agenda de Prioridades de Pesquisa do Ministério da Saúde – APPMS. Brasília: Ministério da Saúde; 2018 [cited 2023 May 12]. 26 p. Available from: https://bvsms.saude.gov.br/bvs/publicacoes/agenda_prioridades_pesquisa_ms.pdf.
14. Governo do Estado Amapá (BR), Secretaria de Estado da Saúde, Hospital de Clínicas Dr. Alberto Lima. Laudo Técnico de Insalubridade do Hospital de Clínicas Dr. Alberto Lima. Macapá: SESA; 2018 [cited 2023 May 12]. Available from: https://editor.amapa.gov.br/arquivos_portais/publicacoes/SESA_1fddbde4858053ab08546ab76ae88d13.pdf.
15. Araújo MH, Daher DV, Coelho KMR, Silva RSS, Rodrigues JCM. Atenção integral à saúde de trabalhadores: experiência de implantação do Núcleo de Saúde e Segurança do Trabalhador em um hospital público de Macapá. In: Abrahão AL, Moreira DC. Um exercício micropolítico na saúde: experiências e narrativas. Rio de Janeiro: Autorale; 2022.
16. Favero LP, Belfiore P, Silva FL, Chan BL. Análise de dados: modelagem multivariada para tomada de decisões. Rio de Janeiro: Elsevier; 2009.
17. Medronho RA, Bloch KV, Luiz RR, Werneck GL. Epidemiologia. São Paulo: Atheneu; 2009.
18. Ministério da Saúde (BR). Resolução nº 466, de 12 de dezembro de 2012. Diretrizes e normas regulamentadoras de pesquisas envolvendo seres humanos. Brasília: Ministério da Saúde; 2012 [cited 2023 May 12]. Available from: https://conselho.saude.gov.br/resolucoes/2012/Reso466.pdf.
19. Ministério do Trabalho e Previdência (BR). NR 32 - Segurança e saúde no trabalho em serviços de saúde. Brasília: MTb/MS; 2005 [cited 2023 May 12]. Available from: https://www.gov.br/trabalho-e-previdencia/pt-br/composicao/orgaos-especificos/secretaria-de-trabalho/inspecao/seguranca-e-saude-no-trabalho/normas-regulamentadoras/nr-32.pdf.

Research Article
Artigo de Pesquisa
Artículo de Investigación

DOI: http://dx.doi.org/10.12957/reuerj.2023.76901

20. Comisión Económica para América Latina y el Caribe. La autonomía económica de las mujeres en la recuperación sostenible y con igualdad. Informe Especial COVID-19, nº 9. Santiago: CEPAL; 2021 [cited 2023 May 12]. Available from: https://repositorio.cepal.org/bitstream/handle/11362/46633/S2000740_es.pdf?sequence=5&isAllowed=y
21. Departamento Intersindical de Estatística e Estudos Socioeconômicos. Boletim Especial 8 de março - Dia da Mulher - Mulheres no mercado de trabalho brasileiro: velhas desigualdades e mais precarização. São Paulo: DIEESEE; 2022 [cited 2023 May 12]. Available from: https://www.dieese.org.br/boletimespecial/2022/mulher.html.
22. Pedro DRC, Fracasso NV, Costa RG, Rossaneis MA, Aroni P, Haddad MCFL. Age management practices toward workers aged 45 years or older: an integrative literature review. Rev Bras Med Trab. 2020 [cited 2023 May 12]; 18(2):194-202. DOI: http://dx.doi.org/10.47626/1679-4435-2020-536.
23. Amaral IM. Crise COVID-19 e trabalho: um olhar sobre a desigualdade de gênero na ciência. Gêner Amazônia. 2021 [cited 2021 Aug 12]; 19:71-84. DOI: http://dx.doi.org/10.18542/rcga.v0i19.13313.
24. Machado MH, Wermelinger M, Machado AV, Pereira EJ, Aguiar Filho W. Perfil e condições de trabalho dos profissionais da saúde em tempos de COVID-19: a realidade brasileira. In: Portela MC, Reis LGC, Lima SML. COVID-19: desafios para a organização e repercussões nos sistemas e serviços de saúde. Rio de Janeiro: FIOCRUZ; 2022 [cited 2023 May 12]. p. 283-95. Available from: https://portal.fiocruz.br/livro/covid-19-desafios-para-organizacao-e-repercussoes-nos-sistemas-e-servicos-de-saude.
25. Silva MAS, Lima MCL, Dourado CARO, Pinho CM, Andrade MS. Nursing professionals' biosafety in confronting COVID-19. Rev Bras Enferm. 2022 [cited 2023 May 12]; 75(suppl 1):e20201104. DOI: http://dx.doi.org/10.1590/0034-7167-2020-1104.
26. Ministério da Saúde (BR). Orientações de vigilância epidemiológica da COVID-19 relacionada ao trabalho. Brasília: Ministério da Saúde; 2020 [cited 2023 May 12]. Available from: https://www.sindhoesg.org.br/dados/publicacoes/pub0003572-ff90fd9cecc5a091899b7d3a0f6212e9.pdf.
27. Miranda FMA, Santana LL, Pizzolato AC, Saquis LMM. Condições de trabalho e o impacto na saúde dos profissionais de enfermagem frente a COVID-19. Cogitare Enferm. 2020 [cited 2023 May 12]; 25:e72702. DOI: http://dx.doi.org/10.5380/ce.v25i0.72702.
28. Souza NVDO, Carvalho EC, Soares SSS, Varella TCMML, Pereira SRM, Andrade KBS. Nursing work in the COVID-19 pandemic and repercussions for workers' mental health. Rev Gaúcha Enferm. 2021 [cited 2023 May 12]; 42(spe):e20200225. DOI: http://dx.doi.org/10.1590/1983-1447.2021.20200225.
29. Oliveira RRA. Alta prevalência de hipertensão arterial sistêmica associada ao diabetes mellitus tipo 2 e suas complicações [Monografia de Conclusão de Curso]. Belo Horizonte: UFMG; 2019 [cited 2023 May 12]. Available from: https://www.nescon.medicina.ufmg.br/biblioteca/imagem/RAIZA-RANGEL-ALVES-OLIVEIRA.pdf.
30. Akyala AI, Awayimbo JR, Elayo MI, Olugbade OT, Akabe EA, Akinyoade A. Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) infection among health care workers in Nasarawa State, Nigeria: implications for infection prevention and control measures. Pan Afr Med J. 2020 [cited 2023 May 12]; 37(Suppl 1):21. DOI: http://dx.doi.org/10.11604/pamj.supp.2020.37.1.25767.
31. Oliveira A, Leite C, Rocha D, Morais M, Bento J, Rocha L. Em época de pandemia: COVID-19 como doença profissional - a experiência de um Instituto Português de Oncologia. RPSO. 2020 [cited 2023 May 12]; 10:1-9. DOI: http://dx.doi.org/10.31252/RPSO.26.09.2020.
32. Ministério da Saúde (BR). Guia de vigilância epidemiológica: emergência de saúde pública de importância nacional pela doença pelo coronavírus 2019 - COVID-19. Brasília: Ministério da Saúde; 2022 [cited 2023 May 12]. Available from: https://www.gov.br/saude/pt-br/coronavirus/publicacoes-tecnicas/guias-e-planos/guia-de-vigilancia-epidemiologica-covid-19.
33. Barranco R, Ventura F. COVID-19 and infection in health-care workers: an emerging problem. Med Leg J. 2020 [cited 2023 May 12]; 88(2):65-6. DOI: http://dx.doi.org/10.1177/0025817220923694.
34. Suárez-García I, Lopez MJMA, Vicente AS, Abascal PL. SARS-CoV-2 infection among healthcare workers in a hospital in Madrid, Spain. J Hosp Infect. 2020 [cited 2023 May 12]; 106(2):357-63. DOI: http://dx.doi.org/10.1016/j.jhin.2020.07.020.
35. Amer HA, Abdallah HA, Alkheledan HS, Gul NS, Altayieb JÁ, Alsalam M, et al. Characteristics of healthcare workers with COVID-19: a retrospective descriptive study in a quaternary care center in Riyadh, Saudi Arabia. Ann Med Surg (Lond). 2021 [cited 2023 May 12]; 72:103069. DOI: http://dx.doi.org/10.1016/j.amsu.2021.103069.
36. Meirelles GSP. COVID-19: uma breve atualização para os radiologistas. Radiol Bras. 2020 [cited 2023 May 12]; 53(5):320-8. DOI: http://dx.doi.org/10.1590/0100-3984.2020.0074.
37. Ministério da Saúde (BR). Recomendações de proteção aos trabalhadores dos serviços de saúde no atendimento de COVID-19 e outras síndromes gripais. Brasília: Ministério da Saúde; 2020 [cited 2023 May 12]. Available from: https://www.saude.go.gov.br/files/banner_coronavirus/GuiaMS-RecomendacoesdeprotecaotrabalhadoresCOVID-19.pdf.
38. Fernandez JG, Vilches IM, Rodríguez AB, Torres IC, Romay EIC, Arata IG, et al. Impact of SARS-CoV-2 pandemic among health care workers in a secondary teaching hospital in Spain. PLoS ONE. 2021 [cited 2023 May 12]; 16(1):e0245001. DOI: http://dx.doi.org/10.1371/journal.pone.0245001.
39. Gaber TAK, Ashish A, Unsworth A. Persistent post-covid symptoms in healthcare workers. Occup Med (Lond). 2021 [cited 2023 May 12]; 71(3):144-6. DOI: https://doi.org/10.1093/occmed/kqab043.

Authors' contributions

Conceptualization, M.H.M.A., D.V.D. e I.S.B.; methodology, M.H.M.A., D.V.D. e I.S.B; validation, M.H.M.A., D.V.D. e I.S.B; formal analysis, D.V.D., I.S.B. e V.M.S.; investigation, M.H.M.A., D.V.D., I.S.B., V.M.S., E.R.T., M.G.A.F., C.H.M. e C.A.G.M.D.; resources, M.H.M.A.; manuscript writing, M.H.M.A., D.V.D., I.S.B., M.G.A.F., C.H.M. e C.A.G.M.D.; manuscript review and editing, M.H.M.A., D.V.D. e I.S.B.; visualization, M.G.A.F., C.H.M. e C.A.G.M.D; supervision, D.V.D. e I.S.B; project administration, D.V.D.; financial aquisition, M.H.M.A. All authors have read and agreed to the published version of the manuscript.