Original Research Article

Protocol for a Systematic Review and Meta-Analysis on Risk Factors to COVID-19 Infection in Nursing Professionals

Maria de Lourdes de Souza[1*], Cheila Maria Lins Bentes[2], Stefhanie Conceição de Jesus[3], Kátia Cilene Godinho Bertoncello[4], Beatriz Furtuoso Petry[5], Geline Nascente Soares Lentz[6], Carolina Huller Farias[7], Jéssica Costa Maia[8], Juliano Kernitskei[9], Húndra Prestes de Godoi[10], Julio Cesar Preve[11], Rhuan Medeiros Rios[12]

[1]Professor at Nursing Graduate Program of Federal University of Santa Catarina, Coordinator of REPENSUL Institute, Florianópolis, Santa Catarina, Brazil
[2]Assistant Teacher at University of Amazonas State, Brazil
[3]Brazil. Master in Nursing at Federal University of Santa Catarina, Brazil
[4]Professor at Nursing Graduate Program of Federal University of Santa Catarina, Brazil
[5]Graduation nursing student at Federal University of Santa Catarina, Brazil
[6]Student of the Professional Master's Degree in Nursing at the Federal University of Santa Catarina, Brazil
[7]Student in the Graduate Nursing Program at Federal University of Santa Catarina, Brazil
[8]Student in the Graduate Nursing Program at Federal University of Santa Catarina, Brazil
[9]Msc. in Nursing at Federal University of Santa Catarina, Brazil
[10]Student of the Professional Master's Degree in Nursing at the Federal University of Santa Catarina, Brazil
[11]Student of the Professional Master's Degree in Nursing at the Federal University of Santa Catarina, Brazil
[12]Graduation nursing student at Federal University of Santa Catarina, Brazil

*Corresponding author: Maria de Lourdes de Souza

Abstract

The scenario of the COVID-19 pandemic and the existing care conditions are different in each country. The risk factors for contamination can directly affect health professionals, especially nursing professionals, causing a worsening of the pandemic at the time of their illness and death. To identify risk factors for COVID-19 infection in nursing professionals in the care of suspected or confirmed COVID-19 patients. A protocol for a Systematic Review and Meta-Analysis study has been developed, supported by the Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P), and registered in the International Prospective Register of Systematic Reviews (PROSPERO) under number CRD42020178168. The research question was structured according to the PICO strategy, P – nursing professionals; I – any nursing care to suspected or confirmed COVID-19 patient; C – nursing professionals without COVID-19 infection; O – nursing professionals with confirmed COVID-19 infection. Defined as follows: What are the risk factors associated with COVID-19 infection in nursing professionals with suspected or confirmed COVID-19 infection? In order to better plan the use of electronic searches, the following databases were consulted given the specificities of each database, specific search strategies were chosen for each database. Once the inclusion and exclusion criteria have been applied, the quality of the evidence will be assessed by applying the Grading of Recommendations, Assessment, Development and Evaluation.T. Ethics and disclosure: review study with primary articles already published. Therefore, it does not require authorization from any Ethics Committee. Trial registration number: CRD42020178168 Available from: https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42020178168
Keywords: SARS virus; Risk; Risk factors; Nursing professionals; Systematic review as topic.

Strengths and weaknesses of this review

- Until the date of 04/07/2020, there were no records in the PROSPERO of other SRs, with theme, research question and similar objectives about risk of COVID-19 for nursing professionals;
- In the face of an emerging disease in China in December 2019 and the lack of studies of this nature, this SR enables us to identify the risks for the contamination of nursing staff and the gaps in the pertinent literature. In addition, it enables us to propose specific preventive measures;
- The quality of evidence from all studies registered in the consulted databases will be assessed with the support of the Grading of Recommendations,

Citation: Maria de Lourdes de Souza *et al* (2021). Protocol for a Systematic Review and Meta-Analysis on Risk Factors to COVID-19 Infection in Nursing Professionals. *Saudi J Nurs Health Care, 4*(8): 214-217.

214

Assessment, Development and Evaluation (GRADE), with the online tool – GRADEpro GDT;

- Nevertheless, the sample size of this SR represents a limitation, as it will be integrated only by studies published between December 2019 and December 2020, besides the possibility of heterogeneity of such studies;

- The risks of bias, the heterogeneity of studies and other analyses are introduced in the method, and may demonstrate that new theoretical, empirical and technological production studies are necessary.

1. INTRODUCTION

The virus homologous to the respiratory syndrome that took place in 2003, or Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), and its disease was named Coronavirus Disease 2019 (COVID-19). The outbreak that started in China has spread to over 200 countries, territories and areas and was officially declared by the WHO on 30th January as a Public Health Emergency of International Interest [1, 2].

SARS-CoV-2 is among the seven coronavirus subtypes that can infect humans and cause infections [2]. In studies conducted, scholars estimate that the incubation period of the virus is between 1 to 12.5 days (average 5-6 days) and the main transmission route is through droplets expelled from the upper respiratory tract of the infected individual and/or contact with the respiratory secretions of the patient on contaminated surfaces and equipment [1, 3, 4].

Patients infected with SARS-CoV-2 show different manifestations of the disease, but many of them have no symptoms and are called asymptomatic and are disease transmitters. Fever, cough, nasal congestion, fatigue and other manifestations of upper airway infections have been identified in those with symptoms [2, 5].

Healthcare professionals are at the forefront of ensuring essential care for patients, mainly those in critical condition. Consequently, these professionals are routinely exposed to the virus [1].

2. IMPORTANCE OF THIS REVIEW

Nursing professionals constitute the largest number of health professionals in the world and are integrated into all levels of healthcare, since they are in direct contact with those affected by COVID-19 infection and, therefore, with the virus itself [6].

Among the risk factors for the spread of the disease and the illness of the professionals, the weekly/daily workloads, the lack of materials and equipment necessary for safe care, fatigue, professional wear and tear, physical and psychological violence,

injuries caused by prolonged use of equipment, should be highlighted on a preliminary basis [1].

Nursing professionals need support from the health services, since they will remain on the frontline for patient care, evaluation and monitoring [6]. Therefore, the identification of the risk factors for infection in these professionals is fundamental to propose and implement prevention and control measures, in order to control the spread of the disease [1, 7, 8]. Considering the scenario of the COVID-19 pandemic, which has proved to be different in each country and the care conditions [9, 10], the analysis of studies published from December 2019 to December 2020 is justified, seeking to systematize the evidence on the risk factors for these professionals.

3. OBJECTIVE

The objectives of this systematic review are: to identify risk factors for COVID-19 infection in nursing professionals in the care of suspected or confirmed COVID-19 patients; to analyze the evidence for the association of infection and the work of nursing professionals; and to introduce an overview about the risks associated to the work of these professionals that require protective technologies.

4. METHOD

4.1 Stage 01 – Review question

This protocol for a Systematic Review and Meta-Analysis was developed in accordance with the Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P) [11], and registered in the International Prospective Register of Systematic Reviews (PROSPERO) under number CRD42020178168, April 7th, 2020. In addition, the reporting of this review will be conducted in line with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) recommendation [12].

The research question for conducting this review was structured according to the PICO strategy, where P represents the population of interest; I - intervention to be evaluated; C - comparator; and O – the outcome [13]. Defined as follows: What are the risk factors associated with COVID-19 infection in nursing professionals in the care of suspected or confirmed COVID-19 patients?

4.2 Stage 02 – Search

4.2.1 Data base: In order to better plan the use of electronic searches, the following databases were consulted: Literature Analysis and Retrieval System Online (MEDLINE)/National Library of Medicine (PubMed); Virtual Health Library (VHL); Scientific Electronic Library Online (SciELO); and SCOPUS, using the platform of the Coordination for the Improvement of Higher Education Personnel (CAPES, as per its Portuguese acronym). Given the specificities

of each database, search strategies were chosen for each database.

Controlled descriptors were used in English, Portuguese and Spanish, in the possibilities of plural and singular for each descriptor, besides recovering their synonyms. To that end, terms indexed in Medical Subject Headings (MeSH) as "MeSH terms" and "All Fields", and also in Health Science Descriptors (DeCS) as descriptors and synonyms, were recovered. Therefore, the following descriptors have been established: "Risk Factors"; "Occupational Exposure"; "Infection Control"; "COVID-19"; "2019-nCoV"; "Health Personnel"; "Nursing Team"; and "Nurses". In addition, Boolean AND and OR operators were adopted in the search strategies.

4.2.2. Eligibility criteria

The following inclusion criteria were defined: original articles; published from December 2019 to December 2020; in English, Portuguese or Spanish; and that the content was related to the topic – risk factor for COVID-19 transmission and infection to nursing professionals. Review studies, interviews, reports, letters, chronicles, editorial, government documents, guidelines, qualitative studies; studies which are not available for full recovery; studies which addressed health professionals other than nursing professionals; and studies which did not include the total number of nursing professionals will be excluded.

4.2.3. Process and tool for obtaining data

The collected data will be exported to a reference manager, EndNote. The results of base searches will be exported to Rayyan®, an electronic tool that enables independent evaluation of studies by reviewers. It will also enable us to identify studies indexed in more than one database [14]. Accordingly, duplicate publications will be removed, and the titles and abstracts of articles will be reviewed by two reviewers, independently, according to inclusion and exclusion criteria.

In order to evaluate the level of agreement between the reviewers, the Kappa coefficient will be calculated, in such a way as to obtain the proportion of agreement between the researchers, taking from those given by chance [15]. The following classification will be adopted: < 0.00, poor concordance; 0.00 - 0.20, slight concordance; 0.21 - 0.40, reasonable concordance; 0.41 - 0.60, moderate concordance; 0.61 - 0.80, substantial concordance; and 0.81 - 1.00, almost perfect [16].

Articles that do not obtain consensus between the two reviewers will be evaluated by a third reviewer for inclusion or disposal. All selected articles, considered relevant, will be integrated to this SR for reading the full article.

4.3 Stage 03 – Data extraction

The data that will be extracted from the studies included in this SR refer to: first author, year of publication, country, and study design; study population (Professional category, Age, Gender, Nationality, Pre-existing clinical conditions, Structural conditions of the health service); Positive test for COVID-19; and outcome measures. The data will be compiled in a spreadsheet designed by the researchers themselves in Microsoft Excel®, version 2019.

4.4 Stage 04 – Risk of bias (quality) assessment

All studies meeting the inclusion and exclusion criteria will be included in this SR, regardless of the quality of the evidence.

The quality of evidence will be assessed by applying the Grading of Recommendations, Assessment, Development and Evaluation (GRADE). In this assessment, the evidence can be classified into four levels, namely: high, moderate, low and very low. Randomized clinical trials, in this assessment, begin with a high level of evidence; on the other hand, observational studies, with a low level [17].

An online tool – GRADEpro GDT – will be applied to assess the level of evidence of studies included in this SR. Risk of bias, inconsistency, indirect evidence, imprecision and publication bias will be considered for criteria that may reduce the quality of evidence. Moreover, a large magnitude of effect, dose-response gradient, and residual confounding factors, which are criteria that may increase the degree of confidence in effect estimation [17].

Six domains will be considered for risk of bias: 1. Random sequence generation; 2. Allocation secrecy; 3. Participant and researcher masking; 4. Evaluator masking; 5. Incomplete results due to high loss rates, where losses up to 20% are considered as: low, >20%≤30%: moderate, >30%: high risk; 6. Incomplete data publishing). Each study will be classified as low, high or uncertain risk of bias according to the areas assessed.

4.5 Stage 05 – Strategy for data synthesis

As the main outcome, confirmed cases of COVID-19 among nursing professionals in the care of suspected or confirmed patients for COVID-19 will be considered. Thus, the relative risk for the variables will be calculated, considering a 95% Confidence Interval. The heterogeneity will be tested using the I^2 statistic, considering a value higher than 50% for high heterogeneity. Besides the Chi^2 test (significance level: 0.05), considering high heterogeneity when $P < 0.05$. The Mantel-Haenszel test will be used for the fixed effects model if the heterogeneity tests are not significant. In addition, supplementary analyses will be performed by subgroups by professional category; age; gender; pre-existing clinical condition; nationality; and use of protective equipment.

The RevMan public domain statistical programme will be used for the meta-analysis. The analysis of the funnel chart will be applied to assess the possibility of publication bias if the number of studies under analysis exceeds ten. The results will be reported with 95% CI and with statistical significance level set at 5% ($P < 0.05$).

5. ETHICS AND DISCLOSURE OF RESULTS

This review will systematically identify and assess the risks associated with the work of nursing professionals and possible protective technologies. This systematic review will be the subject of studies with nursing professionals at the Federal University of Santa Catarina. It will also be submitted for publication in an international journal that performs peer review.

This SR may subsidize the definition of guidelines and possible protective technologies for the risk factors associated with the work of nursing professionals identified in the national and international context, which will integrate articles published in Portuguese, Spanish and English.

Collaborators

All authors attended the study meetings for the planning of this protocol and graduate students made important questions and comments which were incorporated in the composition of this manuscript.

Conflict of interests

The author(s) stated that the content of this article represents the individual opinions of the authors and does not necessarily represent the views of the institutions where they work, as well as the UFSC.

REFERENCES

1. World Health Organization. (2020). Rolling updates on coronavirus disease (COVID-19): WHO characterizes COVID-19 as a pandemic.
2. Velavan, T. P., & Meyer, C. G. (2020). The COVID-19 epidemic. *Tropical Medicine & International Health, 25*(3), 278-280. https://doi.org/10.1111/tmi.13383
3. Zheng, J. (2020). SARS-CoV-2: an Emerging Coronavirus that Causes a Global Threat. Int J Biol Sci, 16(10), 1678-1685.https://doi.org/ 10.7150/ijbs.45053
4. Li, Q., Guan, X., Wu, P., Wang, X., Zhou, L., Tong, Y., Feng, Z. (2020). Early Transmission Dynamics in Wuhan, China, of Novel Coronavirus–Infected Pneumonia. *N Engl J Med*, 382, 1199-1207. https://doi.org/10.1056/NEJMoa2001316
5. Huang, C., Wang, Y., Li, X., Ren, L., Zhao, J., Hu, Y., Cao, B. (2020). Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet, 395(10223), 497-506. https://doi.org/10.1016/S0140-6736(20)30183-5
6. Choi, K. R., Jeffers, K. S., & Logsdon, M. C. (2020). Nursing and the Novel Coronavirus: Risks and Responsibilities in a Global Outbreak. *J Adv Nurs., 76*, 1486–1487. https://doi.org/10.1111/jan.14369
7. Ran, L., Chen, X., Wang, Y., Wu, W., Zhang, L., & Tan, X. (2020). Risk Factors of Healthcare Workers with Coronavirus Disease 2019: A Retrospective Cohort Study in a Designated Hospital of Wuhan in China. *Clin Infect Dis, 71*(16), 2218-2221. http://doi.org/10.1093/cid/ciaa287
8. Liu, M., He, P., Liu, H., Wang, X. J., Li, F. J., Chen, S., ... & Liu, J. H. (2020). Analysis of clinical characteristics of 30 new coronavirus pneumonia in medical staff. *Chinese Journal of Tuberculosis and Respiratory Diseases, 43*(3), 209-214.
9. Leung, K., Wu, J. T., Liu, D., & Leung, G. M. (2020). First-wave COVID-19 transmissibility and severity in China outside Hubei after control measures, and second-wave scenario planning: a modelling impact assessment. *The Lancet, 395*(10233), 1382-1393.
10. Deng, C. X. (2020). The global battle against SARS-CoV-2 and COVID-19. *International journal of biological sciences, 16*(10), 1676.
11. Moher, D., Shamseer, L., Clarke, M., Ghersi, D., Liberati, A., Petticrew, M., & Stewart, L. A. (2015). Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Systematic reviews, 4*(1), 1-9.
12. Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & Prisma Group. (2009). Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *PLoS medicine, 6*(7), e1000097.
13. Shamseer, L., Moher, D., Clarke, M., Ghersi, D., Liberati, A., Petticrew, M., ... & Stewart, L. A. (2015). Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015: elaboration and explanation. Bmj, 349.
14. Ouzzani, M., Hammady, H., Fedorowicz, Z., & Elmagarmid, A. (2016). Rayyan—a web and mobile app for systematic reviews. *Systematic reviews, 5*(1), 1-10.
15. Conger, A. J. (2017). Kappa and rater accuracy: Paradigms and parameters. Educational and psychological measurement, 77(6), 1019-1047.
16. Landis, J. R., & Koch, G. G. (1977). The measurement of observer agreement for categorical data. Biometrics, 159-174.
17. Zhang, Y., Akl, E. A., & Schünemann, H. J. (2019). Using systematic reviews in guideline development: the GRADE approach. *Research synthesis methods, 10*(3), 312-329.