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REVIEW PROTOCOL

Conditions associated with the worsening of COVID-19 in children and adolescents: scoping review protocol

Condiciones asociadas al agravamiento de la COVID-19 en niños y adolescentes: protocolo de *scoping review*

Condições associadas ao agravamento da COVID-19 em crianças e adolescentes: protocolo de revisão de escopo

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ABSTRACT

Objective: To map the available scientific knowledge about the conditions associated with the worsening of the COVID-19 situation in children and adolescents. **Method**: This is a protocol of a scoping review based on the Joanna Briggs Institute methodology. The following databases were chosen: MEDLINE via PubMed, Scopus, Web of Science, Cumulative Index to Nursing and Allied Health Literature (CINAHL), LILACS via Virtual Health Library (BVS), and Google Scholar. Two independent reviewers will carry out the search. The retrieval of references will take place in three steps according to the Joanna Briggs Institute recommendations. Medical Subject Headings (MeSH) descriptors and Health Sciences Descriptors (DeCS) will be used. The mapping tool suggested by the adopted reference will be used to extract the results. The results will be presented according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR). **Descriptors:** COVID-19; Child; Risk Factors.

RESUMO

Objetivo: Mapear o conhecimento científico disponível sobre as condições associadas ao agravamento do quadro da COVID-19 nas populações infantil e adolescente. **Método:** Protocolo de *scoping review* engendrada com base no desenho metodológico do Instituto Joanna Briggs. As bases de dados selecionadas foram: MEDLINE via PubMed, Scopus, Web of Science, *Cumulative Index to Nursing and Allied Health Literature* (CINAHL), LILACS via Biblioteca Virtual em Saúde (BVS), e Google Acadêmico. A busca dos artigos será realizada por dois pesquisadores independentes. A recuperação das referências se dará em três passos, conforme diretrizes preconizadas pelo Instituto Joanna Briggs. Serão empregados os descritores do *Medical Subject Headings* (MeSH) e os Descritores em Ciências da Saúde (DeCS). Para extração dos resultados, utilizar-se-á da ferramenta de mapeamento sugerida pelo referencial adotado. Os resultados serão apresentados de acordo com o *checklist* do *Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews* (PRISMA-ScR).
Descritores: COVID-19; Criança; Fatores de Risco.

RESUMEN

Objetivo: Mapear el conocimiento científico disponible sobre las condiciones asociadas al empeoramiento de la situación del COVID-19 en niños y adolescentes. **Método**: Este es un protocolo de una *scoping review* basado en la metodología del Joanna Briggs Institute. Se eligieron las siguientes bases de datos: MEDLINE a través de PubMed, Scopus, Web of Science, *Cumulative Index to Nursing and Allied Health Literature* (CINAHL), LILACS a través de la Biblioteca Virtual en Salud (BVS) y Google Scholar. Dos revisores independientes realizarán la búsqueda. La recuperación de referencias se realizará en tres pasos según las recomendaciones del Joanna Briggs Institute. Se utilizará los *Medical Subject Heading Terms* (MeSH) y los Descriptores de Ciencias de la Salud (DeSC). La herramienta de mapeo sugerida por la referencia adoptada se utilizará para extraer los resultados. Los resultados se presentarán de acuerdo con los elementos del *Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews* (PRISMA-Scr).
Descriptores: COVID-19; Niño; Factores de Riesgo.

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INTRODUCTION

On March 11, 2020, the World Health Organization (WHO) announced the Coronavirus disease 2019 (COVID-19) pandemic state[1]. The first cases of the hitherto unknown pathology were reported in December 2019, in the Chinese city of Wuhan, in the province of Hubei, and a new type of coronavirus was identified as the etiological agent of the infection[2]. The virus that triggers pneumonia of atypical presentation observed in patients was initially titled 2019-nCoV; then, in mid-February 2020, it was renamed by the International Committee on Taxonomy of Viruses as Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2)[3].

The COVID-19 pandemic is one of the greatest and most serious public health challenges at a global level that has punctuated the history of humanity[4]. The total number of cases accumulated in the world until this date, February 10, 2022, exceeds the mark of 400 million people infected and more than 5.7 million deaths[5].

When it comes to the pediatric population, the clinical spectrum of COVID-19 can range from asymptomatic cases to the development of severe acute respiratory syndrome[6]. Furthermore, the main symptoms of the pathology observed in children include fever, cough, and nasal symptoms such as nasal congestion and diarrhea, nausea, or vomiting, among others[7].

The disease seems to be less frequent among children, and, in general, it appears to result in less severe manifestations than in adult patients[8].

Several hypotheses have been reported in the scientific literature, aiming to substantiate the reasons for the lower severity of COVID-19 among pediatric patients. Among the possible justifications are the periodic exposure of children to viral infections and the relevant role of the angiotensin-converting enzyme 2, whose receptor is the target of SARS-CoV-2 binding, allowing the entry of the virus into the cells[9].

Although the prognosis of COVID-19 in this population is more favorable, children are susceptible to the pathology[10] and to severe conditions that require hospitalization in the Intensive Care Unit (ICU), use of mechanical ventilation, and death[11].

Another highlighted aspect is that children exposed to SARS-CoV-2 can develop the so-called Pediatric Multisystem Inflammatory Syndrome (PIMS). The condition, considered rare, has clinical characteristics similar to Kawasaki disease (KD), and some common signs and symptoms include fever, mucocutaneous findings, such as rash and edema of the extremities, gastrointestinal symptoms, myocardial dysfunction, and shock[12].

A study that included 20,714 patients aged 18 years or younger affected by COVID-19 found that 11.7% required hospitalization, 3.6% were admitted to the ICU, and 0.8% received invasive mechanical ventilation[11]. Another study, carried out in six pediatric hospitals in the United States, found that 14.5% of patients hospitalized due to the disease required invasive mechanical ventilation, 29.5% were treated in the ICU, and 1.5% died. Among the 915 children involved, 2.7% were diagnosed with PIMS[13].

Finally, it should be noted that the possibility of complications from COVID-19, such as PIMS and long-term COVID-19, the heightened vulnerability of children with comorbidities, the emergence of new variants of SARS-CoV-2, and other factors triggered the discussion about vaccination for these patients. Analyzes have indicated vaccines' efficacy, safety, and immunogenicity against COVID-19 in this population and, based on the results from these analyses, health authorities, at a global level, extended immunization to adolescents and, later, to children[14].

A previous search in two relevant health databases (MEDLINE via PubMed and Scopus) identified several literature reviews on COVID-19 in children. However, we found no reviews addressing the possible conditions related to the deterioration of the clinical status of children and adolescents affected by the pathology.

Thus, it is important to synthesize the existing knowledge regarding the potential factors that induced some children and adolescents to develop severe COVID-19 or critical conditions since research in this area is still incipient[15]. The present research aims to map the available scientific knowledge about the conditions associated with the worsening of the COVID-19 situation in children and adolescents.

METHOD

This study is a protocol for a scoping review based on the Joanna Briggs Institute (JBI) methodology[16], and we will follow the guidelines of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR). The scoping review is a suitable method for mapping the evidence available in the literature, and it is also viable to

investigate emerging areas of knowledge, such as COVID-19[16-17]. This research protocol was registered in the Open Science Framework (OSF), with registration no. 10.17605/OSF.IO/328FR. The research question developed to guide the review was: What scientific knowledge is available on the conditions related to the worsening of COVID-19 in children and adolescents? The mnemonic PCC (Population, Concept, and Context) was used as follows: "P": children and adolescents; "C": conditions related to the worsening of COVID-19; and "C": the COVID-19 pandemic. Individuals up to 10 years of age were considered children, and adolescents were those aged between 10 and 19 years, in line with the WHO classification[18-19]. Furthermore, due to the heterogeneity of criteria for classifying the severity of the disease available in the literature, the following indicators of COVID-19 worsening were determined: the need for hospitalization, ICU admission, and demand for ventilatory support. The following databases were chosen: MEDLINE via PubMed, Scopus, Web of Science, Cumulative Index to Nursing and Allied Health Literature (CINAHL), LILACS via Virtual Health Library (BVS), and Google Scholar. In addition, articles published from December 2019 onwards (date of the advent of COVID-19 cases) will be included, in any language, since they are available in full format and address children and adolescents with confirmed SARS-CoV-2 infection. Suppose the study simultaneously encompasses adult individuals (or other populations, such as older adults, pregnant women, etc.) besides children and adolescents. In that case, it will only be integrated into the review if the results are presented separately, allowing the differentiation of data concerning children and adolescents. In order to map the available knowledge extensively, restrictions will not be established regarding the study design as long as the research deals with the conditions associated with COVID-19 worsening. References that do not answer the research question or the proposed objective will be excluded.

Two independent reviewers will carry out the search. The retrieval of references will occur in three steps, according to the recommendations of the JBI[16]. The first step concerns a limited initial search in relevant databases and the analysis of titles, abstracts, and keywords. The second phase corresponds to a search in all the chosen databases, using the descriptors and keywords identified in full. In the last step, the reference list of articles chosen for review will be used to detect additional studies.

First, the two reviewers will read the titles and abstracts of the articles for pre-selection, and then the full texts will be screened. In case of divergences, and if there is no consensus, a third reviewer will decide whether or not to select the study.

Regarding the search strategy, the Medical Subject Headings (MeSH) and the Health Sciences Descriptors (DeCS) will be used in addition to uncontrolled descriptors, helping retrieve relevant articles. The following descriptors were initially defined: "children", "adolescent", "coronavirus infections", "COVID-19", "SARS-CoV-2", "intensive care units", "hospitalization", and "artificial respiration". The Boolean operators AND and OR will be used for the advanced search. The initial search strategy that will be applied to retrieve articles from MEDLINE through PubMed is described in Figure 1. It is noteworthy that the filters for "full text" and time (studies published from 2019) are included in the strategy.

The mapping tool suggested by the JBI[16] will be used to extract the results. Articles selected for review will be stored and organized using the Mendeley Desktop® reference manager. Since scoping reviews aim not to generate critically evaluated and condensed answers, the methodological limitations, and risk of bias of the incorporated articles will not be assessed[20]. The results will be presented according to the guidelines of the PRISMA-ScR checklist. Finally, the study is exempt from review by an Ethics Committee since it is a literature review.

CONFLICT OF INTEREST

The authors have declared that there is no conflict of interest.

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Database	Search strategy
MEDLINE (via PubMed)	((“child”[MeSH Terms] OR “adolescent”[MeSH Terms]) AND (“coronavirus infections”[MeSH Terms] OR “covid 19”[MeSH Terms] OR “sars cov 2”[MeSH Terms]) AND (“hospitalization”[MeSH Terms] OR “intensive care units”[MeSH Terms] OR “respiration, artificial”[MeSH Terms])) AND ((fft[Filter]) AND (2019:2022[pdat]))

Figure 1 - Search strategy to retrieve articles from MEDLINE via PubMed. Maringá, PR, Brazil
Source: Elaborated by the authors, 2022.

REFERENCES

1. World Health Organization (WHO). WHO Director-General’s opening remarks at the media briefing on COVID-19 - 11 March 2020 [Internet]. Geneva: WHO; 2020 [cited 2021 may 18]. Available from: https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks--at-the-%20media-briefing-on-covid-1911--march-2020

2. Helmy YA, Fawzy M, Elaswad A, Sobieh A, Kenney SP, Shehata AA. The COVID-19 Pandemic: A Comprehensive Review of Taxonomy, Genetics, Epidemiology, Diagnosis, Treatment, and Control. J Clin Med. 2020;9(4):1225. https://doi.org/10.3390/jcm9041225

3. Coronaviridae Study Group of the International Committee on Taxonomy of Viruses. The species severe acute respiratory syndrome--related coronavirus: classifying 2019-nCoV and naming it SARS- CoV-2. Nat Microbiol. 2020;5:536-544. https://doi.org/10.1038/s41564-020-0695-z. PMid:32123347

4. Roychoudhury S, Das A, Senguta P, Dutta S, Roychoudhury S, Choudhury AP, et al. Viral Pandemics of the Last Four Decades: Pathophysiology, Health Impacts and Perspectives. Int J Environ Res Public Health. 2020;17(24):9411. https://doi.org/10.3390/ijerph17249411. PMid:33333995

5. World Health Organization (WHO). Coronavirus disease (COVID-19) Dashboard [Internet]. Geneva: WHO; 2020 [cited 2022 feb 10]. Available from: https://covid19.who.int/

6. Carlotti APCP, Carvalho WB de, Johnston C, Rodriguez IS, Delgado AF. COVID-19 Diagnostic and Management Protocol for Pediatric Patients. Clinics. 2020;75:e1894. https://doi.org/10.6061/clinics/2020/e1894

7. Souza TH, Nadal JA, Nogueira RJN, Pereira RM, Brandão MB. Clinical manifestations of children with COVID-19: A systematic review. Pediatr Pulmonol. 2020;55(8):1892-9. https://doi.org/10.1002/ppul.24885. PMid:32492251

8. Ludvigsson JF. Systematic review of COVID-19 in children shows milder cases and a better prognosis than adults. Acta Paediatr. 2020;109(6):1088-95. https://doi.org/10.1111/apa.15270. PMid:32202343

9. Brodin P. Why is COVID-19 so mild in children? Acta Paediatr. 2020;109(6):1082-3. https://doi.org/10.1111/apa.15271. PMid:32212348

10. Parri N, Magistà AM, Marchetti F, Cantoni B, Arrighini A, Romanengo M, et al. Characteristic of COVID-19 infection in pediatric patients: early findings from two Italian Pediatric Research Networks. Eur J Pediatr. 2020;179:1315-23. https://doi.org/10.1007/s00431-020-03683-8. PMid:32495147

11. Preston LE, Chevinsky JR, Kompaniyets L, Lavery AM, Kimball A, Boehmer TK, et al. Characteristics and Disease Severity of US Children and Adolescents Diagnosed With COVID-19. JAMA Netw Open. 2021;4(4):e215298. https://doi.org/10.1001/jamanetworkopen.2021.5298. PMid:33835179

12. Henderson LA, Canna SW, Friedman KG, Gorelik M, Lapidus SK, Bassiri H, et al. American College of Rheumatology Clinical Guidance for

Multisystem Inflammatory Syndrome in Children Associated With SARS–CoV-2 and Hyperinflammation in Pediatric COVID-19: Version 2. Arthritis Rheumatol. 2021;73(4):e13--e29. https://doi.org/10.1002/art.41616. PMid:33277976

13. Wanga V, Gerdes ME, Shi DS, Choudhary R, Dulski TM, Hsu S, et al. Characteristics and Clinical Outcomes of Children and Adolescents Aged <18 Years Hospitalized with COVID-19 - Six Hospitals, United States, July--August 2021. MMWR Morb Mortal Wkly Rep. 2021 Dec 31;70(51-52):1766-72. https://doi.org/10.15585/mmwr.mm705152a3. PMid:34968374

14. Rudan I, Adeloye D, Katikireddi SV, Murray J, Simpson C, Shah SA, et al. The COVID-19 pandemic in children and young people during 2020-2021: A complex discussion on vaccination. J Glob Health. 2021;11:01011. https://doi.org/10.7189/jogh.11.01011. PMid:35047183

15. Zachariah P, Johnson CL, Halabi KC, Ahn D, Sen AI, Fischer A, et al. Epidemiology, Clinical Features, and Disease Severity in Patients With Coronavirus Disease 2019 (COVID-19) in a Children's Hospital in New York City, New York. JAMA Pediatr. 2020;174(10):e202430. https://doi.org/10.1001/jamapediatrics.2020.2430

16. Joanna Briggs Institute (JBI). Aromataris E, Munn Z, editors. JBI Manual for Evidence Synthesis [Internet]. Adelaide (AUS): JBI; 2020 [cited 2021 may 18]. Available from: https://synthesismanual.jbi.global. doi: https://doi.org/10.46658/JBIMES-20-01

17. Tricco AC, Lillie E, Zarin W, O'Brien K, Colquhoun H, Kastner M, et al. A scoping review on the conduct and reporting of scoping reviews. BMC Med Res Methodol. 2016;16:15. https://doi.org/10.1186/s12874-016-0116-4

18. Ministério da Saúde (BR), Secretaria de Atenção à Saúde, Departamento de Ações Programáticas Estratégicas. Política Nacional de Atenção Integral à Saúde da Criança: orientações para implementação [Internet]. Brasília: Ministério da Saúde; 2018 [cited 2021 may 18]. Available from: https://portaldeboaspraticas.iff.fiocruz.br/wp-content/uploads/2018/07/Pol%C3%ADtica--Nacional-de-Aten%C3%A7%C3%A3o--Integral-%C3%A0-Sa%C3%BAde-da--Crian%C3%A7a-PNAISC-Vers%C3%A3o--Eletr%C3%B4nica.pdf

19. Ministério da Saúde (BR), Secretaria de Atenção à Saúde, Departamento de Ações Programáticas e Estratégicas. Proteger e cuidar da saúde de adolescentes na atenção básica [Internet]. Brasília: Ministério da Saúde; 2017 [cited 2021 may 18]. Available from: https://bvsms.saude.gov.br/bvs/publicacoes/proteger_cuidar_adolescentes_atencao_basica.pdf

20. Munn Z, Peters MDJ, Stern C, Tufanaru C, McArthur A, Aromataris E. Systematic review or scoping review? Guidance for authors when choosing between a systematic or scoping review approach. BMC Med Res Methodol. 2018;18:143. https://doi.org/10.1186/s12874-018-0611-x

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