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Severity and mortality of COVID-19 among people with disabilities: protocol for a systematic review and meta-analysis

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ABSTRACT

Introduction As the COVID-19 pandemic and the subsequent global healthcare crisis continue, people with disabilities may face greater health risks than their non-disabled peers. This systematic review and meta-analysis aims to determine the severity and mortality of COVID-19 among people with different types of disabilities.

Methods and analysis We will search PubMed, HINARI, ScienceDirect, PEDro and Cochrane Library databases. Grey literature search will also be conducted on MedRxiv and Google Scholar. Searches will be without date restrictions. Cohort, case-control and cross-sectional studies assessing the severity and mortality of COVID-19 among people with disabilities will be included. Only full-text studies in the English language will be included. The outcomes of interest include the risk of COVID-19 infection, rate of hospitalisation, severity, hospital stay, mortality and others variables where data are available. Two reviewers will extract data and perform risk of bias assessment independently. The Newcastle-Ottawa Scale will be used to assess risk of bias. Review Manager V.5.4 and Stata V.16.0 software will be used for statistical analysis. Heterogeneity will be analysed using I^2 statistics. Pooled OR with 95% CI will be used to calculate the pooled results for outcome variables.

Ethics and dissemination Ethical approval and informed consent are not required as this is a systematic review of existing publications. The final results will be published in a peer reviewed journal and presented at national and international conferences.

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STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ Data extraction and risk of bias assessment will be performed by two reviewers independently.
⇒ The Newcastle-Ottawa Scale will be used to assess the risk of bias of the included studies.
⇒ The risk of publication bias and sensitivity analysis for outcomes will be assessed.
⇒ The absence of sufficient high-quality studies focusing on disability and COVID-19, heterogeneity in severity of COVID-19 measures and small sample size might be the limitations for this systematic review and meta-analysis.

INTRODUCTION

The number of globally registered COVID-19 cases exceeded 320 million, with more than 5.5 million deaths (as of 14 January 2022).[1] There is a growing concern that people with disability might be more exposed to SARS-CoV-2 infection, be more likely to present with severe COVID-19 outcomes and have poorer health during and after the outbreak depending on their disability status.[2–4] According to the International Classification of Functioning, Disability and Health, disability is the umbrella term for impairments, activity limitations and participation restrictions, and it happens when difficulties are encountered in any or all three areas of functioning.[5] It is not easy to practise COVID-19 prevention measures such as social distance in most disabled people with visual impairment and walking problems. It is relevant to note that many people with disabilities are financially dependent on others for their daily lives, so it is difficult to afford COVID-19 prevention measures as well as to practise quarantine and stay home. In addition, people with disabilities were systemically vulnerable for COVID-19 due to inaccessible health information and marginalisation.[6 7]

Previous studies have outlined that older age and presence of underlying comorbidities such as cancer, diabetes, cardiovascular disease, hypertension, heart failure, chronic kidney disease, HIV/AIDS and obesity, increased the risk of infection and mortality from COVID-19.[8–13] There are also ongoing and newly published review studies investigating the severity and mortality of COVID-19 in patients with sleep disorder and mental disorders.[14 15] Studies have identified that people with intellectual and developmental disabilities have higher prevalence

of comorbidities, such as hypertension, heart disease, respiratory disease, diabetes and depression, which are in-turn identified as risk factors for poor outcomes from COVID-19.[2] Even though, there exist limitations in data collection, recent studies have highlighted that COVID-19-related disease severity and death rate in people with intellectual and developmental disabilities were higher than in the general population.[2 3] Thus, intellectual and developmental disability and COVID-19 infection seems to be closely associated. A systematic review and meta-analysis conducted on COVID-19 in people with Parkinson's disease reported 5%, 49% and 12% prevalence, hospitalisation and mortality rates, respectively.[16] Another study reported that the prevalence of dementia was 10% (7%–13%) with an increased mortality rate (adjusted OR 1.80, 95% CI 1.45 to 2.24, p<0.001; I^2=72.9%) in patients with COVID-19.[17]

With nearly 1 billion (15% of the world's population) people with disabilities across the globe,[18] it remains urgent to characterise the outcomes of COVID-19 among this group. International definition and statistics of disability is very wide and general (disability is perceived and defined differently in different contexts). In this study we will focus on the most common types of disabilities like intellectual and developmental disability (such as autism, Down syndrome and fragile X syndrome), sensory disability (such as visual and hearing impairments), physical disability (such as cerebral palsy, multiple sclerosis and absence or deformities of limbs), mentally/neurologically related disability (such as schizophrenia, obsessive-compulsive disorder, bipolar disorder, Alzheimer's disease and Parkinson's disease) and other types of disability where data are available. This study aimed to explore the associations between different types of disabilities and the mortality and severity of COVID-19. We will also explore the rate of hospitalisation, rate of intensive care unit (ICU) admission, hospital stay, laboratory findings and other relevant clinical symptoms as well as long-term impacts due to COVID-19. To our knowledge, this will be the first systematic review and meta-analysis to investigate the mortality and severity of COVID-19 among people with disabilities.

METHODS AND ANALYSIS

This systematic review and meta-analysis protocol is reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Protocols[19] statement. The reporting flow chart is presented in figure 1.

Search strategy

Literature search will be conducted in PubMed, HINARI (Health InterNetwork Access to Research Initiative), ScinceDirect, PEDro, Cochrane Library, MedRxiv and Google Scholar databases supplemented by manual search of references of included studies. Articles published from inception to date will be included. Observational studies (cohort, case-control and cross-sectional studies) assessing the severity and mortality of COVID-19 among people with disabilities will be considered. The predefined search terms determined by Medical Subject Headings (MeSH) and keywords including multiple combinations of COVID-19 and disabled persons (MeSH terms and entry terms for each) as well as severity and mortality related terms will be used. Two reviewers (AAS and AWT) will independently screen titles and abstracts of the studies, and any disagreement between the reviewers will be resolved by consensus or by the third reviewer (AAH). The search strategy of the PubMed database is presented in table 1. The search strategy of other databases is presented in the supplementary file (online supplemental file 1).

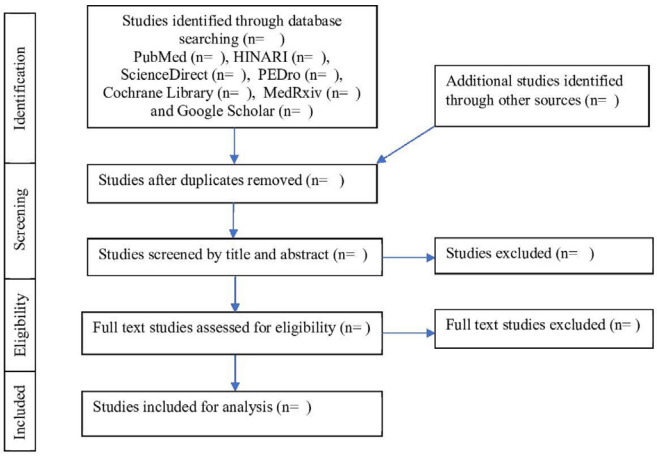

Figure 1 Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow chart.

Inclusion criteria

Only observational studies (cohort, case-control and cross-sectional studies) that focused on adult people with disabilities (aged over 18 years) and investigate the association between severity, hospitalisation, ICU admission and need for mechanical ventilation, hospital stay, mortality, other complications and long-term effects due to COVID-19 will be included. The following types of studies will be excluded: (1) Studies that included infants and children; (2) Studies with a very small sample size; (3) Studies that did not have enough statistical information to be extracted; and (4) Descriptive reviews, randomised-controlled trials, systematic reviews, meta-analyses, opinions, editorials, comments and conference abstracts. Excluded studies will be documented with reasons for their exclusion. Only full-text published studies in English language will be included.

Outcome measures

The primary outcome measures will be the risk ratio for COVID-19 severity and mortality in people with disabilities. Secondary outcome measures will include rate of hospitalisation, ICU admission and the need for mechanical ventilation, viral load, hospital stay and other variables where data are available.

Table 1 PubMed search strategy

Search number	Search details
#1	'COVID-19'(MeSH Terms)
#2	'disabled persons'(MeSH Terms)
#3	'COVID-19'(Title/Abstract)OR 'sars coronavirus 2'(Title/Abstract)OR 'coronavirus 2 sars'(Title/Abstract)OR "coronavirus disease 2019 virus'(Title/Abstract)OR "2019 novel coronavirus'(Title/Abstract)OR "2019 novel coronaviruses'(Title/Abstract)OR "coronavirus 2019 novel'(Title/Abstract)OR "novel coronavirus 2019'(Title/Abstract)OR 'wuhan seafood market pneumonia virus'(Title/Abstract)OR 'sars cov 2 virus'(Title/Abstract) OR 'sars cov 2 viruses'(Title/Abstract)OR 'virus sars cov 2'(Title/Abstract)OR "2019-nCoV'(Title/Abstract)OR 'COVID-19 19 virus'(Title/Abstract)OR 'severe acute respiratory syndrome coronavirus 2'(Title/Abstract)OR 'wuhan coronavirus'(Title/Abstract)
#4	'disabled persons'(Title/Abstract)OR 'disabled person'(Title/Abstract)OR 'persons disabled'(Title/Abstract)OR 'Handicapped'(Title/Abstract)OR 'people with disabilities'(Title/Abstract)OR 'persons with disabilities'(Title/Abstract)OR 'persons with disability'(Title/Abstract)OR 'physically handicapped'(Title/Abstract)OR 'handicapped physically'(Title/Abstract)OR 'physically disabled'(Title/Abstract)OR 'physically challenged'(Title/Abstract)OR 'Amputees'(Title/Abstract)OR 'mentally ill persons'(Title/Abstract)OR 'persons with hearing impairments'(Title/Abstract)OR 'persons with mental disabilities'(Title/Abstract)OR 'visually impaired persons'(Title/Abstract)OR 'psychosocial disability'(Title/Abstract)OR 'intellectual disability'(Title/Abstract)OR 'developmental disability'(Title/Abstract)OR 'autism spectrum disorder'(Title/Abstract) OR 'cerebral palsy'(Title/Abstract)OR 'Autism'(Title/Abstract)OR 'Down syndrome'(Title/Abstract)'fragile x syndrome'(Title/Abstract)OR 'epilepsy'(Title/Abstract)OR 'multiple sclerosis'(Title/Abstract)OR 'schizophrenia'(Title/Abstract)OR 'obsessive-compulsive disorder'(Title/Abstract)OR 'bipolar disorder'(Title/Abstract)OR 'Alzheimer's disease'(Title/Abstract)OR 'sensory disability'(Title/Abstract)OR 'Parkinson's disease'(Title/Abstract)
#5	'prevalence'(Title/Abstract)OR 'impact'(Title/Abstract)OR 'rate of infection'(Title/Abstract)OR 'mortality'(Title/Abstract)OR 'death'(Title/Abstract)OR 'severity'(Title/Abstract)OR 'hospitalization'(Title/Abstract)OR 'ICU admission'(Title/Abstract)OR 'mechanical ventilation'(Title/Abstract)
#6	#1 OR #3
#7	#2 OR #4
#8	#5 AND #6 AND #7

ICU, intensive care unit; MeSH, Medical Subject Headings.

Data extraction

Two reviewers (AAS and AWT) will initially screen titles and abstracts of all identified articles for eligibility. After initially screening articles for inclusion based on titles and abstracts, full-text articles will be screened. Disagreements will be resolved by discussion or a third reviewer (AAH) will be consulted in order to reach a consensus. We will develop a standard data extraction form and use it to extract data to reflect the characteristics of each included study. The included studies might vary in their classification of COVID-19 disease severity, ranging from mild, moderate, severe to critically severe. We will categorise mild and moderate cases into the non-severe group and severe and critically severe cases into the severe group.[12] We will extract the following information: year of publication, date of the study, type of study, the sample size of participants, severity and mortality of COVID-19, rates of hospitalisation and other relevant clinical symptoms and laboratory findings.

Methodological quality assessment

Two reviewers (AAS and AAH) will independently assess the risk of bias of the included studies using the Newcastle-Ottawa Scale (NOS).[20] The NOS rates observational studies based on three parameters: selection, comparability between the exposed and unexposed groups, and exposure/outcome assessment. The scale assigns a maximum of four stars for selection, two stars for comparability and three stars for exposure/outcome assessment. Studies with less than five stars were considered of low quality, with five to seven stars of moderate quality, and more than seven stars of high quality.[9] Only studies with moderate and above quality score will be included in this systematic review and meta-analysis. When conflicts related to bias scores arise, the final decision will be taken by a consensus.

Data synthesis

Review Manager V.5.4 (Cochrane Collaboration) and Stata V.16.0 (Stata Corporation, College Station, Texas, USA) software will be used to conduct the meta-analysis. We will calculate pooled estimates of ORs with 95% CIs by the generic inverse variance method. Heterogeneity among included studies will be assessed using the I^2 test. First a fixed-effect model will be used for data analysis. If I^2 >0.5 or p<0.1 it is considered that there is a significant heterogeneity among the included studies,[21] and a random-effects model with the inverse variance method

will be used in this case. To determine the source of heterogeneity, sensitivity analysis will be conducted by excluding the studies one by one. Subgroup analyses will be performed on age, gender, type of disability and other variables depending on the data available. Publication bias across studies will be examined using the funnel plot method, Egger's test and Begg's test.[22] If the funnel plot is symmetrical and the Egger's and Begg's tests' values of p are >0.05, no statistically significant publication bias will be considered to exist in the meta-analysis.[11] If publication bias is found, a trim and fill analysis will be used to evaluate the number of missing studies and to recalculate the pooled OR with the addition of those missing hypothetical studies.

Patient and public involvement

There was no patient or public involvement in the study.

ETHICS AND DISSEMINATION

Ethics approval and informed consent are not required as this study is a systematic review which only involves the use of previously published data and does not include any patient. The final results of this systematic review and meta-analysis will be published in a peer-reviewed journal and presented at relevant conferences and events.

Contributors All authors have made significant contributions to this study protocol. AAS developed the research question, wrote the first draft, designed the search strategy, and edited and approved the final version of the manuscript. AAH revised the search strategy of databases, developed the data extraction form, and edited and approved the final version of the manuscript. AWT revised the data extraction form and edited and approved the final version of the manuscript.

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Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

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