



Infection Prevention and  
Control in Residential Aged  
Care Facilities In and Out of  
Recent Pandemics:  
A Scoping Review Protocol

# Infection Prevention and Control in Residential Aged Care Facilities In and Out of Recent Pandemics: A Scoping Review Protocol

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## Contributions

FY: Project administration, Methodology, Investigation, Data curation, Formal analysis, Writing – original draft, Visualisation

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PC: Conceptualisation, Methodology, Formal analysis, Writing – original draft, Writing – review & editing, Visualisation

GG: Conceptualisation, Formal analysis, Supervision, Funding acquisition, Writing – review & editing

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## Abstract

### Background

The longstanding problem of infection prevention and control (IPC) in residential aged care facilities (RACFs) has been highlighted and seriously exacerbated by the COVID-19 pandemic. The risk of severe illness and death from COVID-19 among aged care residents is increased by age, comorbidities and the congregate living arrangements, which often also function as healthcare settings. Implementation of IPC practices are intended to protect residents and staff from infectious disease risks, but can also impact on other dimensions of wellbeing and safety.

### Objectives

To identify evidence of effective IPC strategies in RACFs and their impacts on resident or staff safety or wellbeing, during both 'business as usual' and infectious disease outbreaks.

### Methods

We will search relevant databases for original research articles, published in 2000 or later, that examine (1) IPC measures and/or (2) infectious disease outbreaks in (3) in residential aged care settings, whilst (4) considering resident and/or staff wellbeing and/or safety.

Following Preferred Reporting of Systematic Review and Meta-Analysis for Scoping Reviews (PRISMA-SCR) and consultation with a university librarian, we have devised a search strategy for review of relevant key articles. One author customised the search strategy for each database (CINAHL, Embase, Cochrane, MEDLINE, Scopus and Web of Science) and reviewed each term before inclusion. After deletion of duplicates, 2-4 reviewers will screen references by title and abstract, then review full texts of selected articles. Items included will be charted with respect to publication details and quality assessment performed. Results will be grouped according to thematic contributions.

### Results

Systematic searches began at the end of 2021 and data extraction will progress in early 2022, followed by data analyses and writing.

### Anticipated conclusions

Implementation of IPC practices in RACFs must balance effectiveness, feasibility, and wellbeing and safety of residents and staff. This review will summarise, and identify gaps in, evidence for how best to protect residents and staff from infection in long term aged care settings.

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# Introduction

Infection prevention and control (IPC) in aged care settings is a well-documented challenge, even under normal circumstances. The COVID-19 pandemic has highlighted how residential aged care facilities (RACFs) – also called ‘care homes’, ‘nursing homes’, ‘long term care’ or ‘skilled nursing facilities’ – can rapidly become sites of extensive infection transmission and significant mortality rates among residents (Crotty et al., 2020; Hashan et al., 2021). The risks are not limited to pandemics or epidemics of novel diseases, such as COVID-19 (Lee et al., 2020). The spread of multi-drug resistant organisms (MROs), seasonal influenza and other respiratory viruses and gastrointestinal pathogens are recurring issues in RACFs, and contribute to significant morbidity and mortality of residents (Kahvecioglu et al., 2014; Kirk et al., 2010; Peters et al., 2017).

An RACF is an unusual hybrid, which represents: a) a congregate residence (but different from hotel-like accommodation); b) a healthcare-like setting, due to increasing physical and psychological effects of advancing age among many residents (although they are not hospitals or clinics); and c) the residents’ home. This intersection of settings presents a challenge for IPC in RACFs, which must balance resident comfort, wellbeing and other dimensions of safety (Gilbert & Lilly, 2021).

RACFs typically accommodate older people, many of whom have significant physical and/or psychological comorbidities, including frailty or cognitive impairment. Their care needs range from limited assistance with activities of daily living (ADLs) to full dependency (Dyer et al., 2019). A range of overlapping types and levels of care is therefore provided *in situ*. For people requiring ongoing high care, these can include health/medical/psychiatric nursing care, personal care and domestic assistance.

RACFs are staffed by a varied skill mix of registered and/or enrolled nurses, personal care assistants, managers, and administrative, hospitality, food services and cleaning staff. Visiting healthcare professionals may include primary care or specialist physicians, in-reach hospital geriatric teams and allied health practitioners (e.g. physiotherapists, occupational therapists, pharmacists), depending on facility business models and national/state regulations (Hussein & Manthorpe, 2005).

Longstanding staffing issues have been highlighted in the literature (Jackson et al., 2003) and by the recent Royal Commission into Aged Care Quality and Safety in Australia (2018-2021). At any time – but particularly during the COVID-19 pandemic – presenteeism, insufficient leave entitlements and high rates of community infection can lead to staff with mild or asymptomatic infection unwittingly introducing and spreading infection, particularly if they work at multiple sites (Shallcross et al., 2021).

Transmission via staff, between the community and RACFs, and between and within RACFs, has been identified as a major driver of COVID-19 infection rates in RACFs (Shi et al., 2020; Sun et al., 2020; Van Houtven et al., 2020).

Quality of care may decrease when staff workloads are too high to allow time to get to know residents and their needs, leading to job dissatisfaction, emotional exhaustion and depersonalisation, which result in burnout (Bogaert et al., 2014; Costello et al., 2019; Harrad & Sulla, 2018; Rouxel et al., 2016). Additionally, there may be little opportunity to participate in continuing professional education to avoid such situations (Frey et al., 2015). From an infectious disease perspective, these characteristics are a potentially dangerous mix, for staff and the people they care for. Early in the pandemic, this situation was exacerbated by inadequate IPC training, shortages of protective personal equipment (PPE), variable compliance with hand hygiene, and laboratory

testing for SARS-CoV-2 being limited to symptomatic people or difficult to access (Dean et al., 2020; Hammerschmidt & Manser, 2019; Ladhani et al., 2020; Thompson et al., 2020). Whilst pandemic conditions have highlighted these issues, they have also been longstanding concerns during 'business as usual' (Eagar et al., 2020; Stone et al., 2015).

The design of the built environment in communal, supported settings, like RACFs, also influences infection risks. In healthcare facilities, including aged care settings, the built environment can contribute to pathogen spread by influencing whether and how staff, residents and visitors encounter one another in shared spaces and/or how they interact with their surroundings (Barnett & Grabowski, 2020; Hashan et al., 2021; Koshkouei et al., 2020; Strausbaugh et al., 2003). This requires consideration across architectural features, fittings, usage of bathrooms, bedrooms and resident or staff dining/meeting areas, and overall building design. In addition to spatial layouts, building performance qualities and uses can have a significant influence on IPC, including ventilation (Lydon et al., 2014), water-management (Hanlin & Myers, 2018; Perkins et al., 2019) and crowding. Design can influence infection risk in complex and varied ways and also, potentially, affect social connectivity or care (Anderson et al., 2020). This relationship must be considered to ensure that IPC practices do not impact on the social experiences of residents, efficiency of health care provision or onsite operations.

Whilst there have been high rates of COVID-19 infections among residents and staff in some RACFs (Hashan et al., 2021), there has also been evidence of effective lines of defence against infectious disease in the form of effective leadership, governance, and IPC policies and practices (Rios et al., 2020). A recent rapid review into IPC strategies in the RACF setting identified a range of strategies applied during the COVID-19 pandemic, but also emphasised the need to more closely examine the trade-offs that were made in compassionate and person-centred care for older people (Dykgraaf et al., 2021).

Therefore, the potential adverse effects of IPC policies and risk management strategies need to be acknowledged, and balanced against the quality of life for both residents and staff in risk management during outbreak and pandemic situations (Anderson et al., 2020; Levere et al., 2021). In particular, strategies such as lockdown, isolation and visitor restrictions should be addressed (O'Caoimh et al., 2020; Sizoo et al., 2020; Wammes et al., 2020).

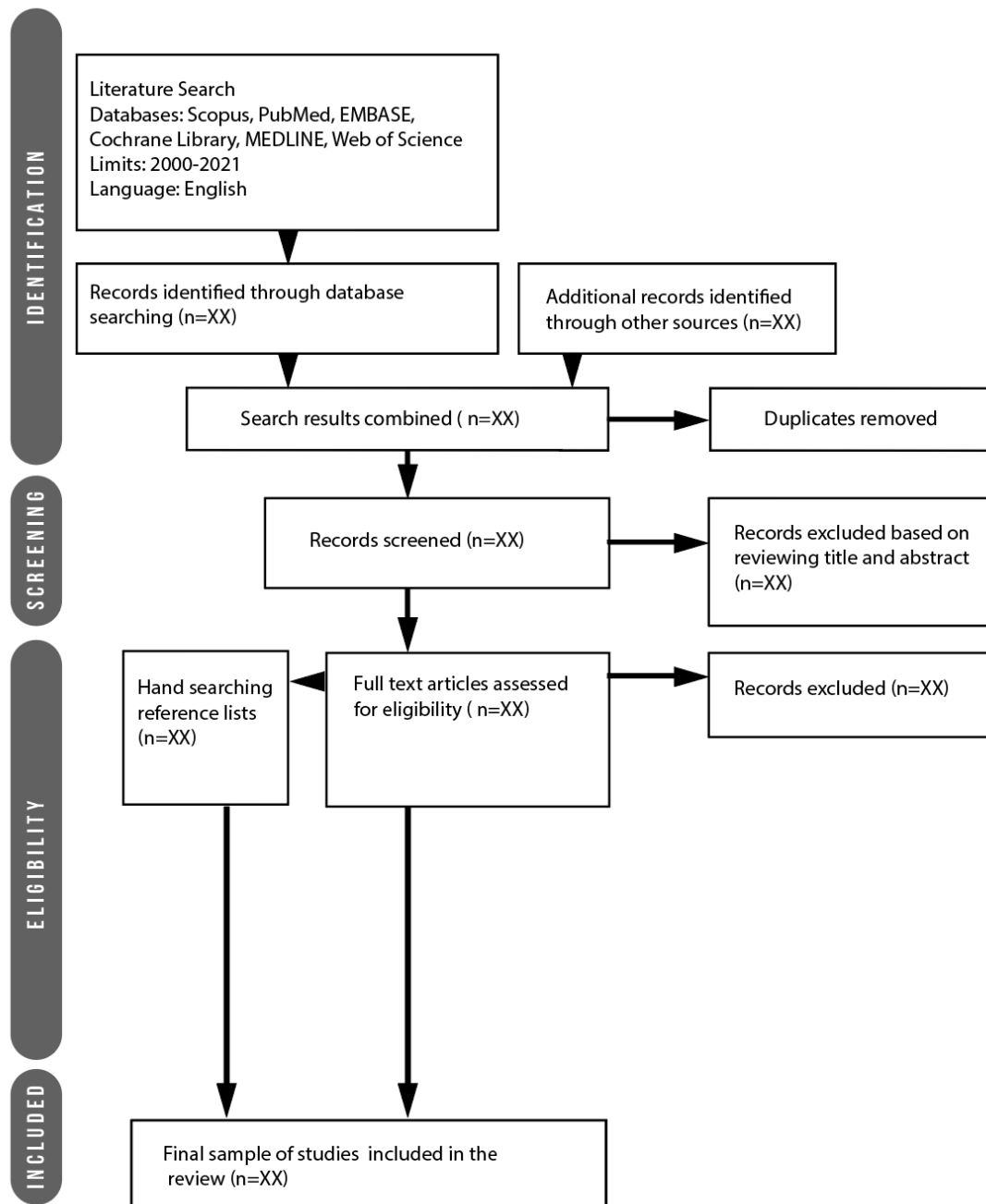
## Objective

This review will seek to examine the international evidence relating to IPC in RACFs to identify key strategies that are effective in minimising pathogen transmission, feasible to maintain during business-as-usual, and that enable successful preparation for, and prompt response to, an infectious disease outbreak. In particular, we aim to identify the factors that protect both the physical and psychological safety and wellbeing of residents and staff.

In other words, this review seeks to explore the following research question: which of the full range of IPC measures in residential aged care settings are supported by evidence of a) their effectiveness and feasibility, b) their impacts on the physical and/or psychological safety and well-being of residents and staff, and c) their capacity to be applied routinely, and/or escalated rapidly, in the event of an infectious disease outbreak? Our findings should provide practical advice for managers, practitioners and researchers on how to improve and sustain IPC and pandemic preparedness in a growing residential aged care sector.

# Methods

This protocol will be registered on the Open Registries Network (OSF Registries). The scoping review will be executed according to PRISMA-Scr guidelines (Tricco et al., 2018) to map the breadth and scale of the international evidence base in RACF IPC policies and practices. This evidence will be considered internationally, across a range of research fields.



**Figure 1. PRISMA-P flow chart illustrating the selection, inclusion and exclusion process of original articles**

## Eligibility criteria

Primary inclusion criteria include published, peer-reviewed research that reports on:

- 1) infection prevention and control in residential aged care facilities, *in relation to*
- 2) resident/staff wellbeing, including but not limited to evidence produced from infectious disease outbreaks or pandemics, such as COVID-19.

To be included, a study would need to report evidence relating to the effect of any component of the hierarchy of (infection prevention) controls on infectious disease, MRO prevalence, or incidence or occurrence (frequency/size) of outbreaks AND/OR health or well-being of residents and staff (including infectious disease or adverse physical or psychological effects of IPC measures).

Both quantitative and qualitative studies will be included in the review to build a picture of the breadth and balance of the evidence on infectious disease (ID) outbreaks. Study quality will be assessed but not used as a selection criterion.

Studies will be excluded if they:

- Are purely theoretical (including commentaries, editorials, notes, etc.)
- Do not discuss a component of resident and/or staff wellbeing (physical and psychological) in relation to IPC in RACFs
- Do not discuss results in RACFs separately to other settings, or results cannot be separated from other settings (e.g. attached medical clinics, hospitals, etc.)
- Cannot be reliably translated into English for research team review (i.e. cannot be processed in Google translate)

If the search strategy results become unmanageable (i.e. more than 500 items in the full text screening after deleting duplicates and title/abstract screening), date limitations will be imposed (e.g. 2000-2021) to ensure relevance of results, and items for which full text articles cannot be obtained will be excluded.

Included databases are: CINAHL, Scopus, Medline, Embase, Web of Science Core Collection, Cochrane and Web of Science. These databases were chosen to include biomedical and social science journals, and followed recommendations on optimal database combinations (Bramer et al., 2017). A grey literature search was deemed unnecessary, due to the large body of literature existing on the topic.

The search is planned to take place in early 2022.

**Table 1: Search terms**

Infectious disease outbreaks	Residential aged care facilities	Infection control
<ul style="list-style-type: none"> <li>• Pandemic</li> <li>• COVID-19</li> <li>• Influenza outbreak</li> <li>• Norovirus outbreak</li> <li>• Transmission of MROs</li> </ul>	<ul style="list-style-type: none"> <li>• Homes for the aged</li> <li>• Nursing homes</li> <li>• Long term care</li> <li>• Care homes</li> </ul>	<ul style="list-style-type: none"> <li>• Infection prevention and control</li> <li>• Personal protective equipment/PPE</li> <li>• Restrictions –visitor maximums; isolation/quarantine; physical distancing</li> <li>• Adverse effects of restrictions</li> <li>• Standard and transmission-based precautions</li> <li>• Preparedness</li> </ul>

	<ul style="list-style-type: none"> <li>Vaccination (<i>flu, COVID-19, pneumococcal, zoster</i>)</li> </ul>
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Table 2: Search strategies

Database	Search String
Web of science	(COVID-19 OR 'Influenza' OR 'Norovirus' OR 'multi-resistant organism' AND 'outbreak' OR 'pandemic' OR 'transmission' OR 'transmission*based') AND ((long-term OR nursing OR aged) AND care AND (homes OR facilities)) AND ((infection AND prevention OR Control) OR (personal AND protective AND equipment) OR restrictions OR preparedness OR precautions OR standards OR isolation OR quarantine OR (physical AND distancing) OR (adverse AND effects AND restrictions) OR vaccination) (All Fields) and Data Papers or Reprints or Notes or Letters or Editorial Materials or Meeting Abstracts (Exclude – Document Types) and Early Access (Exclude – Document Types) and Veterinary Sciences or Cell Biology or Chemistry Analytical or Chemistry Medicinal or Chemistry Physical or Fisheries or Zoology (Exclude – Web of Science Categories) <a href="https://www.webofscience.com/wos/woscc/summary/7abc13a7-ec36-4139-8d70-5eb2df349dd4-11af48f5/relevance/1">https://www.webofscience.com/wos/woscc/summary/7abc13a7-ec36-4139-8d70-5eb2df349dd4-11af48f5/relevance/1</a>
Medline	(COVID-19/ or SARS-CoV-2/ or Coronavirus Infections/ or Disease Outbreaks/ or Influenza, Human/ or Pandemics/ or Influenza A virus/ or Influenza A Virus, H1N1 Subtype/ or Norovirus/ or Cross Infection/ or Drug Resistance, Multiple, Bacterial/ or Disease Transmission, Infectious/) and (Long-Term Care/ or Geriatric Nursing/ or "Health Services for the Aged"/ or "Hospice and Palliative Care Nursing"/ or "Homes for the Aged"/ or Nursing Homes/ or Assisted Living Facilities/) and (Infection Control/ or Personal Protective Equipment/ or Disaster Planning/ or Immunization/ or Mandatory Testing/ or Physical Distancing/ or Quarantine/ or Sanitation/ or Universal Precautions/ or Contact Tracing/) + limit to humans
CINAHL	(MH "Influenza B Virus") OR (MH "Influenza A H5N1") OR (MH "Influenzavirus C") OR (MH "Influenza A Virus, H1N1 Subtype") OR (MH "COVID-19") OR (MH "Influenza A Virus") OR (MH "Influenza A Virus, H5N1 Subtype") OR (MH "Influenza A Virus, H3N2 Subtype") OR (MH "Influenza, Pandemic (H1N1) 2009") OR (MH "SARS-CoV-2") OR (MH "Virus Diseases") OR (MH "Caliciviridae Infections") OR (MH "Orthomyxoviridae") OR (MH "Disease Outbreaks") OR (MH "Disease Hotspot") OR (MH "Skin Diseases, Infectious") OR (MH "Respiratory Tract Diseases") OR (MH "Vaccine-Preventable Diseases") OR (MH "Disease Transmission, Professional-to-Patient") OR (MH "Communicable Diseases, Imported") OR (MH "Disease Transmission, Horizontal") OR (MH "Disease Transmission") OR (MH "Disease Vectors") OR (MH "Blood-Borne Infections") OR (MH "Sexually Transmitted Diseases") AND (MH "Nursing Home Patients") OR (MH "Nursing Homes") OR (MH "Home Health Aides") OR (MH "National Association of Directors of Nursing Administration in Long Term Care") OR (MH "American Society for Long Term Care Nurses") OR (MH "Gerontologic Nursing") OR (MH "Nursing Home Personnel") OR (MH "Home Health Care Information Systems") OR (MH "Home Health Care") OR (MH "Nursing Home Design and Construction") OR (MH "Home Care Equipment and Supplies") OR (MH "Home Health Agencies") OR (MH "Hospice and Palliative Nursing") AND (MH "Personal Protective Equipment") OR (MH "Contact Tracing") OR (MH "Universal Precautions") OR (MH "Disaster Planning") OR (MH "Infection Preventionists") OR (MH "Mandatory Testing") OR (MH "Infection Control (Saba CCC)") OR (MH "Universal Precautions (Saba CCC)")
COCHRANE	([mh "COVID-19"] or [mh "SARS-CoV-2"] or [mh "Coronavirus Infections"] or [mh "Disease Outbreaks"] or [mh "Influenza, Human"] or [mh "Pandemics"] or [mh "Influenza A virus"] or [mh "Influenza A Virus, H1N1 Subtype"] or [mh "Norovirus"] or [mh "Cross Infection"] or [mh "Drug Resistance, Multiple, Bacterial"] or [mh "Disease Transmission, Infectious"]) and ([mh "Long-Term Care"] or [mh "Geriatric Nursing"] or [mh "Health Services for the Aged"] or [mh "Hospice and Palliative Care Nursing"] or [mh "Homes for the Aged"] or [mh "Nursing Homes"] or [mh "Assisted Living Facilities"]) and ([mh "Infection Control"] or [mh "Personal Protective Equipment"] or [mh "Disaster Planning"] or [mh "Immunization"] or [mh "Mandatory Testing"] or [mh "Physical Distancing"] or [mh "Quarantine"] or [mh "Sanitation"] or [mh "Universal Precautions"] or [mh "Contact Tracing"])
EMBASE	(COVID-19/ or SARS-CoV-2/ or Coronavirus Infections/ or Disease Outbreaks/ or Influenza, Human/ or Pandemics/ or Influenza A virus/ or Influenza A Virus, H1N1 Subtype/ or Norovirus/ or Cross Infection/ or Drug Resistance, Multiple, Bacterial/ or Disease Transmission, Infectious/) and (Long-Term Care/ or Geriatric Nursing/ or "Health Services for the Aged"/ or "Hospice and Palliative Care Nursing"/ or "Homes for the Aged"/ or Nursing Homes/ or Assisted Living Facilities/) and (Infection Control/ or Personal Protective Equipment/ or Disaster Planning/ or Immunization/ or Mandatory Testing/ or Physical Distancing/ or Quarantine/ or Sanitation/ or Universal Precautions/ or Contact Tracing/) + limit to human
Scopus	( covid-19 OR 'influenza' OR 'norovirus' OR 'multi-resistant AND organism' AND 'outbreak' OR 'pandemic' OR 'transmission' OR 'transmission*based') AND (( long-term OR nursing OR aged ) AND care AND ( homes OR facilities ) ) AND ( ( infection AND prevention OR control ) OR ( personal AND protective AND equipment ) OR restrictions OR preparedness OR precautions OR standards OR isolation OR quarantine OR ( physical AND distancing ) OR ( adverse AND effects AND restrictions ) OR vaccination ) AND ( EXCLUDE ( DOCTYPE , "no" ) OR EXCLUDE ( DOCTYPE , "ed" ) OR EXCLUDE ( DOCTYPE , "le" ) ) AND ( EXCLUDE ( SUBJAREA , "BIOC" ) OR EXCLUDE ( SUBJAREA , "AGRI" ) OR EXCLUDE ( SUBJAREA , "VETE" ) OR EXCLUDE ( SUBJAREA , "CHEM" ) ) AND ( EXCLUDE ( SUBJAREA , "PHAR" ) OR EXCLUDE ( SUBJAREA , "MATE" ) OR EXCLUDE ( SUBJAREA , "CENG" ) OR EXCLUDE ( SUBJAREA , "NEUR" ) OR EXCLUDE ( SUBJAREA , "ENER" ) )
EMBASE	(COVID-19/ or SARS-CoV-2/ or Coronavirus Infections/ or Disease Outbreaks/ or Influenza, Human/ or Pandemics/ or Influenza A virus/ or Influenza A Virus, H1N1 Subtype/ or Norovirus/ or Cross Infection/ or Drug Resistance, Multiple, Bacterial/ or Disease Transmission, Infectious/) and (Long-Term Care/ or Geriatric Nursing/ or "Health Services for the Aged"/ or "Hospice and Palliative Care Nursing"/ or "Homes



for the Aged"/ or Nursing Homes/ or Assisted Living Facilities/) and (Infection Control/ or Personal Protective Equipment/ or Disaster Planning/ or Immunization/ or Mandatory Testing/ or Physical Distancing/ or Quarantine/ or Sanitation/ or Universal Precautions/ or Contact Tracing/) + limit to human
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## Screening and eligibility

The search results will be uploaded to Covidence, an online software system that assists researchers in conducting systematic and scoping reviews. This software will scan and remove duplicates. The studies will be independently screened and critically appraised by at least two review authors.

The initial stage of screening will be title and abstract screening. Where any ambiguity about possible inclusion exists, the reference will be included in the next screening stage, which will be the full text paper screening. The screening process will be documented independently by at least two review authors, with inclusion and exclusion criteria for each stage of screening. These criteria will be 'calibrated' using a sample of 20 articles screened by each author, followed by a meeting to discuss any disagreements that may arise. After the full text screening stage, the research team will meet to come to a consensus on any discrepancies.

Manual searching of the reference lists of included items (including the included studies of reviews) will follow the full text screening stage, where each potential item will be analysed with the same title/abstract and full text screening criteria. Review authors will meet at regular intervals to facilitate consistency in the inclusion or exclusion of particular studies, and come to a consensus on the list of included full text articles.

Included articles will be stored in Covidence, and bibliographic software Endnote. The details of each study will be extracted in Covidence, and if necessary for documentation purposes, entered into an Excel spreadsheet. These details will include journal titles, country (if applicable), original language, study type (randomised controlled trials, systematic reviews, quasi-experimental, secondary data, qualitative, and surveys) and participant sample sizes.

Each study will be assessed for quality using the Mixed Methods Assessment Tool, which assists systematic review authors to critically analyse studies (Hong et al., 2018).

The extracted study outcomes will be summarised thematically for use in practice. Study outcomes and details will be visualised in diagrams where appropriate.

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