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More than just staffing? Assessing evidence on the complex interplay among nurse staffing, other features of work environments, and resident outcomes in long-term care - a systematic review protocol

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Title: More than just staffing? Assessing evidence on the complex interplay among nurse staffing, other features of work environments, and resident outcomes in long-term care - a systematic review protocol

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Abstract

Introduction

The complex interplay among nurse staffing, other features of work environments (organizational context factors such as leadership, work culture or interactions among care teams), and resident outcomes in long-term care is poorly understood. Our systematic review will identify, critically evaluate, and synthesize the available evidence on how nurse staffing and organizational context in residential long-term care interact and how this impacts resident outcomes.

Methods and analysis

We will systematically search the databases MEDLINE, EMBASE, CINAHL, Scopus and PsycINFO for quantitative research studies and systematically conducted reviews. Two reviewers will independently screen titles/abstracts, and full texts for inclusion. They will also independently search and screen contents of key journals, publications of key authors and reference lists of all included studies, and they will independently assess methodological quality of studies. They will resolve discrepancies at any stage of the review process by consensus. One research team member will perform data extraction, and a second team member will double check the extracted information. We will conduct Meta-analysis if pooling is possible. Otherwise, we will synthesize results using thematic analysis and vote counting.

Ethics and dissemination

We did not seek ethics approval for this study, as we will not collect primary data. Data from included studies cannot be linked to individuals or organisations. We will publish findings of this review in a peer-reviewed journal and present them at an international peer-reviewed conference.

Article Summary

Strengths and limitations of this study

- This is the first synthesis of research examining the available evidence on interactions among organizational context factors and nurse staffing, and how these are associated with resident outcomes in long-term care.

- This review will help clarify why the associations between staffing and resident outcomes in residential long-term care identified by previous studies have been inconsistent.
- This study protocol is informed by the Cochrane Collaboration systematic review methods and adheres to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Protocols. Two reviewers will independently identify studies for inclusion, and assess methodological quality of included studies.
- The number of high-quality studies on this topic may be small, possibly limiting the strength of the conclusions we can draw.

Introduction

Demographic changes such as decreasing fertility and population aging have increased the pressure on residential long-term care (LTC) settings.[1,2] Residential LTC is defined as 24-hour functional support and care for individuals who require assistance with activities of daily living and often have complex health needs and increased vulnerability. Services may also include palliative/hospice and end-of-life care.[3] Due to demographic trends, demand for LTC has increased, and older adults have entered LTC with increasingly complex care needs and closer to the end of life than ever before.[4,5] However, staffing levels have not kept up with these increasing demands.[2] In almost all OECD countries, the number of LTC workers per population has remained consistent or decreased since 2011 – and more than half of OECD countries report a shortage of LTC caregivers.[2] Media and researchers have increasingly expressed concerns about LTC staffing levels being too low, affecting quality of resident care and safety.[6–9]

In acute care, multiple studies have demonstrated that better nurse staffing (i.e. more care hours per client and day and more qualified care teams) is associated with better client outcomes.[10–15] For example, Driscroll et al.[16] found in their meta-analysis that higher nurse staffing levels decreased the mortality risk by 14% (odds ratio [OR]=0.86, 95% confidence interval [CI]: 0.79; 0.94). Similarly, a systematic review by Kane et al.[17] demonstrated that on intensive care units one registered nurse (RN) more per client day decreased the odds of hospital acquired pneumonia (OR=0.70; 95% CI: 0.56; 0.88), unplanned extubation

(OR=0.49; 95% CI: 0.36; 0.67), respiratory failure (OR=0.40; 95% CI: 0.27; 0.59), and cardiac arrest (OR=0.72; 95% CI: 0.62; 0.84).

However, in LTC the evidence is more heterogeneous and not as conclusive. Most of the studies on staffing in LTC are based out of the US.[18,19] Older systematic reviews suggested an association between higher total staffing levels and improved quality of care.[20] Bostick et al.[20] found that staffing levels most strongly influenced residents' functional ability, pressure ulcers, and weight loss. Yet, more recent reviews do not support these conclusions. In a systematic review published in 2020, Armijo-Olivo et al.[21] pointed out that total nurse staffing hours were not associated with urinary catheter use, use of physical restraint, and development of infections. Three of the studies included in this review reported a positive association of total nurse staffing hours with overall quality of care, whereas two of the included studies indicated no association. Overall, the included studies were of poor methodological quality, failed to adequately and consistently define measures of staffing and quality, and reported contradictory study findings, clearly not permitting any strong conclusions.[21–23]

The relationship between nurse staffing and quality of care may be nonlinear and moderated by other factors. Backhaus et al.[24] point to organizational context factors as one of the possible reasons for the inconclusive evidence – and these factors have received little attention in the discussions about nurse staffing and quality of LTC. Better organizational context, such as supportive leadership, a collaborative work culture, or supportive care teams may interact with LTC staffing and mitigate the negative effects of lower nurse staffing in LTC.[24] However, the current body of literature on organizational context lacks adequate definitions too, and it and is characterized by considerable variability in how contextual factors are measured across studies.[25] Squires et al.[26] created a framework of domains, attributes and features of organizational context. The authors defined organizational context *'as characteristics of: the providers and users of health care, internal organizational arrangements, infrastructures and networks, responsiveness to change, and the broader healthcare system'*.[26] Organizational context is different from merely structural variables such as facility size, ownership model, etc. Organizational context refers to facility or unit characteristics that are created by the interactions and relationships of those living and

working in these organizations, such as leadership, culture, connections among care teams, etc. These factors are dynamic and potentially modifiable. Staffing can be considered an element of organizational context.[27]

Recent studies in acute care settings have demonstrated that organizational context is associated with quality of client care and nurse outcomes.[28–30] In their systematic review, Kaplan et al.[31] identified leadership from top management, organizational culture, data infrastructure and information systems as important contextual factors influencing quality improvement success in health care. Ten (21%) of the included studies were conducted in LTC. In their systematic review, Braithwaite et al.[32] found that across multiple studies, settings and countries positive organisational and workplace cultures were consistently associated with a wide range of patient outcomes, such as reduced mortality rates, falls, hospital acquired infections and increased patient satisfaction. Four studies (6.5%) were conducted in aged care settings. Temkin-Greener et al.[33] demonstrated that residents in LTC facilities with lower staff cohesion had significantly greater odds of pressure ulcers (OR=0.957; p=.016) and incontinence (OR=0.924; p<.001). Residents in facilities with more self-managed care teams had a lower risk of pressure ulcers (OR=0.977; p=.028). Van Beek et al.[34] found that organizational culture was related to perceived and observed quality of care in LTC dementia units.

These study findings suggest that organizational context elements interact in complex ways with nurse staffing. However, to the best of our knowledge no review has synthesized available evidence on these multiple interacting organizational context factors, nurse staffing, and the association of these interactions with resident outcomes.

Aim

This systematic review aims to identify, analyze and synthesize quantitative research evidence on interactions between nurse staffing and organizational context in LTC homes, and the effects of these interactions on LTC resident outcomes. To this end, the proposed systematic review will answer the following research questions:

1. Which interactions between elements of organizational context and nurse staffing in LTC have been described in the literature?
2. What LTC resident outcomes are influenced by these staffing-context interactions?

Methods and analysis

Our systematic review will follow the Cochrane Handbook of Systematic Reviews of Interventions[35] and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)[36] guidelines. This protocol followed the PRISMA-P reporting guidelines for systematic review protocols.[37]

Inclusion and exclusion criteria

We will include empirical studies that (a) used nurse staffing and organizational context in LTC as independent variables, (b) statistically modelled interactions among staffing and contextual variables, and (c) described any association of these interactions with resident outcomes in LTC facilities. We will include original quantitative studies of any design or systematically conducted reviews (i.e. reviews that used a comprehensive search strategy, and systematically described their inclusion/exclusion criteria, process of eligibility screening, data extraction, and analysis/synthesis of the included studies). If the search identifies non-peer reviewed references (grey literature, such as dissertations, theses, technical reports, etc.), we will include these references if they meet our inclusion criteria.

Search strategy

A research science librarian with expertise in systematic reviews in healthcare developed our search strategy (supplementary file). This search strategy combines database-specific subject headings and keywords related to the concepts of LTC, organizational context, nurse staffing and resident outcomes. We will systematically search the databases of Medline, EMBASE, CINAHL, PsycINFO and Scopus. We will complement the electronic database search by searching for trial protocols through meta Register (http://www.controlled-trials.com/mrct/). We will retrieve all findings available in the respective database without limiting by language, country of origin and year of publication.

To ensure literature saturation, we will review the reference lists of included studies or relevant reviews identified through the search. Also, for study protocols, we will search authors' names to identify

results that are published in peer-reviewed journals or 'grey literature'. Finally, we will search contents of key journals (i.e., Journal of Clinical Nursing, Journal of Aging & Health, International Journal of Nursing Studies) and publications of key authors by hand. Key authors will emerge during the screening process (i.e., those who published particularly substantial research papers or who published a large number of research papers relevant to our research question).

Management and screening of identified references

Following the search, all identified citations will be collated and uploaded into Covidence systematic review online software (Veritas Health Information, Melbourne, Australia. Available at http://www.covidence.org). All review team members will receive training in using Covidence prior to the screening, and we will conduct calibration exercises as well as regular team meetings to discuss issues to improve the application of the inclusion and exclusion criteria. After duplicates are removed, two review team members will independently screen titles and abstracts of 50 randomly selected papers to test, and if needed refine and clarify inclusion criteria. Level of agreement among reviewers will be assessed for each pair of reviewers by calculating weighted Kappa statistics. All reviewers will discuss and clarify discrepancies until consensus is reached. Titles and abstracts of the remaining papers will also be screened by two independent reviewers and discrepancies will be resolved by consensus. We will obtain full texts of all included studies based on title/abstract screening and for those with insufficient information in titles or abstracts to decide on inclusion. Two review team members will screen full texts independently for inclusion. One review team member will carry out a hand search of key journals, and a second team member will independently check the included studies. Two team members will independently screen the reference lists of all included studies for any additional relevant studies. The results of the screening process will be reported in full and presented in a PRISMA flow diagram.

Data items

We will focus on three major outcomes: (1) nurse staffing, (2) organizational context, and (3) resident outcomes – all of which we define in the following sections.

The most common operationalizations of nurse staffing include nurse staffing levels (i.e. care hours per resident day) and professional staff mix (i.e. the proportions of different care providers with various qualifications and skills).[38] Examples of staffing variables include staffing levels (numbers of persons, full-time equivalents, care hours per resident day) and the proportion of different provider groups such as registered nurses (RNs), licensed practical nurses (LPNs), and care aides (also called nurse assistants or personal care workers) among care teams.[18] While non-nursing care staff, such as recreational therapists, social workers, etc. play a critical role in LTC, their role is not bed-side care. Therefore, we will limit our focus to nurse staffing (i.e. RNs, LPN, and care aides).

Organizational context is the environment or setting in which people receive health care services, or getting research evidence into practice.[39] Organizational context is influenced by various factors on social, political, and economic levels. Organizational context differs from merely structural variables. Structural variables like size, ownership model, etc. are not easily modifiable. Organizational context refers to facility or unit characteristics that are more dynamic, more modifiable, and that are brought about by the relationships and interactions of those who work and live in these settings, such as leadership, culture, connections among care teams, etc.[40]. Squires et al.[26] categorized six domains of organizational context: (1) users of context, (2) providers/workers in context, (3) internal arrangements of context, (4) internal infrastructures/networks, (5) responsiveness to change, (6) broader system related to context.

The dependent variable is defined as resident outcomes. Resident outcomes will include:

1. Indicators of quality of care such as individual resident-level measures or unit/facility aggregated rates of outcomes such as pain, falls, pressure ulcers, physical restraint use, antipsychotics use without a diagnosis of psychosis, hospitalizations, depression, social isolation/loneliness, weight loss, infectious disease, injuries, etc.
2. Summary measures of functional status such as activities of daily living (ADL) or cognition scores
3. Global measures such as mortality rates and rehospitalization rates.

Quality appraisal

Two members of the review team will independently assess the methodological quality of the studies. They will discuss discrepancies until consensus is reached. The whole research team will discuss results for each study in detail. To evaluate study quality, we will use four validated checklists as appropriate to each study's design, all of which were used and described in detail in previous systematic reviews:

- Systematic reviews and meta-analyses—Assessment of Multiple Systematic Reviews (AMSTAR) tool.[41] AMSTAR is a reliable and valid instrument [42] that assesses study quality in the categories of definition of an a priori design, study selection and data extraction, literature search, inclusion and exclusion criteria, list of studies included and excluded, characteristics and scientific quality of studies included, appropriateness of conclusions and methods used to combine findings, publication bias and conflict of interest.
- For intervention studies, we will use the Quality Assessment Tool for Quantitative Studies,[43] which has established validity and reliability.[44] This tool assesses eight domains: selection bias, study design, confounders, blinding, data collection methods, withdrawals and dropouts, intervention integrity and analysis. An overall rating of strong, moderate or weak is assigned based on scores of each domain.
- For cohort studies and case-control studies, we will use the Newcastle-Ottawa Scale (NOS). This tool assesses three broad perspectives: the selection of the study groups; the comparability of the groups; and the ascertainment of either the exposure or outcome of interest for case-control or cohort studies respectively.[45]
- For cross-sectional studies, we will use the rigorously developed AXIS critical appraisal tool.[46] This tool contains 20 guiding questions relating to the quality of reporting, study design quality and possible introduction of biases. The reviewer will assign to each guiding question one of three options: yes, no, do not know.

We will rate the overall quality of each study included with a scoring method developed by de Vet et al.[47] We will calculate the ratio of the obtained score to the maximum possible score, which varies with the

checklist used and the number of checklist items applicable. Based on this quality score with a possible range of 0–1, we will rank studies as weak (≤0.50), low moderate (0.51–0.66), high moderate (0.67–0.79), or strong (≥0.80).

Data extraction

We will use an Excel spreadsheet data extraction form to guide our data extraction. We will test the data extraction process by having each team member extracting data from the same five included studies. The extracted data will then be compared and any discrepancies will be discussed as a team prior to moving on to extract data from the remainder of the studies. One team member will extract study details into the template, and a second team member will double check the extracted information. Any arising disagreements will be resolved through discussion, or with a third reviewer. We will extract:

- Study author(s)
- Year of publication
- Title
- Journal (or type of reference if not a journal paper)
- Country of origin (ie, the country in which included LTC homes are located)
- Research question(s) or objective(s)
- Study design
- Study setting and sample
- Staffing variables assessed and tool/measures used to assess staffing variables
- Organizational context variables measured, and tools/methods used to measure organizational context variables
- Types of interactions between staffing and organizational context assessed
- Resident outcomes and tools/methods used to assess resident outcomes (dependent variable(s))
- Statistical analyses methods used
- Main study findings

Analyses

We will first conduct a thematic analysis of all studies included.[48] In this step, we will identify and categorize the types of interactions between organizational context and nurse staffing identified in each study (research question 1). We will then identify and categorize the effects of these interactions on quality of resident care (research question 2). In addition, we will summarize the available quantitative evidence (i.e., effect sizes of correlations, regression parameters, relative risks). We will report the range of scores, and the number and proportion of studies reporting statistically significant positive associations, statistically negative associations, and statistically non-significant associations for a certain study outcome (vote counting).

If possible, we will statistically pool results of quantitative studies, using random-effects meta-analysis. We will conduct these analyses separately for longitudinal and cross-sectional studies. Statistical pooling is possible if three or more longitudinal studies or three or more cross-sectional studies (a) report the same influencing organizational context and staffing factors on resident outcomes, (b) measure organizational context and staffing in a comparable way (eg, all studies used a comparable measurement tool and report the outcome in the same way), (c) report the same resident outcomes and (d) report the same type of statistical outcome. Pooling a minimum of two studies can be performed statistically.[49] However, at least three studies are needed to estimate measures of heterogeneity in addition to estimating the pooled effect for random-effects meta-analysis.[50] Where possible, we will contact authors of included studies to obtain missing information. We will use STATA V.15 (StataCorp LLC, College Station, Texas) to run random-effects models, which are more appropriate than fixed-effects models if we identify heterogeneity and small numbers of included studies.[51,52] We will report pooled effect sizes and their 95% CIs. To assess statistical heterogeneity we will use the I^2[53,54] and H[55] statistics (including their 95% CIs) and inconsistency of study results.[54] If we are not able to identify a sufficient number of comparable studies or studies are too heterogeneous (e.g. different designs, settings, outcomes), we will report the thematic analyses and vote counting results described above.[56]

Meta-bias(es)

To assess reporting bias, we will determine whether for intervention studies a study protocol was published before recruitment of patients had started. We will compare those study protocols to the published studies. In case we are able to include ten or more comparable studies (eg, similar designs, settings, outcomes), we will use funnel plots to assess publication bias.[57]

We will compare a fixed effect estimate against the random effects model to assess the possible presence of small sample bias in the published literature (i.e. in which the intervention effect is more beneficial in smaller studies). In the presence of small sample bias, the random effects estimate of the intervention is more beneficial than the fixed effect estimate. The potential for reporting bias will be further explored by funnel plots if ≥10 studies are available.

The overall quality of the body of evidence will be judged using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) guidelines.[27,58] The quality of evidence will be assessed based the following details: risk of bias, consistency, directness, precision and publication bias. Additional domains may be considered where appropriate. Quality will be adjudicated as high (further research is very unlikely to change our confidence in the estimate of effect), moderate (further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate), low (further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate), or very low (very uncertain about the estimate of effect).

Patient and Public Involvement

We will discuss the findings of the review and its implications with our Citizen Advisory Board including 5 older adults in need of ongoing care and their family/friend care partners.

Ethics and dissemination

We did not seek ethics approval for this study, as we will not collect primary data and data from studies included cannot be linked to individuals or organisations. We will publish findings of this review in a peer-reviewed paper. The results of this study will be disseminated via peer-reviewed publication.

Author Contributions

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KC and MH developed the research questions, the systematic review design, developed the study protocol and are leading this project. MK developed the search strategy. KC, MH and MK conducted the preliminary search and pilot-tested the search strategies. KC wrote the first draft of the manuscript; MH assisted with drafting Data Extraction and Data Analysis sections. All authors read, provided feedback and approved the final manuscript.

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Search strategies by database

OVID MEDLINE(R) ALL <1946 to March 15, 2021>

1 homes for the aged/ or "residential aged-care facilit*".mp. 14612
2 Long-Term Care/ or nursing homes/ 57909
3 (("long term" adj3 care) or LTC or LTCs).mp. 45137
4 nursing home*.mp. 47994
5 or/2-4 84294
6 exp Geriatrics/ or exp Aged/ or (elders or elderly or geriatric* or gerontolog* or "old age*" or (seniors not "high school") or "older adult*" or "old* person*" or "old* people*" or "old* individual*" or centenarian* or nonagenarian* or octogenarian* or septuagenarian* or sexagenarian* or dottering or decrepit or tottering or overaged or "oldest old").mp. 3366026
7 5 and 6 47074
8 1 or 7 52348
9 Personnel Staffing and Scheduling/ or Shift work schedule/ or workload/ 37129
10 Personnel Selection/ 13043
11 (staffing or staffed).ti,ab. 17640
12 exp Workforce/ 76933
13 (staffing adj3 model$).mp. 606
14 care model*.mp. 8225
15 ((staff* or skill* or care or case or nurs* or RN or NP or MVN or LPN) adj3 (mix or mixes or mixture* or composition*)).mp. 9195
16 nursing care/og, st or patient care team/ 76447
17 (nurs* adj1 (workforce or supply or shortage*)).mp. 4861
18 (("full time" or fulltime or "part time" or casual or contract) adj3 (work* or employment)).ti,ab. 5686
19 (differentiated adj3 practice).mp. 114
20 team nursing.mp. 328
21 ((nurs* or staff* or patient* or client* or caregiv* or "care giv*") adj2 ratio*).mp. 14092
22 ((nursing or caregiving or "care giving") adj3 "delivery system*").mp. 107
23 (functional adj3 nurs*).mp. 402
24 (staff* adj3 level*).mp. 4180
25 or/9-24 238804
26 models, organizational/ or organizational culture/ 36056
27 Leadership/ 42285
28 Communication/ 86512
29 social behavior/ or cooperative behavior/ 96982
30 organizational policy/ 14297
31 Motivation/ 69449
32 Institutional Management Teams/ 2137
33 Health Personnel/og, px [Organization & Administration, Psychology] 11480
34 (work* adj2 (context* or culture* or climate* or characteristic* or feature* or factor* or environment* or condition* or setting* or management or manager* or leaders* or authorit*)).mp. 59441
35 (Organi?ational adj2 (context* or culture* or climate* or characteristic* or feature* or factor* or determinant* or environment* or management or manager* or leaders* or authorit*)).mp. 28005
36 (Contextual adj2 (characteristic* or feature* or factor* or determinant* or culture*)).mp. 9099
37 (communication or "knowledge transmission").mp. 376852
38 (motivat* or incentiv* or inspire* or inspiration*).mp. 266464
39 cooperative behavio?r*.mp. 45423
40 or/26-39 853675

41 8 and 25 and 40 835
42 (ethnol$ or ethnog$ or ethnonurs$ or emic or etic).mp. 179019
43 exp qualitative research/ or grounded theory/ 61890
44 exp nursing methodology research/ 16385
45 qualitative.mp. 266153
46 (ethnol$ or ethnog$ or ethnonurs$ or emic or etic).mp. 179019
47 (hermeneutic$ or phenomenolog$ or lived experience$).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms] 34232
48 (Grounded adj5 theor$).mp. 14211
49 (content analys$ or thematic analys$ or narrative analys$).mp. 56898
50 (metasynthes$ or meta-synthes$ or metasummar$ or meta-summar$ or metastud$ or meta-stud$).mp. 1664
51 (meta-ethnog$ or metaethnog$ or meta-narrat$ or metanarrat$ or meta-interpret$ or metainterpret$).mp. 860
52 (qualitative adj5 meta-analy$).mp. 667
53 (qualitative adj5 metaanaly$).mp. 3
54 (action research or photovoice or photo voice).mp. 5212
55 or/42-54 495044
56 41 not 55 668

OVID Embase <1974 to 2021 March 15>

1 home for the aged/ or ("residential aged-care facilit*" or "home* for the aged").mp. 13134
2 long term care/ 132318
3 nursing home/ 53960
4 (("long-term" adj3 care) or LTC or LTCs).ti,ab,kw. 37713
5 nursing home*.mp. 66576
6 or/2-4 194940
7 exp geriatrics/ 38317
8 exp aged/ 3126655
9 (elders or elderly or geriatric* or gerontolog* or "old age*" or (seniors not "high school") or "older adult*" or "old* person*" or "old* people*" or "old* individual*" or centenarian* or nonagenarian* or octogenarian* or septuagenarian* or sexagenarian* or dottering or decrepit or tottering or overaged or "oldest old").mp. 810743
10 7 or 8 or 9 3321059
11 6 and 10 68945
12 1 or 11 76603
13 personnel management/ 58177
14 exp health care personnel management/ 3167
15 exp shift work/ 3041
16 workload/ 46310
17 (staffing or staffed).ti,ab. 24147
18 exp workforce/ 7477
19 (staffing adj3 model$).mp. 980
20 care model*.mp. 11772
21 ((staff* or skill* or care or case or nurs* or RN or NP or MVN or LPN) adj3 (mix or mixes or mixture* or composition*)).mp. 13034
22 skill mix/ 408
23 nursing care/ and (organization* or standard*).ti,ab,kw. 3060
24 patient care/ or "patient care team*".ti,ab. 308172
25 (nurs* adj1 (workforce or supply or shortage*)).mp. 5199

26 (("full time" or fulltime or "part time" or casual or contract) adj3 (work* or employment)).ti,ab. 9217
27 (differentiated adj3 practice).mp. 123
28 team nursing.mp. 610
29 ((nurs* or staff* or patient* or client* or caregiv* or "care giv*") adj2 ratio*).mp. 22731
30 ((nursing or caregiving or "care giving") adj3 "delivery system*").mp. 212
31 (functional adj3 nurs*).mp. 503
32 (staff* adj3 level*).mp. 5823
33 or/13-32 490302
34 exp "organization and management"/ 2096501
35 exp organizational culture/ 2562
36 leadership/ 72755
37 interpersonal communication/ 161607
38 social behavior/ or cooperation/ 127739
39 organizational policy/ 1513
40 motivation/ 107698
41 (health care personnel/ or health workforce/ or nursing home personnel/) and (organization* or administrat* or psychology).ti,ab,kw. 19425
42 (work* adj2 (context* or culture* or climate* or characteristic* or feature* or factor* or environment* or condition* or setting* or management or manager* or leaders* or authorit*)).mp. 87275
43 (Organi?ational adj2 (context* or culture* or climate* or characteristic* or feature* or factor* or determinant* or environment* or management or manager* or leaders* or authorit*)).mp. 16715
44 (Contextual adj2 (characteristic* or feature* or factor* or determinant* or culture*)).mp. 10214
45 (communication or "knowledge transmission").mp. 555084
46 (motivat* or incentiv* or inspire* or inspiration*).mp. 320806
47 cooperative behavio?r*.mp. 1683
48 or/34-47 3013624
49 12 and 33 and 48 3875
50 (mixed method* or multi-method* or multiple method* or multiple research method* or multimethod* or mixed model* or mixed research).tw. 75457
51 ((qualitative or qual) and (quantitative or quan) and (nested or concurrent or complementary or expansion or initiation or holistic or transformative or embedded or iterative or triangulat*)).tw. 7707
52 ((quantitative or quan) and (phenomenolog* or ethno* or (grounded adj3 theor*) or hermeneutic* or lived experience* or content analys* or thematic or theme* or narrative* or interview* or focus group* or action research)).tw. 32051
53 (triangulat* adj15 (method* or data or concurrent or sequential or simultaneous or design*)).tw. 4588
54 (qualitative adj5 quantitative adj5 (combin* or blend* or mixed or mix or integrat* or method* or analys*)).tw. 25282
55 exp qualitative research/ and quantitative.tw. 7561
56 or/50-55 125551
57 (qualitative and quantitative).tw. 106105
58 (nurs* or educat* or rehabilitat* or psych* or social or socio* or service* or interview* or questionaire* or survey*).af. 8835623
59 57 and 58 46590
60 56 or 59 141507
61 (qualitative and (randomized or (clinical adj3 trial*) or (controlled adj3 trial*))).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word] 26494
62 ((qualitative or quantitative) adj5 nested).tw. 995

63 60 or 61 or 62 161881
64 meta-analysis.pt. 0
65 (meta-anal$ or metaanal$).mp. 334607
66 ((quantitativ$ adj3 review$1) or (quantitativ$ adj3 overview$)).mp. 3954
67 ((systematic$ adj3 review$) or (systematic adj3 overview$)).mp. 389565
68 ((methodologic adj3 review$1) or (methodologic adj3 overview$)).mp. 258
69 (integrat$ adj5 research).mp.13575
70 (quantitativ$ adj3 synthes$).mp. 3627
71 or/64-70 561946
72 review.pt. or (review$ or overview$).mp. 4762703
73 (medline or medlars or pubmed or index medicus or embase or cochrane).mp. 328835
74 (scisearch or web of science or psycinfo or psychinfo or cinahl or cinhal).mp. 105633
75 (excerpta medica or psychlit or psyclit or current contents or science citation index or sciences citation index or scopus).mp. 51023
76 (hand search$ or manual search$).mp. 14792
77 ((electronic adj3 database$) or (bibliographic adj3 database$) or periodical index$).mp. 58136
78 (pooling or pooled or mantel haenszel).mp. 163983
79 (peto or der simonian or dersimonian or fixed effect$).mp. 26155
80 ((combine$ or combining) adj5 (data or trial or trials or studies or study or result or results)).mp. 167382
81 or/73-80 667763
82 72 and 81 362075
83 71 or 82 670674
84 (hta$ or health technology assessment$ or biomedical technology assessment$).mp. 25369
85 technology assessment, biomedical/ or biomedical technology assessment/ 14980
86 84 or 85 25369
87 83 or 86 692352
88 Randomized controlled trial/ or Controlled clinical study/ or randomization/ or intermethod comparison/ or double blind procedure/ or human experiment/ 1670828
89 (random$ or placebo or (open adj label) or ((double or single or doubly or singly) adj (blind or blinded or blindly)) or parallel group$1 or crossover or cross over or ((assign$ or match or matched or allocation) adj5 (alternate or group$1 or intervention$1 or patient$1 or subject$1 or participant$1)) or assigned or allocated or (controlled adj7 (study or design or trial)) or volunteer or volunteers).ti,ab. 2463011
90 (compare or compared or comparison or trial).ti. 847036
91 ((evaluated or evaluate or evaluating or assessed or assess) and (compare or compared or comparing or comparison)).ab. 2278857
92 or/88-91 5350103
93 (random$ adj sampl$ adj7 (cross section$ or questionnaire$1 or survey$ or database$1)).ti,ab. not (comparative study/ or controlled study/ or randomi?ed controlled.ti,ab. or randomly assigned.ti,ab.) 8499
94 Cross-sectional study/ not (randomized controlled trial/ or controlled clinical study/ or controlled study/ or randomi?ed controlled.ti,ab. or control group$1.ti,ab.) 263192
95 (((case adj control$) and random$) not randomi?ed controlled).ti,ab. 18357
96 (Systematic review not (trial or study)).ti. 169803
97 (nonrandom$ not random$).ti,ab. 16875
98 Random field$.ti,ab. 2492
99 (random cluster adj3 sampl$).ti,ab. 1351
100 (review.ab. and review.pt.) not trial.ti. 876470
101 we searched.ab. and (review.ti. or review.pt.) 35780
102 update review.ab. 113

103 (databases adj4 searched).ab. 41545
104 (rat or rats or mouse or mice or swine or porcine or murine or sheep or lambs or pigs or piglets or rabbit or rabbits or cat or cats or dog or dogs or cattle or bovine or monkey or monkeys or trout or marmoset$1).ti. and animal experiment/ 1106392
105 Animal experiment/ not (human experiment/ or human/) 2323120
106 or/93-105 3674062
107 92 not 106 4754298
108 63 or 87 or 107 5411378
109 49 and 108 714

OVID APA PsycInfo <1806 to March Week 2 2021>

1 ("residential aged-care facilit*" or "home* for the aged").mp. 3771
2 nursing homes/ or long term care/ 13376
3 (("long term" adj3 care) or LTC or LTCs).mp. 10876
4 nursing home*.mp. 14602
5 2 or 3 or 4 22800
6 exp geriatrics/ or older adulthood/ 20154
7 (elders or elderly or geriatric* or gerontolog* or "old age*" or (seniors not "high school") or "older adult*" or "old* person*" or "old* people*" or "old* individual*" or centenarian* or nonagenarian* or octogenarian* or septuagenarian* or sexagenarian* or dottering or decrepit or tottering or overaged or "oldest old").mp. 161058
8 6 or 7 161058
9 5 and 8 11110
10 1 or 9 13138
11 work scheduling/ or work load/ 4653
12 exp working conditions/ 30065
13 personnel selection/ 7151
14 (staffing or staffed).ti,ab. 5941
15 (staffing adj3 model$).mp. 138
16 care model*.mp. 2993
17 ((staff* or skill* or care or case or nurs* or RN or NP or MVN or LPN) adj3 (mix or mixes or mixture* or composition*)).mp. 1490
18 (nursing adj3 (organization* or administrat* or standard*)).ti,ab. 1595
19 patient care team*.mp. 8920
20 (nurs* adj1 (workforce or supply or shortage*)).mp. 1500
21 (("full time" or fulltime or "part time" or casual or contract) adj3 (work* or employment)).ti,ab. 4719
22 (differentiated adj3 practice).mp. 51
23 team nursing.mp. 26
24 ((nurs* or staff* or patient* or client* or caregiv* or "care giv*") adj2 ratio*).mp. 1709
25 ((nursing or caregiving or "care giving") adj3 "delivery system*").mp. 16
26 (functional adj3 nurs*).mp. 151
27 (staff* adj3 level*).mp. 1809
28 or/11-27 68089
29 organizations/ or exp organizational behavior/ or exp organizational structure/ 76500
30 exp organizational characteristics/ 34946
31 exp working conditions/ 30065
32 (organizational adj2 model?).ti,ab. 1816
33 exp leadership/ 46079
34 interpersonal communication/ 14839
35 social behavior/ 19083
36 cooperation/ or teamwork/ 17424
37 organization* polic*.mp. 2443

38 motivation/ or employee motivation/ 57953
39 exp health personnel/ and (organization* or administrat* or standard*).ti,ab. 24597
40 (work* adj2 (context* or culture* or climate* or characteristic* or feature* or factor* or environment* or condition* or setting* or management or manager* or leaders* or authorit*)).mp. 60998
41 (Organi?ational adj2 (context* or culture* or climate* or characteristic* or feature* or factor* or determinant* or environment* or management or manager* or leaders* or authorit*)).mp. 37263
42 (Contextual adj2 (characteristic* or feature* or factor* or determinant* or culture*)).mp. 12018
43 (communication or "knowledge transmission").mp. 280437
44 (motivat* or incentiv* or inspire* or inspiration*).mp. 246065
45 cooperative behavio?r*.mp. 10406
46 or/29-45 732665
47 10 and 28 and 46 279
48 qualitative study.md. 246523
49 exp qualitative research/ or grounded theory/ 16738
50 phenomenology/ or constructivism/ or hermeneutics/ 21906
51 ETHNOGRAPHY/ 9202
52 exp Content Analysis/ 18083
53 qualitative.mp. 179487
54 (ethno$ or emic or etic).mp. 42234
55 (leininger$ or noblit or hare).ti,ab. 1369
56 leininger m$.cu. 8
57 noblit g$.cu. 0
58 hare r$.cu. 3
59 (field note$ or field record$ or fieldnote$ or field stud$).mp. 13395
60 (participant$ adj3 observ$).mp. 14336
61 (nonparticipant$ adj3 observ$).mp. 207
62 (non participant$ adj3 observ$).mp. 418
63 (hermeneutic$ or phenomenolog$ or lived experience$).mp. 60494
64 (heidegger$ or husserl$ or merleau-pont$).mp,cu. 16234
65 (colaizzi$ or giorgi$).mp,cu. 7330
66 (ricoeur or spiegelberg$).mp,cu. 6284
67 (van kaam$ or van manen).mp,cu. 4506
68 (Grounded adj5 theor$).mp. 21670
69 (constant compar$ or theoretical sampl$ or triangulat$).ti,ab. 12354
70 (glaser or strauss).mp. 3211
71 glaser b$.cu. 5
72 strauss a$.cu. 9
73 ((content or theme* or thematic or narrative or discourse) adj2 analys*).mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh] 65643
74 (unstructured categor$ or structured categor$).mp. 29
75 (unstructured interview$ or semi-structured interview$ or semistructured interview$).mp. 47758
76 (maximum variation or snowball).mp. 2798
77 (audiorecord$ or taperecord$ or videorecord$ or videotap$).mp. 23885
78 (((audio or video*) adj5 (recorded or recording or tape* or taping)) or (tape adj3 record*)).mp. 15413
79 ((audio* or video* or tape* or taping or recording) and (interview* or transcri* or theme* or thematic)).mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh] 27079
80 (metasynthes$ or meta-synthes$ or metasummar$ or meta-summar$ or metastud$ or meta-stud$).ti,ab. 1000

81 (meta-ethnog$ or metaethnog$ or meta-narrat$ or metanarrat$ or meta-interpret$ or metainterpret$).mp. 783
82 (qualitative adj5 meta-analy$).mp. 290
83 (qualitative adj5 metaanaly$).mp. 3
84 purposive sampl$.mp. 5459
85 action research.mp. 9761
86 focus group$.mp. 39948
87 (photo voice or photovoice or mixed method*).mp. 27758
88 or/48-87 522800
89 47 not 88 199

CINAHL via EBSCOhost < 1936 to March 15, 2021 >
RESULTS: 998

S1 "home* for the aged" or "residential aged-care facilit*"
S2 (MH "Long Term Care")
S3 (MH "Nursing Homes")
S4 (MH "Nursing Home Patients")
S5 (MH "Nursing Home Personnel")
S6 (("long term" N3 care) or LTC or LTCs)
S7 "nursing home*"
S8 S2 OR S3 OR S4 OR S5 OR S6 OR S7
S9 (MH "Geriatrics") OR (MH "Aged+") OR (MH "Aged, 80 and Over+")
S10 (elder? or elderly or geriatric* or gerontolog* or "old age*" or (seniors not "high school") or "older adult*" or "old* person*" or "old* people*" or "old* individual*" or centenarian* or nonagenarian* or octogenarian* or septuagenarian* or sexagenarian* or dottering or decrepit or tottering or overaged or "oldest old")
S11 S9 OR S10
S12 S8 AND S11
S13 S1 OR S12
S14 (MH "Personnel Staffing and Scheduling+") OR (MH "Skill Mix+") OR (MH "Personnel Selection") OR (MH "Motivation") OR (MH "Nursing Manpower+") OR (MH "Workload")
S15 TI ((staffing or staffed)) OR AB ((staffing or staffed))
S16 (MH "Workforce")
S17 (staffing N3 model$)
S18 "care model*"
S19 ((staff* or skill* or care or case or nurs*) N3 (mix or mixes or mixture* or composition*))
S20 (MH "Nursing Care/MA/ST/AM")
S21 (MH "Multidisciplinary Care Team")
S22 (nurs* N1 (workforce or supply or shortage*))
S23 TI ((("full time" or fulltime or "part time" or casual or contract) N3 (work* or employment))) OR AB ((("full time" or fulltime or "part time" or casual or contract) N3 (work* or employment)))
S24 TI (differentiated N3 practice) OR AB (differentiated N3 practice)
S25 ""team nursing"" OR (MH "Differentiated Nursing Practice") OR (MH "Team Nursing")

S26 ((nurs* or staff* or patient* or client* or caregiv* or "care giv*") N2 ratio*)
S27 ((nursing or caregiving or "care giving") N3 "delivery system*")
S28 (MH "Nursing Care Delivery Systems")
S29 (functional N3 nurs*)
S30 (staff* N3 level*)
S31 S14 OR S15 OR S16 OR S17 OR S18 OR S19 OR S20 OR S21 OR S22 OR S23 OR S24 OR S25 OR S26 OR S27 OR S28 OR S29 OR S30

S32 (MH "Organizational Culture+") OR (MH "Organizational Policies") OR (MH "Motivation")
S33 "organi?ational model*"
S34 (MH "Leadership") OR (MH "Management Styles")
S35 (MH "Communication")
S36 (MH "Social Behavior") OR (MH "Cooperative Behavior")
S37 (MH "Health Personnel") and (organization* or administrat* or standard*)
S38 (work* N2 (context* or culture* or climate* or characteristic* or feature* or factor* or environment* or condition* or setting* or management or manager* or leaders* or authorit*))

S39 (MH "Work Environment")
S40 (Organi?ational N2 (context* or culture* or climate* or characteristic* or feature* or factor* or determinant* or environment* or management or manager* or leaders* or authorit*))
S41 (Contextual N2 (characteristic* or feature* or factor* or determinant* or culture*))

S42 (communication or "knowledge transmission")
S43 (motivat* or incentiv* or inspire* or inspiration*)
S44 "cooperative behavio?r*"
S45 S32 OR S33 OR S34 OR S35 OR S36 OR S37 OR S38 OR S39 OR S40 OR S41 OR S42 OR S43 OR S44
S46 S13 AND S31 AND S45
S47 (Qualitative or ethnol* or ethnog* or ethnonurs* or emic or etic or leininger* or noblit or hare or field note* or field record* or fieldnote* or field stud* or (participant* N3 observ*) or (nonparticipant* N3 observ*) or ("non participant*" N3 observ*) or hermeneutic* or phenomenolog* or "lived experience*" or heidegger* or husserl* or merleau-pont* or colaizzi* or giorgi* or ricoeur or spiegelberg* or "van kaam*" or "van manen" (Grounded N5 theor*) "constant compar*" or "theoretical sampl*" or ...
S48 (MH "Qualitative Studies+")
S49 S47 OR S48
S50 S46 NOT S49
S51 S46 NOT S49: Limit to Scholary Peer-Reviewed Journals

SCOPUS via Elsevier < 1976 to March 16, 2021 >
RESULTS: 731

(TITLE-ABS-KEY ("home* for the aged" OR "residential aged-care facilit*")) OR ((TITLE-ABS-KEY ("long term care" OR ltc OR ltcs OR "nursing home*")) AND (TITLE-ABS-KEY ((elder? OR elderly OR geriatric* OR gerontolog* OR "old age*" OR senior* OR "older adult*" OR "old* person*" OR "old* people*" OR "old* individual*" OR centenarian* OR nonagenarian* OR octogenarian* OR septuagenarian* OR sexagenarian* OR dottering OR decrepit OR tottering OR overaged OR "oldest old"))))

AND

("personnel staffing and scheduling" OR "shift work" OR shiftwork OR workload OR "work load" OR "personnel selection" OR staffing OR staffed OR (staffing W/3 model*) OR "care model*" OR ((staff* OR skill* OR care OR case OR nurs* OR rn OR np OR mvn OR lpn) W/3 (mix OR mixes OR mixture* OR composition*)) OR "patient care team*" OR (nurs* W/1 (workforce OR supply OR shortage*)) OR (("full time" OR fulltime OR "part time" OR casual OR contract) W/3 (work* OR employment)) OR (differentiated W/3 practice) OR "team nursing" OR ((

nurs* OR staff* OR patient* OR client* OR caregiv* OR "care giv*") W/2 ratio*) OR (functional W/3 nurs*) OR (staff* W/3 level*))

AND

(TITLE-ABS-KEY (leadership OR "social behavio?r*" OR "cooperative behavio?r*" OR "management team*")) OR (TITLE-ABS-KEY (work* W/2 (context* OR culture* OR climate* OR characteristic* OR feature* OR factor* OR environment* OR condition* OR setting* OR management OR manager* OR leaders* OR authorit*))) OR (TITLE-ABS-KEY (organi?ational W/2 (model* OR context* OR culture* OR climate* OR characteristic* OR feature* OR factor* OR determinant* OR environment* OR management OR manager* OR leaders* OR authorit* OR polic*))) OR (TITLE-ABS-KEY (contextual W/2 (characteristic* OR feature* OR factor* OR determinant* OR culture*))) OR (TITLE-ABS-KEY (communication OR "knowledge transmission")) OR (TITLE-ABS-KEY (motivat* OR incentiv* OR inspire* OR inspiration*))

AND NOT

(Qualitative or ethnol* or ethnog* or ethnonurs* or emic or etic or leininger* or noblit or hare or field note* or field record* or fieldnote* or field stud* or (participant* W/3 observ*) or (nonparticipant* W/3 observ*) or ("non participant*" W/3 observ*) or hermeneutic* or phenomenolog* or "lived experience*" or heidegger* or husserl* or merleau-pont* or colaizzi* or giorgi* or ricoeur or spiegelberg* or "van kaam*" or "van manen" (Grounded W/5 theor*) "constant compar*" or "theoretical sampl*" or triangulat* or "glaser and strauss" or "content analys*" or "thematic analys*" or "narrative analys*" or "unstructured categor*" or "structured categor*" or "unstructured interview*" or "semi-structured interview*" or "semistructured interview*" or "maximum variation" or snowball or audiorecord* or taperecord* or videorecord* or videotap* or ((audio or tape or video*) W/5 record*) or ((audio* or video* or tape*) W/5 interview*) or metasynthes* or "meta-synthes*" or metasummar* or "meta-summar*" or metastud* or "meta-stud*" or "meta-ethnog*" or metaethnog* or "meta-narrat*" or metanarrat* or "meta-interpret*" or metainterpret* or (qualitative W/5 meta-analy*) or (qualitative W/5 metaanaly*) or "purposive sampl*" or "action research" or "focus group* or "photo voice" or photovoice)

Reporting checklist for protocol of a systematic review and meta analysis.

Based on the PRISMA-P guidelines.

Instructions to authors

Complete this checklist by entering the page numbers from your manuscript where readers will find each of the items listed below.

Your article may not currently address all the items on the checklist. Please modify your text to include the missing information. If you are certain that an item does not apply, please write "n/a" and provide a short explanation.

Upload your completed checklist as an extra file when you submit to a journal.

In your methods section, say that you used the PRISMA-Preporting guidelines, and cite them as:

Moher D, Shamseer L, Clarke M, Ghersi D, Liberati A, Petticrew M, Shekelle P, Stewart LA. Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P) 2015 statement. Syst Rev. 2015;4(1):1.

		Reporting Item	Page Number
Title			
Identification	#1a	Identify the report as a protocol of a systematic review	1
Update	#1b	If the protocol is for an update of a previous systematic review, identify as such	n/a
Registration			
	#2	If registered, provide the name of the registry (such as PROSPERO) and registration number	1
Authors			
Contact	#3a	Provide name, institutional affiliation, e-mail address of all protocol authors; provide physical mailing address of corresponding author	1
Contribution	#3b	Describe contributions of protocol authors and identify the guarantor of the review	12

Amendments			
	#4	If the protocol represents an amendment of a previously completed or published protocol, identify as such and list changes; otherwise, state plan for documenting important protocol amendments	n/a
Support			
Sources	#5a	Indicate sources of financial or other support for the review	13
Sponsor	#5b	Provide name for the review funder and / or sponsor	13
Role of sponsor or funder	#5c	Describe roles of funder(s), sponsor(s), and / or institution(s), if any, in developing the protocol	13
Introduction			
Rationale	#6	Describe the rationale for the review in the context of what is already known	2
Objectives	#7	Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators, and outcomes (PICO)	5
Methods			
Eligibility criteria	#8	Specify the study characteristics (such as PICO, study design, setting, time frame) and report characteristics (such as years considered, language, publication status) to be used as criteria for eligibility for the review	6
Information sources	#9	Describe all intended information sources (such as electronic databases, contact with study authors, trial registers or other grey literature sources) with planned dates of coverage	6
Search strategy	#10	Present draft of search strategy to be used for at least one electronic database, including planned limits, such that it could be repeated	6
Study records - data management	#11a	Describe the mechanism(s) that will be used to manage records and data throughout the review	7
Study records - selection process	#11b	State the process that will be used for selecting studies (such as two independent reviewers) through each phase of the review (that is, screening, eligibility and inclusion in meta-analysis)	7

Study records - data collection process	#11c	Describe planned method of extracting data from reports (such as piloting forms, done independently, in duplicate), any processes for obtaining and confirming data from investigators	7
Data items	#12	List and define all variables for which data will be sought (such as PICO items, funding sources), any pre-planned data assumptions and simplifications	7
Outcomes and prioritization	#13	List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale	8
Risk of bias in individual studies	#14	Describe anticipated methods for assessing risk of bias of individual studies, including whether this will be done at the outcome or study level, or both; state how this information will be used in data synthesis	9
Data synthesis	#15a	Describe criteria under which study data will be quantitatively synthesised	11
Data synthesis	#15b	If data are appropriate for quantitative synthesis, describe planned summary measures, methods of handling data and methods of combining data from studies, including any planned exploration of consistency (such as I2, Kendall's τ)	11
Data synthesis	#15c	Describe any proposed additional analyses (such as sensitivity or subgroup analyses, meta-regression)	11
Data synthesis	#15d	If quantitative synthesis is not appropriate, describe the type of summary planned	11
Meta-bias(es)	#16	Specify any planned assessment of meta-bias(es) (such as publication bias across studies, selective reporting within studies)	12
Confidence in cumulative evidence	#17	Describe how the strength of the body of evidence will be assessed (such as GRADE)	12

BMJ Open

More than just staffing? Assessing evidence on the complex interplay among nurse staffing, other features of organizational context and resident outcomes in long-term care: a systematic review protocol

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More than just staffing? Assessing evidence on the complex interplay among nurse staffing, other features of organizational context and resident outcomes in long-term care: a systematic review protocol

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Abstract

Introduction

Especially in acute care, evidence points to an association between care staffing and resident outcomes. However, this evidence is more limited in residential long-term care (LTC). Due to fundamental differences in the population of care recipients, organizational processes, and staffing models, studies in acute care may not be applicable to LTC settings. We especially lack evidence on the complex interplay among nurse staffing and organizational context factors such as leadership, work culture or communication, and how these complex interactions influence resident outcomes. Our systematic review will identify and synthesize the available evidence on how nurse staffing and organizational context in residential LTC interact and how this impacts resident outcomes.

Methods and analysis

We will systematically search the databases MEDLINE, EMBASE, CINAHL, Scopus and PsycINFO from inception for quantitative research studies and systematically conducted reviews that statistically modelled interactions among nurse staffing and organizational context variables. We will include original studies that included nurse staffing and organizational context in LTC as independent variables, modeled interactions between these variables, and described associations of these interactions with resident outcomes. Two reviewers will independently screen titles/abstracts, and full texts for inclusion. They will also screen contents of key journals, publications of key authors and reference lists of all included studies. Discrepancies at any stage of the process will be resolved by consensus. Data extraction will be performed by one research team member and checked by a second team member. Two reviewers will independently assess the methodological quality of included studies using 4 validated checklists appropriate for different research designs. We will conduct a meta-analysis if pooling is possible. Otherwise, we will synthesize results using thematic analysis and vote counting.

Ethics and dissemination

Ethical approval is not required as this project does not involve primary data collection. The results of this study will be disseminated via peer-reviewed publication and conference presentation.

Registration

PROSPERO, CRD42021272671.

Keywords: Workforce, Organization and Administration, Health Services, Long-Term Care, Organizational Culture

Strengths and limitations of this study

- This study protocol is informed by the Cochrane Collaboration systematic review methods and adheres to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Protocols.
- Study selection, data extraction and quality assessment will be performed independently by two researchers, which will ensure that all relevant studies are included without personal biases.
- The number of high-quality studies on this topic may be small, possibly limiting the strength of the conclusions we can draw.

Introduction

Demographic changes such as decreasing fertility and population aging have increased the pressure on residential long-term care (LTC) settings.[1,2] Residential LTC is defined as 24-hour functional support and care for individuals who require assistance with activities of daily living and often have complex health needs and increased vulnerability. Services may also include palliative/hospice and end-of-life care.[3] Due to demographic trends, demand for LTC has increased, and older adults have entered LTC with increasingly complex care needs and closer to the end of life than ever before.[4,5] However, staffing levels have not kept up with these increasing demands.[2] In almost all OECD countries, the number of LTC workers per population has remained consistent or decreased since 2011 – and more than half of OECD countries report a shortage of LTC caregivers.[2] Media and researchers have increasingly expressed concerns about LTC staffing levels being too low, affecting quality of resident care and safety.[6–9]

In acute care, multiple studies have demonstrated that better nurse staffing (i.e. more care hours per client and day and more qualified care teams) is associated with better client outcomes.[10–15] For example, Driscroll et al.[16] found in their meta-analysis that higher nurse staffing levels decreased the mortality risk by 14% (odds ratio [OR]=0.86, 95% confidence interval [CI]: 0.79; 0.94). Similarly, a systematic review by Kane et al.[17] demonstrated that on intensive care units one registered nurse (RN) more per client day decreased the odds of hospital acquired pneumonia (OR=0.70; 95% CI: 0.56; 0.88), unplanned extubation (OR=0.49; 95% CI: 0.36; 0.67), respiratory failure (OR=0.40; 95% CI: 0.27; 0.59), and cardiac arrest (OR=0.72; 95% CI: 0.62; 0.84). However, the results of these studies may not be directly applicable to LTC. LTC facilities serve different populations than acute care, are organized differently, and staffing models differ significantly from those in acute care (more nursing assistants, less regulated staff). In addition, the care provided is less medically focused, emphasizing the management of multiple chronic conditions and related symptoms, and supporting people with physical and cognitive impairment, over curing a disease.[18]

In LTC the evidence is more heterogeneous and not as conclusive. Most of the studies on staffing in LTC are based out of the US.[19,20] Older systematic reviews suggested an association between higher total staffing levels and improved quality of care.[21] Bostick et al.[21] found that staffing levels most strongly influenced residents' functional ability, pressure ulcers, and weight loss. Yet, more recent reviews do not support these conclusions. In a systematic review published in 2020, Armijo-Olivo et al.[22] pointed out that total nurse staffing hours were not associated with urinary catheter use, use of physical restraint, and development of infections. Three of the studies included in this review reported a positive association of total nurse staffing hours with overall quality of care, whereas two of the included studies indicated no association. Overall, the included studies were of poor methodological quality, failed to adequately and consistently define measures of staffing and quality, and reported contradictory study findings, clearly not permitting any strong conclusions.[22–24]

The reason for the above mentioned complexities may be that the relationship between nurse staffing and quality of care could be moderated by other factors. Backhaus et al.[25] point to organizational context factors as one of the possible reasons for the inconclusive evidence – and these factors and their interaction with care staffing have received little attention in the literature on nurse staffing and quality of LTC. Better organizational context, such as supportive leadership, a collaborative work culture, or supportive care teams may interact with LTC staffing and mitigate the negative effects of lower nurse staffing in LTC.[25] However, only a small number of studies have included both, nurse staffing and

organizational context characteristics as independent variables to assess their influence on quality of care in nursing homes.[26–28] These studies suggest a positive association between organizational factors and quality of care, but no association between staffing and quality of care.

The current body of literature on organizational context lacks adequate definitions too, and it and is characterized by considerable variability in how contextual factors are measured across studies.[29] Squires et al.[30] created a framework of domains, attributes and features of organizational context. The authors defined organizational context *'as characteristics of: the providers and users of health care, internal organizational arrangements, infrastructures and networks, responsiveness to change, and the broader healthcare system'*.[30] Organizational context refers to facility or unit characteristics that are created by the interactions and relationships of those living and working in these organizations, such as leadership, culture, connections among care teams, etc. Organizational context differs from structural variables such as facility size, ownership model, etc. in that it is dynamic in nature and potentially modifiable – which are critical characteristics when change is the aim. Staffing can be considered an element of organizational context, but focusing solely on staffing without including other contextual factors is not adequate.[31]

Recent studies in acute care settings have demonstrated that organizational context is associated with quality of client care and nurse outcomes.[32–34] In their systematic review, Kaplan et al.[35] identified leadership from top management, organizational culture, data infrastructure and information systems as important contextual factors influencing quality improvement success in health care. Ten (21%) of the included studies were conducted in LTC. In their systematic review, Braithwaite et al.[36] found that across multiple studies, settings and countries positive organisational and workplace cultures were consistently associated with a wide range of patient outcomes, such as reduced mortality rates, falls, hospital acquired infections and increased patient satisfaction. Four studies (6.5%) were conducted in aged care settings. Temkin-Greener et al.[37] demonstrated that residents in LTC facilities with lower staff cohesion had significantly greater odds of pressure ulcers (OR=0.957; p=.016) and incontinence (OR=0.924; p<.001). Residents in facilities with more self-managed care teams had a lower risk of pressure ulcers (OR=0.977; p=.028). Van Beek et al.[38] found that organizational culture was related to perceived and observed quality of care in LTC dementia units.

The fact that various studies in LTC fail to identify a relationship between staffing levels and quality of care may indicate that more or better-educated staff will not automatically lead to better quality of care, but that the quality of the organizational context may play a significant additional role. [19,27] However, to the best of our knowledge no review has synthesized available evidence on the interactions between organizational context factors, nurse staffing, and the association of these interactions with resident outcomes.

Aim

This systematic review aims to identify, analyze and synthesize quantitative research evidence on statistical interactions between nurse staffing and organizational context in LTC homes, and the effects of these interactions on LTC resident outcomes. To this end, the proposed systematic review will answer the following research questions:

1. Which interactions between elements of organizational context and nurse staffing in LTC have been described in the literature?
2. What LTC resident outcomes are influenced by these staffing-context interactions?

Methods and analysis

Our systematic review will follow the Cochrane Handbook of Systematic Reviews of Interventions[39] and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)[40] guidelines. This protocol followed the PRISMA-P reporting guidelines for systematic review protocols.[41] We started the review in January 2021. Currently, we are screening the full texts. The review is scheduled to be completed by June 2022.

Inclusion and exclusion criteria

We will include empirical studies that (a) used nurse staffing and organizational context in LTC as independent variables, (b) statistically modelled interactions among staffing and contextual variables, and (c) described any association of these interactions with resident outcomes in LTC facilities. We are especially interested in statistical interaction effects and their associations with other outcomes. Therefore, we define interactions, according to Lavrakas,[42] as the simultaneous effect of two or more independent variables on at least one dependent variable in which their joint effect is significantly greater (or significantly less) than the sum of the parts. We will include original quantitative studies of any design or systematically conducted reviews (i.e. reviews that used a comprehensive search strategy, and systematically described their inclusion/exclusion criteria, process of eligibility screening, data extraction, and analysis/synthesis of the included studies). If the search identifies non-peer reviewed references (grey literature, such as dissertations, theses, technical reports, etc.), we will include these references if they meet our inclusion criteria. We will include studies regardless of the year of publication, country of origin, and publication language. Languages spoken among members of our study team include: Chinese, English, French, German, Nepalese and Urdu. Our networks include colleagues who speak Danish, Dutch, Farsi, Italian, Norwegian, Portuguese, Spanish and Swedish, who will help us to assess eligibility of studies in these languages. Should we encounter studies with no English abstract in languages other than those listed, we will further leverage our networks to find a colleague who speaks this language. We have successfully applied this approach in previous literature reviews. [43–45] We will exclude qualitative studies, non-empirical work, non-systematic (selective) reviews and studies with a focus on the psychometrical testing of instruments. We will also exclude studies that are conducted in residential facilities providing care for residents with less complex care needs (assisted living, supportive living, retirement homes, senior housing), day or night care facilities, hospitals, home care, primary care, care housing or studies that focus on LTC homes that admit primarily younger people. We will exclude studies that only include either one of nurse staffing or organizational context, and studies that do not focus on nurses, but on social workers, students, or other healthcare professionals instead. We will exclude studies that do not measure associations with resident outcomes and studies reporting associations with nurse outcomes such as nurse satisfaction, etc.

Search strategy

A research science librarian with expertise in systematic reviews in healthcare developed our search strategy (supplementary file). This search strategy combines database-specific subject headings and keywords related to the concepts of LTC, organizational context, nurse staffing and resident outcomes. We will systematically search the databases of Medline, EMBASE, CINAHL, PsycINFO and Scopus from database inception to the date the final search will be carried out (Summer 2022). We will complement the electronic database search by searching for trial protocols through meta register (http://www.controlled-trials.com/mrct/). We will retrieve all findings available in the respective database without limiting by language, country of origin and year of publication.

To ensure literature saturation, we will review the reference lists of included studies or relevant reviews identified through the search. Also, for study protocols, we will search authors' names to identify results that are published in peer-reviewed journals or 'grey literature'. In addition, we will search contents of key journals (i.e., Journal of Clinical Nursing, Journal of Aging & Health, International Journal of Nursing Studies) and publications of key authors by hand. Key authors will emerge during the screening process (i.e., those who published particularly substantial research papers or who published a large number of research papers relevant to our research question).

Management and screening of identified references

Following the search, all identified citations will be collated and uploaded into Covidence systematic review online software (Veritas Health Information, Melbourne, Australia. Available at http://www.covidence.org). All review team members will receive training in using Covidence prior to the screening, and we will conduct calibration exercises as well as regular team meetings to discuss issues to improve

the application of the inclusion and exclusion criteria. After duplicates are removed, two review team members will independently screen titles and abstracts of 50 randomly selected papers to test, and if needed refine and clarify inclusion criteria. Level of agreement among reviewers will be assessed for each pair of reviewers by calculating weighted Kappa statistics[46]. All reviewers will discuss and clarify discrepancies until consensus is reached. Titles and abstracts of the remaining papers will also be screened by two independent reviewers and discrepancies will be resolved by consensus. We will obtain full texts of all included studies based on title/abstract screening and for those with insufficient information in titles or abstracts to decide on inclusion. Two review team members will screen full texts independently for inclusion. One review team member will carry out a hand search of key journals, and a second team member will independently check the included studies. Two team members will independently screen the reference lists of all included studies for any additional relevant studies. The results of the screening process will be reported in full and presented in a PRISMA flow diagram.

Data items

We will focus on three major outcomes: (1) nurse staffing, (2) organizational context, and (3) resident outcomes – all of which we define in the following sections.

The most common operationalizations of nurse staffing include nurse staffing levels (i.e. care hours per resident day) and professional staff mix (i.e. the proportions of different care providers with various qualifications and skills).[47] Examples of staffing variables include staffing levels (numbers of persons, full-time equivalents, care hours per resident day) and the proportion of different provider groups such as registered nurses (RNs), licensed practical nurses (LPNs), and care aides (also called nurse assistants or personal care workers) among care teams.[19] While non-nursing care staff, such as recreational therapists, social workers, etc. play a critical role in LTC, their role is not bed-side care. Therefore, we will limit our focus to nurse staffing (i.e. RNs, LPN, and care aides).

Organizational context is the environment or setting in which people receive health care services, or getting research evidence into practice.[48] Organizational context is influenced by various factors on social, political, and economic levels. Organizational context includes more than the structural and not easily changeable characteristics such as size, ownership model, etc. Organizational context also refers to characteristics of facilities or units that are more dynamic, more modifiable, and that are brought about by the relationships and interactions of those who work and live in these settings, such as leadership, culture, connections among care teams, etc.[49]. Squires et al.[30] categorized six domains of organizational context: (1) users of context, as the patient population (2) providers/workers in context, as clinician, and provider groups (3) internal arrangements of context, like leadership or culture (4) internal infrastructures/networks, like support or communication (5) responsiveness to change, meaning organizational change processes (6) broader system related to context, like politics, and market. In our review, we will assess structural and contextual factors.

The dependent variable is defined as resident outcomes. The Donabedian Model[50] is a widely accepted method to design the main dimensions of healthcare quality and is used for determining quality in health care. Donabedian has specified three levels of quality outcomes: structural outcomes, process outcomes and care outcomes. Our review focuses on care outcomes only since those are the direct measures of a resident's health and well-being. Organizational context and structural variables are what Donabedian considers structural quality outcomes, so they are accounted for – as the independent variables of interest.

Resident outcomes will include variables such as established and agreed on LTC quality indicators based on the Resident Assessment Instrument – Minimum Data Set 2.0 (RAI-MDS 2.0), which are validated measures of LTC quality,[51,52] or comparable outcomes. We will include:

1. Indicators of quality of care such as individual resident-level measures or unit/facility aggregated rates of outcomes such as pain, falls, pressure ulcers, physical restraint use, antipsychotics use without a diagnosis of psychosis, hospitalizations, depression, social isolation/loneliness, weight loss, infectious disease, injuries, etc.

2. Summary measures of functional status such as activities of daily living (ADL) or cognition scores
3. Global measures such as mortality rates and rehospitalization rates.

Quality appraisal

Two members of the review team will independently assess the methodological quality of the studies. They will discuss discrepancies until consensus is reached. The whole research team will discuss results for each study in detail. To evaluate study quality, we will use four validated checklists as appropriate to each study's design, all of which were used and described in detail in previous systematic reviews:

- Systematic reviews and meta-analyses—Assessment of Multiple Systematic Reviews (AMSTAR) tool.[53] AMSTAR is a reliable and valid instrument [54] that assesses study quality in the categories of definition of an a priori design, study selection and data extraction, literature search, inclusion and exclusion criteria, list of studies included and excluded, characteristics and scientific quality of studies included, appropriateness of conclusions and methods used to combine findings, publication bias and conflict of interest.
- For intervention studies, we will use the Quality Assessment Tool for Quantitative Studies,[55] which has established validity and reliability.[56] This tool assesses eight domains: selection bias, study design, confounders, blinding, data collection methods, withdrawals and dropouts, intervention integrity and analysis. An overall rating of strong, moderate or weak is assigned based on scores of each domain.
- For cohort studies and case-control studies, we will use the Newcastle-Ottawa Scale (NOS). This tool assesses three broad perspectives: the selection of the study groups; the comparability of the groups; and the ascertainment of either the exposure or outcome of interest for case-control or cohort studies respectively.[57]
- For cross-sectional studies, we will use the rigorously developed AXIS critical appraisal tool.[58] This tool contains 20 guiding questions relating to the quality of reporting, study design quality and possible introduction of biases. The reviewer will assign to each guiding question one of three options: yes, no, do not know.

We will rate the overall quality of each study included with a scoring method developed by de Vet et al.[59] We will calculate the ratio of the obtained score to the maximum possible score, which varies with the checklist used and the number of checklist items applicable. Based on this quality score with a possible range of 0–1, we will rank studies as weak (≤0.50), low moderate (0.51–0.66), high moderate (0.67–0.79), or strong (≥0.80).

Data extraction

We will use an Excel spreadsheet data extraction form to guide our data extraction. We will test the data extraction process by having each team member extracting data from the same five included studies. The extracted data will then be compared and any discrepancies will be discussed as a team prior to moving on to extract data from the remainder of the studies. One team member will extract study details into the template, and a second team member will double check the extracted information. Any arising disagreements will be resolved through discussion, or with a third reviewer. The categories of extracted data, based on previous successful literature reviews[60,61], include specific details on:

- Study author(s)
- Year of publication
- Title
- Journal (or type of reference if not a journal paper)
- Country of origin (i.e., the country in which included LTC homes are located)
- Research question(s) or objective(s)
- Study design

- Study setting and sample
- Staffing variables assessed and tool/measures used to assess staffing variables
- Organizational context variables measured, and tools/methods used to measure organizational context variables
- Types of interactions between staffing and organizational context assessed
- Resident outcomes and tools/methods used to assess resident outcomes (dependent variable(s))
- Statistical analyses methods used
- Main study findings

Analyses

We will first conduct a thematic analysis of all studies included.[62] In this step, we will identify and categorize the types of interactions between organizational context and nurse staffing identified in each study (research question 1). We will then identify and categorize the effects of these interactions on quality of resident care (research question 2). In addition, we will summarize the available quantitative evidence (i.e., effect sizes of correlations, regression parameters, relative risks). We will report the range of scores, and the number and proportion of studies reporting statistically significant positive associations, statistically negative associations, and statistically non-significant associations for a certain study outcome (vote counting).

If possible, we will statistically pool results of quantitative studies, using random-effects meta-analysis. We will conduct these analyses separately for longitudinal and cross-sectional studies. Statistical pooling is possible if three or more longitudinal studies or three or more cross-sectional studies (a) report the same influencing organizational context and staffing factors on resident outcomes, (b) measure organizational context and staffing in a comparable way (e.g., all studies used a comparable measurement tool and report the outcome in the same way), (c) report the same resident outcomes and (d) report the same type of statistical outcome. Pooling a minimum of two studies can be performed statistically.[63] However, at least three studies are needed to estimate measures of heterogeneity in addition to estimating the pooled effect for random-effects meta-analysis.[64] Where possible, we will contact authors of included studies to obtain missing information. We will use STATA V.15 (StataCorp LLC, College Station, Texas) to run random-effects models, which are more appropriate than fixed-effects models if we identify heterogeneity and small numbers of included studies.[65,66] We will report pooled effect sizes and their 95% CIs. To verify non-significant statistical heterogeneity among included studies, we will use the I^2[67,68] and H[69] statistics (including their 95% CIs) and inconsistency of study results.[68] If we are not able to identify a sufficient number of comparable studies or studies are too heterogeneous (e.g. different designs, settings, outcomes), we will report the thematic analyses and vote counting results described above.[70]

Meta-bias(es)

To assess reporting bias, we will determine whether for intervention studies a study protocol was published before recruitment of patients had started. We will compare those study protocols to the published studies. In case we are able to include ten or more comparable studies (e.g., similar designs, settings, outcomes), we will use funnel plots to assess publication bias.[71]

We will compare a fixed effect estimate against the random effects model to assess the possible presence of small sample bias in the published literature (i.e. in which the intervention effect is more beneficial in smaller studies). In the presence of small sample bias, the random effects estimate of the intervention is more beneficial than the fixed effect estimate. The potential for reporting bias will be further explored by funnel plots if ≥10 studies are available.

The overall quality of the body of evidence will be judged using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) guidelines.[31,72] The quality of evidence will be assessed based the following details: risk of bias, consistency, directness, precision, and publication bias. Additional domains may be considered where appropriate. Quality will be adjudicated as high (further research is very unlikely to change our confidence in the estimate of effect), moderate (further research is

likely to have an important impact on our confidence in the estimate of effect, and may change the estimate), low (further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate), or very low (very uncertain about the estimate of effect).

Patient and Public Involvement

We will discuss the findings of the review and its implications with our Citizen Advisory Board, which includes five older adults in need of ongoing care and their family/friend care partners.

Ethics and dissemination

We did not seek ethics approval for this study, as we will not collect primary data and data from studies included cannot be linked to individuals or organisations. The results of this study will be disseminated via peer-reviewed publication and conference presentation.

Contributors

KC and MH developed the research questions, the systematic review design, developed the study protocol and are leading this project. MK developed the search strategy. KC, MH, and MK conducted the preliminary search and pilot-tested the search strategies. KC wrote the first draft of the manuscript; MH assisted with drafting the data extraction and data analysis sections. All authors read, provided feedback, and approved the final manuscript.

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Competing interests

None declared.

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Search strategies by database

OVID MEDLINE(R) ALL <from inception>

1 homes for the aged/ or "residential aged-care facilit*".mp.
2 Long-Term Care/ or nursing homes
3 (("long term" adj3 care) or LTC or LTCs).mp.
4 nursing home*.mp.
5 or/2-4
6 exp Geriatrics/ or exp Aged/ or (elders or elderly or geriatric* or gerontolog* or "old age*" or (seniors not "high school") or "older adult*" or "old* person*" or "old* people*" or "old* individual*" or centenarian* or nonagenarian* or octogenarian* or septuagenarian* or sexagenarian* or dottering or decrepit or tottering or overaged or "oldest old").mp.
7 5 and 6
8 1 or 7
9 Personnel Staffing and Scheduling/ or Shift work schedule/ or workload/
10 Personnel Selection/
11 (staffing or staffed).ti,ab.
12 exp Workforce/
13 (staffing adj3 model$).mp.
14 care model*.mp.
15 ((staff* or skill* or care or case or nurs* or RN or NP or MVN or LPN) adj3 (mix or mixes or mixture* or composition*)).mp.
16 nursing care/og, st or patient care team/
17 (nurs* adj1 (workforce or supply or shortage*)).mp.
18 (("full time" or fulltime or "part time" or casual or contract) adj3 (work* or employment)).ti,ab.
19 (differentiated adj3 practice).mp.
20 team nursing.mp.
21 ((nurs* or staff* or patient* or client* or caregiv* or "care giv*") adj2 ratio*).mp.
22 ((nursing or caregiving or "care giving") adj3 "delivery system*").mp.
23 (functional adj3 nurs*).mp.
24 (staff* adj3 level*).mp.
25 or/9
26 models, organizational/ or organizational culture/
27 Leadership/
28 Communication/
29 social behavior/ or cooperative behavior/
30 organizational policy/
31 Motivation/
32 Institutional Management Teams/
33 Health Personnel/og, px [Organization & Administration, Psychology]
34 (work* adj2 (context* or culture* or climate* or characteristic* or feature* or factor* or environment* or condition* or setting* or management or manager* or leaders* or authorit*)).mp.
35 (Organi?ational adj2 (context* or culture* or climate* or characteristic* or feature* or factor* or determinant* or environment* or management or manager* or leaders* or authorit*)).mp.
36 (Contextual adj2 (characteristic* or feature* or factor* or determinant* or culture*)).mp.
37 (communication or "knowledge transmission").mp.
38 (motivat* or incentiv* or inspire* or inspiration*).mp.
39 cooperative behavio?r*.mp.
40 or/26-39
41 8 and 25 and 40
42 (ethnol$ or ethnog$ or ethnonurs$ or emic or etic).mp.
43 exp qualitative research/ or grounded theory/

44 exp nursing methodology research/
45 qualitative.mp.
46 (ethnol$ or ethnog$ or ethnonurs$ or emic or etic).mp.
47 (hermeneutic$ or phenomenolog$ or lived experience$).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
48 (Grounded adj5 theor$).mp.
49 (content analys$ or thematic analys$ or narrative analys$).mp.
50 (metasynthes$ or meta-synthes$ or metasummar$ or meta-summar$ or metastud$ or meta-stud$).mp.
51 (meta-ethnog$ or metaethnog$ or meta-narrat$ or metanarrat$ or meta-interpret$ or metainterpret$).mp.
52 (qualitative adj5 meta-analy$).mp.
53 (qualitative adj5 metaanaly$).mp.
54 (action research or photovoice or photo voice).mp.
55 or/42-54
56 41 not 55

OVID Embase < from inception >

1 home for the aged/ or ("residential aged-care facilit*" or "home* for the aged").mp.
2 long term care/
3 nursing home/53960
4 (("long-term" adj3 care) or LTC or LTCs).ti,ab,kw.
5 nursing home*.mp.
6 or/2-4
7 exp geriatrics/
8 exp aged/
9 (elders or elderly or geriatric* or gerontolog* or "old age*" or (seniors not "high school") or "older adult*" or "old* person*" or "old* people*" or "old* individual*" or centenarian* or nonagenarian* or octogenarian* or septuagenarian* or sexagenarian* or dottering or decrepit or tottering or overaged or "oldest old").mp.
10 7 or 8 or 9
11 6 and 10
12 1 or 11
13 personnel management/
14 exp health care personnel management/
15 exp shift work/
16 workload/
17 (staffing or staffed).ti,ab.
18 exp workforce/
19 (staffing adj3 model$).mp.
20 care model*.mp.
21 ((staff* or skill* or care or case or nurs* or RN or NP or MVN or LPN) adj3 (mix or mixes or mixture* or composition*)).mp.
22 skill mix/
23 nursing care/ and (organization* or standard*).ti,ab,kw.
24 patient care/ or "patient care team*".ti,ab.
25 (nurs* adj1 (workforce or supply or shortage*)).mp.
26 (("full time" or fulltime or "part time" or casual or contract) adj3 (work* or employment)).ti,ab.
27 (differentiated adj3 practice).mp.
28 team nursing.mp
29 ((nurs* or staff* or patient* or client* or caregiv* or "care giv*") adj2 ratio*).mp.

30 ((nursing or caregiving or "care giving") adj3 "delivery system*").mp.
31 (functional adj3 nurs*).mp.
32 (staff* adj3 level*).mp.
33 or/13-32
34 exp "organization and management"/
35 exp organizational culture/
36 leadership/
37 interpersonal communication/
38 social behavior/ or cooperation/
39 organizational policy/
40 motivation/
41 (health care personnel/ or health workforce/ or nursing home personnel/) and (organization* or administrat* or psychology).ti,ab,kw.
42 (work* adj2 (context* or culture* or climate* or characteristic* or feature* or factor* or environment* or condition* or setting* or management or manager* or leaders* or authorit*)).mp.
43 (Organi?ational adj2 (context* or culture* or climate* or characteristic* or feature* or factor* or determinant* or environment* or management or manager* or leaders* or authorit*)).mp.
44 (Contextual adj2 (characteristic* or feature* or factor* or determinant* or culture*)).mp.
45 (communication or "knowledge transmission").mp.
46 (motivat* or incentiv* or inspire* or inspiration*).mp.
47 cooperative behavio?r*.mp.
48 or/34-47
49 12 and 33 and 48
50 (mixed method* or multi-method* or multiple method* or multiple research method* or multimethod* or mixed model* or mixed research).tw.
51 ((qualitative or qual) and (quantitative or quan) and (nested or concurrent or complementary or expansion or initiation or holistic or transformative or embedded or iterative or triangulat*)).tw.
52 ((quantitative or quan) and (phenomenolog* or ethno* or (grounded adj3 theor*) or hermeneutic* or lived experience* or content analys* or thematic or theme* or narrative* or interview* or focus group* or action research)).tw.
53 (triangulat* adj15 (method* or data or concurrent or sequential or simultaneous or design*)).tw.
54 (qualitative adj5 quantitative adj5 (combin* or blend* or mixed or mix or integrat* or method* or analys*)).tw.
55 exp qualitative research/ and quantitative.tw.
56 or/50-55
57 (qualitative and quantitative).tw.
58 (nurs* or educat* or rehabilitat* or psych* or social or socio* or service* or interview* or questionaire* or survey*).af.
59 57 and 58
60 56 or 59
61 (qualitative and (randomized or (clinical adj3 trial*) or (controlled adj3 trial*))).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word]
62 ((qualitative or quantitative) adj5 nested).tw.
63 60 or 61 or 62
64 meta-analysis.pt.
65 (meta-anal$ or metaanal$).mp.
66 ((quantitativ$ adj3 review$1) or (quantitativ$ adj3 overview$)).mp.
67 ((systematic$ adj3 review$) or (systematic adj3 overview$)).mp.
68 ((methodologic adj3 review$1) or (methodologic adj3 overview$)).mp.
69 (integrat$ adj5 research).mp.
70 (quantitativ$ adj3 synthes$).mp.

71 or/64-70
72 review.pt. or (review$ or overview$).mp.
73 (medline or medlars or pubmed or index medicus or embase or cochrane).mp.
74 (scisearch or web of science or psycinfo or psychinfo or cinahl or cinhal).mp.
75 (excerpta medica or psychlit or psyclit or current contents or science citation index or sciences citation index or scopus).mp.
76 (hand search$ or manual search$).mp.
77 ((electronic adj3 database$) or (bibliographic adj3 database$) or periodical index$).mp.
78 (pooling or pooled or mantel haenszel).mp.
79 (peto or der simonian or dersimonian or fixed effect$).mp.
80 ((combine$ or combining) adj5 (data or trial or trials or studies or study or result or results)).mp.
81 or/73-80
82 72 and 81
83 71 or 82
84 (hta$ or health technology assessment$ or biomedical technology assessment$).mp. 25369
85 technology assessment, biomedical/ or biomedical technology assessment/ 14980
86 84 or 85
87 83 or 86
88 Randomized controlled trial/ or Controlled clinical study/ or randomization/ or intermethod comparison/ or double blind procedure/ or human experiment/
89 (random$ or placebo or (open adj label) or ((double or single or doubly or singly) adj (blind or blinded or blindly)) or parallel group$1 or crossover or cross over or ((assign$ or match or matched or allocation) adj5 (alternate or group$1 or intervention$1 or patient$1 or subject$1 or participant$1)) or assigned or allocated or (controlled adj7 (study or design or trial)) or volunteer or volunteers).ti,ab.
90 (compare or compared or comparison or trial).ti.
91 ((evaluated or evaluate or evaluating or assessed or assess) and (compare or compared or comparing or comparison)).ab.
92 or/88-91
93 (random$ adj sampl$ adj7 (cross section$ or questionnaire$1 or survey$ or database$1)).ti,ab. not (comparative study/ or controlled study/ or randomi?ed controlled.ti,ab. or randomly assigned.ti,ab.)
94 Cross-sectional study/ not (randomized controlled trial/ or controlled clinical study/ or controlled study/ or randomi?ed controlled.ti,ab. or control group$1.ti,ab.)
95 (((case adj control$) and random$) not randomi?ed controlled).ti,ab.
96 (Systematic review not (trial or study)).ti.
97 (nonrandom$ not random$).ti,ab.
98 Random field$.ti,ab.
99 (random cluster adj3 sampl$).ti,ab.
100 (review.ab. and review.pt.) not trial.ti.
101 we searched.ab. and (review.ti. or review.pt.)
102 update review.ab.
103 (databases adj4 searched).ab.
104 (rat or rats or mouse or mice or swine or porcine or murine or sheep or lambs or pigs or piglets or rabbit or rabbits or cat or cats or dog or dogs or cattle or bovine or monkey or monkeys or trout or marmoset$1).ti. and animal experiment/
105 Animal experiment/ not (human experiment/ or human/)
106 or/93-105
107 92 not 106
108 63 or 87 or 107
109 49 and 108

OVID APA PsycInfo < from inception >

1 ("residential aged-care facilit*" or "home* for the aged").mp.
2 nursing homes/ or long term care/
3 (("long term" adj3 care) or LTC or LTCs).mp.
4 nursing home*.mp.
5 2 or 3 or 4
6 exp geriatrics/ or older adulthood/
7 (elders or elderly or geriatric* or gerontolog* or "old age*" or (seniors not "high school") or "older adult*" or "old* person*" or "old* people*" or "old* individual*" or centenarian* or nonagenarian* or octogenarian* or septuagenarian* or sexagenarian* or dottering or decrepit or tottering or overaged or "oldest old").mp.
8 6 or 7
9 5 and 8
10 1 or 9
11 work scheduling/ or work load/
12 exp working conditions/
13 personnel selection/
14 (staffing or staffed).ti,ab.
15 (staffing adj3 model$).mp.
16 care model*.mp.
17 ((staff* or skill* or care or case or nurs* or RN or NP or MVN or LPN) adj3 (mix or mixes or mixture* or composition*)).mp.
18 (nursing adj3 (organization* or administrat* or standard*)).ti,ab.
19 patient care team*.mp.
20 (nurs* adj1 (workforce or supply or shortage*)).mp.
21 (("full time" or fulltime or "part time" or casual or contract) adj3 (work* or employment)).ti,ab.
22 (differentiated adj3 practice).mp.
23 team nursing.mp.
24 ((nurs* or staff* or patient* or client* or caregiv* or "care giv*") adj2 ratio*).mp.
25 ((nursing or caregiving or "care giving") adj3 "delivery system*").mp.
26 (functional adj3 nurs*).mp.
27 (staff* adj3 level*).mp.
28 or/11-27
29 organizations/ or exp organizational behavior/ or exp organizational structure/
30 exp organizational characteristics/
31 exp working conditions/
32 (organizational adj2 model?).ti,ab.
33 exp leadership/
34 interpersonal communication/
35 social behavior/
36 cooperation/ or teamwork/
37 organization* polic*.mp.
38 motivation/ or employee motivation/
39 exp health personnel/ and (organization* or administrat* or standard*).ti,ab.
40 (work* adj2 (context* or culture* or climate* or characteristic* or feature* or factor* or environment* or condition* or setting* or management or manager* or leaders* or authorit*)).mp.
41 (Organi?ational adj2 (context* or culture* or climate* or characteristic* or feature* or factor* or determinant* or environment* or management or manager* or leaders* or authorit*)).mp.
42 (Contextual adj2 (characteristic* or feature* or factor* or determinant* or culture*)).mp.
43 (communication or "knowledge transmission").mp.
44 (motivat* or incentiv* or inspire* or inspiration*).mp.

45 cooperative behavio?r*.mp.
46 or/29-45
47 10 and 28 and 46
48 qualitative study.md.
49 exp qualitative research/ or grounded theory/
50 phenomenology/ or constructivism/ or hermeneutics/
51 ETHNOGRAPHY/
52 exp Content Analysis/
53 qualitative.mp.
54 (ethno$ or emic or etic).mp.
55 (leininger$ or noblit or hare).ti,ab.
56 leininger m$.cu.
57 noblit g$.cu.
58 hare r$.cu.
59 (field note$ or field record$ or fieldnote$ or field stud$).mp.
60 (participant$ adj3 observ$).mp.
61 (nonparticipant$ adj3 observ$).mp.
62 (non participant$ adj3 observ$).mp.
63 (hermeneutic$ or phenomenolog$ or lived experience$).mp.
64 (heidegger$ or husserl$ or merleau-pont$).mp,cu.
65 (colaizzi$ or giorgi$).mp,cu.
66 (ricoeur or spiegelberg$).mp,cu.
67 (van kaam$ or van manen).mp,cu.
68 (Grounded adj5 theor$).mp.
69 (constant compar$ or theoretical sampl$ or triangulat$).ti,ab.
70 (glaser or strauss).mp.
71 glaser b$.cu.
72 strauss a$.cu.
73 ((content or theme* or thematic or narrative or discourse) adj2 analys*).mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh]
74 (unstructured categor$ or structured categor$).mp.
75 (unstructured interview$ or semi-structured interview$ or semistructured interview$).mp.
76 (maximum variation or snowball).mp.
77 (audiorecord$ or taperecord$ or videorecord$ or videotap$).mp.
78 (((audio or video*) adj5 (recorded or recording or tape* or taping)) or (tape adj3 record*)).mp.
79 ((audio* or video* or tape* or taping or recording) and (interview* or transcri* or theme* or thematic)).mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh]
80 (metasynthes$ or meta-synthes$ or metasummar$ or meta-summar$ or metastud$ or meta-stud$).ti,ab.
81 (meta-ethnog$ or metaethnog$ or meta-narrat$ or metanarrat$ or meta-interpret$ or metainterpret$).mp.
82 (qualitative adj5 meta-analy$).mp.
83 (qualitative adj5 metaanaly$).mp.
84 purposive sampl$.mp.
85 action research.mp.
86 focus group$.mp.
87 (photo voice or photovoice or mixed method*).mp.
88 or/48-87
89 47 not 88

CINAHL via EBSCOhost < from inception >

S1 "home* for the aged" or "residential aged-care facilit*"
S2 (MH "Long Term Care")
S3 (MH "Nursing Homes")
S4 (MH "Nursing Home Patients")
S5 (MH "Nursing Home Personnel")
S6 (("long term" N3 care) or LTC or LTCs)
S7 "nursing home*"
S8 S2 OR S3 OR S4 OR S5 OR S6 OR S7
S9 (MH "Geriatrics") OR (MH "Aged+") OR (MH "Aged, 80 and Over+")
S10 (elder? or elderly or geriatric* or gerontolog* or "old age*" or (seniors not "high school") or "older adult*" or "old* person*" or "old* people*" or "old* individual*" or centenarian* or nonagenarian* or octogenarian* or septuagenarian* or sexagenarian* or dottering or decrepit or tottering or overaged or "oldest old")
S11 S9 OR S10
S12 S8 AND S11
S13 S1 OR S12
S14 (MH "Personnel Staffing and Scheduling+") OR (MH "Skill Mix+") OR (MH "Personnel Selection") OR (MH "Motivation") OR (MH "Nursing Manpower+") OR (MH "Workload")
S15 TI ((staffing or staffed)) OR AB ((staffing or staffed))
S16 (MH "Workforce")
S17 (staffing N3 model$)
S18 "care model*"
S19 ((staff* or skill* or care or case or nurs*) N3 (mix or mixes or mixture* or composition*))
S20 (MH "Nursing Care/MA/ST/AM")
S21 (MH "Multidisciplinary Care Team")
S22 (nurs* N1 (workforce or supply or shortage*))
S23 TI ((("full time" or fulltime or "part time" or casual or contract) N3 (work* or employment))) OR AB ((("full time" or fulltime or "part time" or casual or contract) N3 (work* or employment)))
S24 TI (differentiated N3 practice) OR AB (differentiated N3 practice)
S25 ""team nursing"" OR (MH "Differentiated Nursing Practice") OR (MH "Team Nursing")
S26 ((nurs* or staff* or patient* or client* or caregiv* or "care giv*") N2 ratio*)
S27 ((nursing or caregiving or "care giving") N3 "delivery system*")
S28 (MH "Nursing Care Delivery Systems")
S29 (functional N3 nurs*)
S30 (staff* N3 level*)
S31 S14 OR S15 OR S16 OR S17 OR S18 OR S19 OR S20 OR S21 OR S22 OR S23 OR S24 OR S25 OR S26 OR S27 OR S28 OR S29 OR S30
S32 (MH "Organizational Culture+") OR (MH "Organizational Policies") OR (MH "Motivation")
S33 "organi?ational model*"
S34 (MH "Leadership") OR (MH "Management Styles")
S35 (MH "Communication")
S36 (MH "Social Behavior") OR (MH "Cooperative Behavior")
S37 (MH "Health Personnel") and (organization* or administrat* or standard*)
S38 (work* N2 (context* or culture* or climate* or characteristic* or feature* or factor* or environment* or condition* or setting* or management or manager* or leaders* or authorit*))
S39 (MH "Work Environment")
S40 (Organi?ational N2 (context* or culture* or climate* or characteristic* or feature* or factor* or determinant* or environment* or management or manager* or leaders* or authorit*))
S41 (Contextual N2 (characteristic* or feature* or factor* or determinant* or culture*))
S42 (communication or "knowledge transmission")
S43 (motivat* or incentiv* or inspire* or inspiration*)

S44 "cooperative behavio?r*"
S45 S32 OR S33 OR S34 OR S35 OR S36 OR S37 OR S38 OR S39 OR S40 OR S41 OR S42 OR S43 OR S44
S46 S13 AND S31 AND S45
S47 (Qualitative or ethnol* or ethnog* or ethnonurs* or emic or etic or leininger* or noblit or hare or field note* or field record* or fieldnote* or field stud* or (participant* N3 observ*) or (nonparticipant* N3 observ*) or ("non participant*" N3 observ*) or hermeneutic* or phenomenolog* or "lived experience*" or heidegger* or husserl* or merleau-pont* or colaizzi* or giorgi* or ricoeur or spiegelberg* or "van kaam*" or "van manen" (Grounded N5 theor*) "constant compar*" or "theoretical sampl*" or ...
S48 (MH "Qualitative Studies+")
S49 S47 OR S48
S50 S46 NOT S49
S51 S46 NOT S49: Limit to Scholary Peer-Reviewed Journals

SCOPUS via Elsevier < from inception >

(TITLE-ABS-KEY ("home* for the aged" OR "residential aged-care facilit*")) OR ((TITLE-ABS-KEY ("long term care" OR ltc OR ltcs OR "nursing home*")) AND (TITLE-ABS-KEY ((elder? OR elderly OR geriatric* OR gerontolog* OR "old age*" OR senior* OR "older adult*" OR "old* person*" OR "old* people*" OR "old* individual*" OR centenarian* OR nonagenarian* OR octogenarian* OR septuagenarian* OR sexagenarian* OR dottering OR decrepit OR tottering OR overaged OR "oldest old"))))

AND

("personnel staffing and scheduling" OR "shift work" OR shiftwork OR workload OR "work load" OR "personnel selection" OR staffing OR staffed OR (staffing W/3 model*) OR "care model*" OR ((staff* OR skill* OR care OR case OR nurs* OR rn OR np OR mvn OR lpn) W/3 (mix OR mixes OR mixture* OR composition*)) OR "patient care team*" OR (nurs* W/1 (workforce OR supply OR shortage*)) OR (("full time" OR fulltime OR "part time" OR casual OR contract) W/3 (work* OR employment)) OR (differentiated W/3 practice) OR "team nursing" OR ((nurs* OR staff* OR patient* OR client* OR caregiv* OR "care giv*") W/2 ratio*) OR (functional W/3 nurs*) OR (staff* W/3 level*))

AND

(TITLE-ABS-KEY (leadership OR "social behavio?r*" OR "cooperative behavio?r*" OR "management team*")) OR (TITLE-ABS-KEY (work* W/2 (context* OR culture* OR climate* OR characteristic* OR feature* OR factor* OR environment* OR condition* OR setting* OR management OR manager* OR leaders* OR authorit*))) OR (TITLE-ABS-KEY (organi?ational W/2 (model* OR context* OR culture* OR climate* OR characteristic* OR feature* OR factor* OR determinant* OR environment* OR management OR manager* OR leaders* OR authorit* OR polic*))) OR (TITLE-ABS-KEY (contextual W/2 (characteristic* OR feature* OR factor* OR determinant* OR culture*))) OR (TITLE-ABS-KEY (communication OR "knowledge transmission")) OR (TITLE-ABS-KEY (motivat* OR incentiv* OR inspire* OR inspiration*))

AND NOT

(Qualitative or ethnol* or ethnog* or ethnonurs* or emic or etic or leininger* or noblit or hare or field note* or field record* or fieldnote* or field stud* or (participant* W/3 observ*) or (nonparticipant* W/3 observ*) or ("non participant*" W/3 observ*) or hermeneutic* or phenomenolog* or "lived experience*" or heidegger* or husserl* or merleau-pont* or colaizzi* or giorgi* or ricoeur or spiegelberg* or "van kaam*" or "van manen" (Grounded W/5 theor*) "constant compar*" or "theoretical sampl*" or triangulat* or "glaser and strauss" or "content analys*" or "thematic analys*" or "narrative analys*" or "unstructured categor*" or "structured categor*" or "unstructured interview*" or "semi-structured interview*" or "semistructured interview*" or "maximum variation" or snowball or audiorecord* or taperecord* or videorecord* or videotap* or ((audio or tape or video*) W/5 record*) or ((audio* or video* or tape*) W/5 interview*) or metasynthes* or "meta-synthes*" or metasummar* or "meta-summar*" or metastud* or "meta-stud*" or "meta-ethnog*" or metaethnog* or "meta-narrat*" or metanarrat* or "meta-interpret*" or metainterpret* or (qualitative W/5 meta-analy*) or (qualitative W/5 metaanaly*) or "purposive sampl*" or "action research" or "focus group* or "photo voice" or photovoice)

Reporting checklist for protocol of a systematic review and meta analysis.

Based on the PRISMA-P guidelines.

Instructions to authors

Complete this checklist by entering the page numbers from your manuscript where readers will find each of the items listed below.

Your article may not currently address all the items on the checklist. Please modify your text to include the missing information. If you are certain that an item does not apply, please write "n/a" and provide a short explanation.

Upload your completed checklist as an extra file when you submit to a journal.

In your methods section, say that you used the PRISMA-Preporting guidelines, and cite them as:

Moher D, Shamseer L, Clarke M, Ghersi D, Liberati A, Petticrew M, Shekelle P, Stewart LA. Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P) 2015 statement. Syst Rev. 2015;4(1):1.

		Reporting Item	Page Number
Title			
Identification	#1a	Identify the report as a protocol of a systematic review	1
Update	#1b	If the protocol is for an update of a previous systematic review, identify as such	n/a

Registration			
	#2	If registered, provide the name of the registry (such as PROSPERO) and registration number	1
Authors			
Contact	#3a	Provide name, institutional affiliation, e-mail address of all protocol authors; provide physical mailing address of corresponding author	1
Contribution	#3b	Describe contributions of protocol authors and identify the guarantor of the review	12
Amendments			
	#4	If the protocol represents an amendment of a previously completed or published protocol, identify as such and list changes; otherwise, state plan for documenting important protocol amendments	n/a
Support			
Sources	#5a	Indicate sources of financial or other support for the review	7
Sponsor	#5b	Provide name for the review funder and / or sponsor	7
Role of sponsor or funder	#5c	Describe roles of funder(s), sponsor(s), and / or institution(s), if any, in developing the protocol	7
Introduction			

Rationale	#6	Describe the rationale for the review in the context of what is already known	2
Objectives	#7	Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators, and outcomes (PICO)	3
Methods			
Eligibility criteria	#8	Specify the study characteristics (such as PICO, study design, setting, time frame) and report characteristics (such as years considered, language, publication status) to be used as criteria for eligibility for the review	3
Information sources	#9	Describe all intended information sources (such as electronic databases, contact with study authors, trial registers or other grey literature sources) with planned dates of coverage	4
Search strategy	#10	Present draft of search strategy to be used for at least one electronic database, including planned limits, such that it could be repeated	4
Study records - data management	#11a	Describe the mechanism(s) that will be used to manage records and data throughout the review	4
Study records - selection process	#11b	State the process that will be used for selecting studies (such as two independent reviewers) through each phase of the review (that is, screening, eligibility and inclusion in meta-analysis)	4

Study records - data collection process	#11c	Describe planned method of extracting data from reports (such as piloting forms, done independently, in duplicate), any processes for obtaining and confirming data from investigators	4
Data items	#12	List and define all variables for which data will be sought (such as PICO items, funding sources), any pre-planned data assumptions and simplifications	4
Outcomes and prioritization	#13	List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale	5
Risk of bias in individual studies	#14	Describe anticipated methods for assessing risk of bias of individual studies, including whether this will be done at the outcome or study level, or both; state how this information will be used in data synthesis	5
Data synthesis	#15a	Describe criteria under which study data will be quantitatively synthesised	6
Data synthesis	#15b	If data are appropriate for quantitative synthesis, describe planned summary measures, methods of handling data and methods of combining data from studies, including any planned exploration of consistency (such as I2, Kendall's τ)	6
Data synthesis	#15c	Describe any proposed additional analyses (such as sensitivity or subgroup analyses, meta-regression)	6

Data synthesis	#15d	If quantitative synthesis is not appropriate, describe the type of summary planned	6
Meta-bias(es)	#16	Specify any planned assessment of meta-bias(es) (such as publication bias across studies, selective reporting within studies)	7
Confidence in cumulative evidence	#17	Describe how the strength of the body of evidence will be assessed (such as GRADE)	7