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ABSTRACT

Background: Nursing literature frequently emphasises the benefits of person-centred approaches for healthcare quality and safety.

Objective: This umbrella review aimed to synthesise the combined evidence from systematic reviews assessing the impact of person-centred care interventions on patient safety.

Design: A three-step review process included a preliminary review of literature, a comprehensive search, and manual searching of reference lists and forward citations of selected reviews. The review protocol was registered with Prospero (CRD42018090048).

Data sources: Reviewers searched 10 databases for systematic reviews published in English-language peer-reviewed journals between 2000 and 2019: Academic Search Complete, CINAHL, Cochrane Library, EMBASE, JBI Database, Medline, ProQuest Health & Medicine, PROSPERO Register, PubMed and Scopus.

Review methods: Covidence software was used to manage screening and eligibility. Two reviewers independently screened titles and abstracts, reviewed full texts of articles for eligibility, and appraised the quality of reviews using the JBI Critical Appraisal Checklist for Systematic Reviews and Research Syntheses.

Results: From an initial total of 3412 potential titles, 16 reviews met the inclusion criteria. The selected reviews examined the impact of person-centred care for diverse groups of patients (children, adults and older people) in varied settings. Most systematic reviews assessed

experimental studies, generally comparing person-centred interventions with ‘usual care’, often demonstrating limited evidence of impact. Reviews addressed several patient safety outcomes relevant to nursing, including falls, infections, medication use and misuse and mortality rates. The systematic reviews were generally well conducted, although several included studies of poor or fair quality.

Given the heterogeneity of the interventions, outcomes and research designs of studies included in the selected reviews, we were unable to draw unequivocal conclusions about the implications of person-centred care for patient safety in this umbrella review. However, there was some encouraging evidence that person-centred care initiatives may result in reduced rates of falls (in acute care and residential aged care settings). The review also highlighted reductions in agitation for people with dementia and some improvement in anti-psychotic medication use in older people with dementia.

Conclusions: Although abundant evidence exists demonstrating the positive effects of person-centred care on healthcare quality and patient (and provider) wellbeing, there is little research focussing specifically on the impact of person-centred care on patient safety. Thus, there is scope for further high-quality nursing research into how person-centred interventions improve specific patient safety outcomes so as to inform more widespread adoption of person-centred practice.

Keywords

Patient-centred care; person-centred care; patient safety; medical errors; medication errors; patient harm; nurse-patient relations; systematic reviews

Contribution of Paper

What is already known about the topic?

Nurses have been at the forefront of initiatives to develop and implement person-centred care.

Person-centred care is widely associated with improved healthcare quality and greater patient satisfaction and wellbeing.

What this paper adds

This umbrella review identified limited unequivocal research attesting to the impact of person-centred interventions on patient safety.

Studies that do exist are heterogeneous in terms of research design, interventions, healthcare settings and patient safety outcomes.

There is some evidence of a positive impact of person-centred care initiatives on some aspects of patient safety, including falls, and rates of agitation and anti-psychotic medication use in older people with dementia.

The impact of person-centred care on patient safety: An umbrella review of systematic reviews

INTRODUCTION

Person-centred care and the related concept of patient-centred care are valued touchstones of nursing theory and practice. Since patient-centred care was theorised and articulated in the early 1990s, (Gerteis et al., 1993), academics and practitioners have embraced the concept and its underlying philosophy. Healthcare professionals and consumers alike welcome its focus on humanity, respect, mutual communication and holistic interactions within clinical care.

Key health policies and programs frequently cite person-centred care as a central component of quality and safety in health services (Australian Commission on Safety and Quality in Health Care, 2011, McCormack and McCance, 2016). While the value of person-centred care in improving healthcare quality and consumer satisfaction is widely acknowledged, there is less evidence linking it with patient safety more specifically. Thus, this review sought to explore the research on the impact of person-centred care on patient safety outcomes for people across healthcare settings.

BACKGROUND

Person-centred approaches to planning and providing healthcare are founded on partnerships between clinicians and patients while responding to the preferences, needs and values of each individual (Australian Commission on Safety and Quality in Health Care, 2011, Institute for Patient- and Family-Centered Care, 2017). McCormack and McCance conceptualised a Person-centred Practice Framework for nursing and health care, as:

> "... an approach to practice established through the formation and fostering of healthful relationships between all care providers, service users and others significant to them in their lives. It is underpinned by values of respect for persons, individual right to self-

determination, mutual respect and understanding. It is enabled by cultures of empowerment that foster continuous approaches to practice development" (2016).

McCormack and McCance's Framework of Person-centred Practice consisted of four domains: prerequisites (the attributes of healthcare professionals), the care environment (how conducive physical settings, systems and relationships are to person-centred practice), person-centred processes (activities involved in delivering care) and person-centred outcomes (the expected results for patients, families and providers) (McCormack and McCance, 2016). A later refinement of the Framework added the further dimension of the macro context, embracing health and social care policy, strategic frameworks, workforce development and strategic leadership (McCance and McCormack, 2017).

Globally, key healthcare organisations frequently promote person-centred care as closely linked to patient quality and safety (Australian Commission on Safety and Quality in Health Care, 2011, Institute of Medicine, 2001, Goodrich and Cornwell, 2008, Bate and Robert, 2007, Picker Institute, 2018, Agency for Healthcare Research and Quality, 2012, Darzi, 2008). Patient safety has become central to initiatives designed to improve health care, particularly since the ground-breaking report '*To Err is Human: Building a Safer Health Care System'* (Institute of Medicine, 2000). Adverse healthcare events are caused by healthcare processes and provision, rather than the underlying condition of the patient (Brennan et al., 1991). It is estimated that over 17 million adverse events occur each year (Jha et al., 2013) making healthcare errors the third leading cause of death in developed countries (Makary and Daniel, 2016). Internationally, healthcare services have implemented many diverse strategies to address adverse events and, although some studies indicate progress, others suggest that improvements to patient safety are variable and inconsistent across contexts (Agency for Healthcare Research and Quality, 2012).

Person-centred care has been positively associated with healthcare quality outcomes (Australian Commission on Safety and Quality in Health Care, 2011, Park et al., 2018, Agency for Healthcare Research and Quality, 2012, Bate and Robert, 2007, Darzi, 2008, Goodrich and Cornwell, 2008,

Institute of Medicine, 2001, Picker Institute, 2018, Rathert et al., 2013). A comprehensive systematic review of 40 studies found that nearly all reported a positive influence of patient-centred processes on patient satisfaction, well-being and self-management. The authors also note 'generally positive empirical relationships between PCC and immediate and some distal outcomes' (Rathert et al., 2013), with randomised controlled trials finding mixed results for long-term outcomes, although most nonrandomised longitudinal studies found positive relationships. The authors note the importance of moderating and mediating factors such as patients' condition or adherence to treatment in the impact of patient-centred care on outcomes, and the variation in patient-centred processes in different settings (Rathert et al., 2013).

However, the relationship between person-centred care and specific safety outcomes is less well established and the evidence base is diffuse and varied. Some systematic reviews of research into safety outcomes have focused on distinct elements of person-centred care rather than the concept as a whole, examining the impact of initiatives such as patient education or shared decision-making (e.g. Arthurs et al., 2015, Ramelet et al., 2013, Kew et al., 2017, Coxeter et al., 2015). Other reviews have examined outcomes of interventions or processes that are potentially consistent with person-centred philosophy, such as patient reporting of potential safety errors (King et al., 2010, Ward and Armitage, 2012) and patient 'involvement' in safety initiatives or monitoring (Davis et al., 2011, Doherty and Stavropoulou, 2012, Guijarro et al., 2010, Hall et al., 2010, Schwappach, 2010, Trier et al., 2015, Peat et al., 2010, Longtin et al., 2010, Berger et al., 2014).

The aim of this umbrella review was to examine, appraise and synthesise previous systematic reviews that specifically linked an explicitly articulated person-centred care intervention with one or more aspects of patient safety. Although one recent systematic review examined the evidence of the impact of patient-centred interventions on adverse events in acute care settings (Klancnik Gruden et al., 2020), to our knowledge, there are no previous systematic reviews or umbrella reviews examining the relationship between person-centred care and patient safety outcomes across healthcare settings.

METHODS

Research questions

This umbrella review addresses the following questions:

- How have researchers defined and studied person-centred care in relation to safety outcomes?
- What types of patient safety indicators are investigated as outcomes of person-centred care interventions?
- What is the quality of the evidence examining the impact of person-centred care on patient safety?
- What aspects of person-centred care are effective in improving patient safety?
- How do person-centred care initiatives/interventions affect patient safety?

The protocol for this umbrella review was originally registered with Prospero (http://www.crd.york.ac.uk/PROSPERO/) in March 2018 (Registration CRD42018090048).

Inclusion criteria

The umbrella review included systematic reviews that were published in English in peer-reviewed journals between 2000 – the date of *To Err is Human* (Institute of Medicine, 2000) – and 2019. It included reviews synthesising studies of the impact of explicit and holistic person-centred care interventions on patient safety.

Accordingly, the umbrella review excluded articles reporting individual studies or protocols for forthcoming reviews, reviews of interventions that were not explicit and holistic person-centred care approaches, and reviews where the primary outcome was not a specific aspect of patient safety.

Population

The participants in the included systematic reviews were healthcare consumers (patients, residents, clients) regardless of age and ethnicity. We excluded reviews focussing solely on outcomes for healthcare professionals.

Interventions

The phenomenon of interest was person-centred care interventions and we used synonymous search terms including 'patient-centred care', 'client-centred care' and 'patient-centred practice'. With reference to McCormack and McCance's Framework of Person-centred Practice, the focus of the review was interventions that specifically articulated holistic person-centred approaches rather than those that referred to single aspects of person-centred care. In particular, we aimed to identify reviews of interventions that were consistent with the Framework's dimension of person-centred processes, including 'working with patients' beliefs and values; engaging authentically; being sympathetically present; sharing decision-making; and providing holistic care' (McCormack and McCance, 2016). Person-centred interventions were compared with usual care as defined by review authors (where indicated).

Outcomes

We included systematic reviews where the dependent variable (health outcome of interest) was patient safety, defined as 'the prevention of errors and adverse effects to patients associated with healthcare' (World Health Organization, 2017). We aimed to distinguish safety outcomes from a more general focus on healthcare quality and person-centred outcomes such as satisfaction.

Context

The review included syntheses of research conducted in any country and all healthcare settings, including in-patient, residential and community settings.

Types of studies

The umbrella review included only systematic reviews, with or without meta-analysis.

Three step search strategy

The first step involved a preliminary search of CINAHL, JBI Database of Systematic Reviews and Cochrane Database of Systematic Reviews. This limited search used the following terms in the Subject Heading or Abstract & Title fields: [Safety OR adverse event OR medical error] AND [person-centred OR patient-centred OR consumer involvement OR patient involvement OR patients' rights OR consumer rights OR compassionate care OR individualised care]. This process generated a more comprehensive list of keywords and search terms and informed the inclusion and exclusion criteria for the next two steps. This step also incorporated a detailed search of the index of articles published in a key quality and safety journal over a 10-year period, to further identify and clarify concepts and search terms.

The second step incorporated a comprehensive search of ten electronic databases conducted during January–March 2018: Academic Search Complete, CINAHL, Cochrane Library, EMBASE, JBI Database, Medline, ProQuest Health & Medicine, PROSPERO Register, PubMed and Scopus. The searches were re-run in February 2020 to locate any recent publications. Table 1 lists the key words and subject headings. The terms in each column were linked with the operator OR; then the two groups of terms were linked with AND.

Box 1: Search terms

Person-centred care terms (connected with OR)	AND	Safety terms (connected with OR)
Patient Centered Care (MeSH)		Patient Safety (MeSH)
Patient Rights (MeSH)		Adverse Health Care Event (MeSH)
Person-cent* OR person cent*		Adverse Drug Event (MeSH)
Patient-cent* OR patient cent*		Health Care Errors (MeSH)
Client-cent* OR client cent*		Iatrogenic Disease (MeSH)

Consumer-cent* OR consumer cent*		Medication Errors (MeSH)
Relationship-cent* OR relationship cent*		Safety
Patient* rights		Mortality
Consumer rights		Medication err*
Individuali* care		Medical err*
Compassionate care		Diagnostic err*
Patient involvement		Surgical err*
Consumer involvement		Adverse effect
User involvement		Adverse event
Patient empowerment		Harm*
Consumer empowerment		Incident*
		Complication*
		Iatrogenic
Filter for: Systematic review OR Meta analysis, where applicable		

The third step consisted of a manual search using the reference lists and forward citations of selected systematic reviews to identify further potential titles for screening. We also contacted authors of relevant protocols included in the Cochrane Library and Prospero to ascertain whether these had been completed and published.

Study selection

One researcher conducted the electronic database searches and initially eliminated duplicates and titles clearly outside the scope of the umbrella review (e.g. not in English), then uploaded the remaining citations from EndNote to COVIDENCE (Covidence systematic review software, Veritas Health Innovation, Melbourne, Australia, www.covidence.org). Two reviewers then independently screened the titles and abstracts within Covidence for relevance to the research questions. At

least two of the three reviewers then independently examined remaining full-text articles to identify those that met all inclusion criteria. One reviewer hand-searched forward and backward citations from the eligible articles selected from the database searches and referred titles to another reviewer for full text review and potential inclusion. Disagreements about eligibility were resolved by discussion until consensus was reached.

Assessment of methodological quality

Two reviewers assessed the quality of each review article, using the JBI Critical Appraisal Checklist for Systematic Reviews and Research Syntheses (Joanna Briggs Institute, 2017) with disagreements resolved by a third reviewer. We did not eliminate reviews according to their results on this instrument.

Extraction of data

We extracted details of the key features of the selected systematic reviews into three tables. Table 1 presents review details: author/s, date, aims/objectives, participants, setting, number and design of included studies, person-centred approach, comparators, safety outcomes investigated. Table 2 summarises the results reported for the safety outcomes addressed. The third table summarises quality appraisal methods used by review authors and the results for included studies.

RESULTS

The electronic search generated 3412 records and hand-searching another 43. After screening titles and abstracts, we reviewed 184 full-text articles. Of these, 16 met the inclusion criteria (Figure 1). Searching revealed extensive use of the terms ‘person-centred’ and ‘patient-centred’, particularly in abstracts, without clear definitions and without explicit reference to the concepts/s or how the research adopted a person-centred approach. For this reason, many studies initially

located were subsequently screened out, as they did not report on interventions explicitly related to person-centred care frameworks.

INSERT FIGURE 1 HERE

PRISMA flowchart of review process

Table 1 summarises the elements of the selected reviews, indicating the diversity of research designs, participant groups, interventions and outcomes addressed by the authors.

INSERT TABLE 1 HERE

Participants and settings

The most common participant group investigated was older people, either those with dementia (Chenoweth et al., 2019, Fossey et al., 2014, Jutkowitz et al., 2016, Kim and Park, 2017), or frail people with complex needs (Berntsen et al., 2019) or in residential care (Brownie and Nancarrow, 2013). Another studied interventions for adults over 45 using benzodiazepines (Mokhar et al., 2018). Only one study focused exclusively on children (Barnes et al., 2012), but most excluded those under 18 years. Diagnoses addressed in reviews included heart conditions (Casimir et al., 2014, Chiang et al., 2018), chronic kidney disease (Valentijn et al., 2018), asthma (Barnes et al., 2012) and psychiatric diagnoses (Giacco et al., 2018). Two studies focused on acute care settings (Avanecean et al., 2017, Klancnik Gruden et al., 2020) and one on intensive care (Goldfarb et al., 2017). Total participants ranged from 1098 (Casimir et al., 2014) to 53,037 (Avanecean et al., 2017) (Table 1) although some reviews did not indicate total participant numbers, reporting numbers of hospitals or wards instead.

Study characteristics and designs

The reviews included studies utilising various experimental designs. Five reviews consisted entirely of randomised controlled trials (RCTs) (Avanecean et al., 2017, Fossey et al., 2014, Chiang et al., 2018, Valentijn et al., 2018, Jutkowitz et al., 2016). Several systematic reviews

also performed meta-analyses combining RCT results on variables relevant to this umbrella review. The reviews synthesised findings from between five and 46 studies, although the number of studies addressing patient safety outcomes was often smaller (see Table 2).

Person-centred care interventions

The selection process targeted systematic reviews that focused on holistic and comprehensive person-centred approaches, rather than into single aspects of person-centred care. Interventions varied widely as illustrated in Table 1, which summarises authors' definitions of person-centred care. Table 2 presents the findings for individual patient safety outcomes, with further detail of the interventions investigated for each. The diverse interventions utilising person-centred approaches included training for healthcare professionals and for patients, enhanced communication, individualised management plans, extended psychiatric care, individualised support technologies, falls prevention strategies, bedside rounds and organisation-wide person-centred approaches in residential aged care (including dementia care mapping).

INSERT TABLE 2 HERE

Safety outcomes and key results

Table 2 indicates the range of safety issues addressed. Most reviews included one or more studies that did not address any safety-related outcomes, reporting on patient characteristics, satisfaction or other indicators of quality care, sometimes with very few safety indicators. Most reviews did not find unequivocal evidence of significantly improved safety outcomes following intervention. However, there was modest evidence that person-centred care interventions had some positive impact on some safety outcomes.

The results from reviews of person-centred care interventions in residential aged care were varied. Two reviews reported significantly improved rates of neuro-psychiatric symptoms (Kim and Park, 2017) and agitation across studies (Kim and Park, 2017, Fossey et al., 2014), although others reported improved agitation in some but not all analyses (Jutkowitz et al., 2016,

Chenoweth et al., 2019). The results on falls rates for older residents were mixed with most studies reporting non-significant differences between intervention and control settings; one review reported higher rates of falls in the person-centred models (Brownie and Nancarrow, 2013). Reviews of the impact of person-centred care on falls in acute care settings also reported that some but not all studies identified significant improvements in falls rates (Avanecean et al., 2017, Klancnik Gruden et al., 2020). There was no evidence of impact of person-centred care on infection rates, although very few studies explored this relationship (Klancnik Gruden et al., 2020, Ratelle et al., 2019, Brownie and Nancarrow, 2013). Two reviews identified some positive effect of person-centred initiatives on reducing use of potentially inappropriate medications, including benzodiazepines (Mokhar et al., 2018) and anti-psychotic medication for older residents in care homes (Fossey et al., 2014).

Reviews that assessed mortality outcomes also reported mixed results. Overall, person-centred interventions for patients with chronic kidney disease had no significant impact on all-cause mortality, although those described as professional integration interventions (n=5) did show significant effect (Valentijn et al., 2018). One study of person-centred bedside rounds in hospitals reported a significant decrease in mortality, although none of the other 28 studies in the review assessed this outcome (Ratelle et al., 2019). One study of an intensive communication intervention in ICU was associated with significantly reduced mortality after four years (Goldfarb et al., 2017). Some reviews of person-centred interventions reported reduced rates of hospital readmission among patients with heart failure (Casimir et al., 2014) or people receiving involuntary psychiatric treatment (Giacco et al., 2018), albeit from very small numbers of studies that addressed these outcomes. Similarly, there appeared to be fewer emergency room visits among children with asthma (Barnes et al., 2012) or frail older people with complex health needs (Berntsen et al., 2019) reported in a few studies.

Study quality

Table 3 indicates the quality appraisal methods used by the systematic review authors. Most used instruments from either the Joanna Briggs Institute or the Cochrane Collaboration. Two used the Mixed Methods Appraisal Tool (Pluye et al., 2011). Where reported, the systematic reviews gave mixed ratings to the included studies including some rated 'poor' or 'fair'. Some authors retained these studies in their reviews, although most removed them from meta-analysis where undertaken. Several authors urged caution in interpreting results due to variable study quality.

INSERT TABLE 3 HERE

Table 4 presents our critical appraisal of the selected systematic reviews. It indicates that the reviews generally met most requirements in the checklist, especially in terms of search strategy and data synthesis in relation to their stated aims. Some made only general recommendations for clinical practice or further research. Only two reviews analysed the included studies for publication bias (Valentijn et al., 2018, Kim and Park, 2017). However, some others addressed publication bias by articulating extensive search strategies including grey literature (Casimir et al., 2014, Berntsen et al., 2019), or noting that it was not possible to analyse given small numbers of studies (Chiang et al., 2018).

INSERT TABLE 4 HERE

DISCUSSION

This umbrella review identified 16 systematic reviews that specifically examined the impact of comprehensive person-centred care approaches on patient safety. Within the literature searched, there was widespread but sometimes tokenistic use of the terms 'person-centred' and 'patient-centred', with relatively few systematic reviews focusing explicitly on a holistic person-centred care framework as the main intervention. The reviews explored person-centred care in varying ways, although most referred to seeking to identify and address individuals' needs,

values and preferences, providing respectful care and enhancing patients' autonomy and personal control.

The patient safety outcomes identified were diverse (Table 2) and few reviews reported on safety outcomes that were addressed by all included studies (Avanecean et al., 2017, Mokhar et al., 2018, Klancnik Gruden et al., 2020). Many reviews reported relatively few studies that examined any safety outcomes. The safety outcomes addressed included those that directly indicate an adverse event (e.g. falls, infection rates). Others referred to health service utilisation reflecting heightened risk or ineffective care (e.g. admission to emergency department) or outcomes of care (e.g. agitation) that have unknown, although potentially serious, implications for the safety of patients, healthcare professionals and others. The heterogeneity among outcomes limited our ability to draw firm conclusions about the specific effect of some person-centred care initiatives.

The majority of reviews scored positive results on most items in the quality checklist (Table 4), with the exception of items addressing publication bias (see above) and demonstrating strategies to reduce errors in data extraction and quality appraisal, for which several were unclear. However, the reviews reported including studies of varying quality and risk of bias (Table 3) and some authors were cautious in drawing definitive conclusions about the direct relationship between person-centred care interventions and outcomes. Two reviews reported that the included studies demonstrated 'acceptable' or 'adequate' methodological quality (Avanecean et al., 2017, Casimir et al., 2014) and another reported that all studies in the meta-analysis were rated 'green' for quality and risk of bias (Fossey et al., 2014). Some authors removed studies with high risk of bias (Jutkowitz et al., 2016, Brownie and Nancarrow, 2013). Those who conducted meta-analysis limited these or conducted sensitivity analyses only with studies at low risk of bias. Although reviews used different quality approach methods, most reported adequate randomisation where indicated, but frequent problems with allocation concealment and performance and detection bias. Clearly, it is not possible to blind trials of person-centred care effectively for participants, care providers and/or assessors.

Similarly, it is difficult to determine adherence to a multi-faceted approach such as person-centred care, partly due to varying definitions. Many of the studies involved settings with multiple caregivers who may each deliver the intervention slightly differently (regardless of professional education), limiting the potential for consistency or fidelity to an intervention. Indeed, in this context there was a challenging 'tension between fidelity and individualization' (Jutkowitz et al., 2016), as personalised interventions that respond to individual needs, values and preferences are by definition bound to differ between participants, limiting their fidelity.

Overall, the ambiguity in the evidence about the effect of person-centred care interventions is illustrated by the results for falls. One review of person-centred interventions in acute care found limited differences beyond one pre-post study (Klancnik Gruden et al., 2020). The other review in acute care (Avanecean et al., 2017) found positive results in three selected randomised controlled trials while two others reported no difference in falls rates compared to usual care, possibly because participants stayed in hospital for shorter periods in the latter studies. Effective interventions incorporated personalised care planning and individualised education based on patients' fall risk factors, although the authors state 'it was not possible to isolate which component(s) …. were the most effective in preventing falls' (Avanecean et al., 2017). The results on falls reported in the reviews about aged care settings (Brownie and Nancarrow, 2013, Fossey et al., 2014) were less positive, and relatively few of the selected studies of person-centred care interventions measured falls. Brownie and Nancarrow's review reported that two individual studies found increased falls rates within the intervention groups (Coleman et al., 2002, Chenoweth et al., 2009). The authors attributed this to more physically hazardous intervention settings in one study and to the more independent and active participants in the person-centred care groups compared with more sedentary participants receiving 'usual care' in the other study (Brownie and Nancarrow, 2013). These were the only adverse outcomes reported from person-centred care initiatives in all 16 reviews. Conversely, the Fossey et al. review of person-centred care interventions with training manuals (2014) reported significantly fewer falls among intervention groups in one of the above studies (Chenoweth et al., 2009); however, this reduction

may have resulted from Dementia Care Mapping which the study authors distinguished from person-centred care approaches.

Similarly, with reviews addressing potentially inappropriate medications, Mokhar and colleagues reported some significant reduction in the prescribing, use or dose of benzodiazepine or z-drugs, although other studies reported no significant improvement. (2018). More definitively, one meta-analysis of the effect of staff training and person-centred activities for people with dementia in care homes found a significant reduction ($p<0.001$) in the use of anti-psychotic medication in the three included studies (Fossey et al., 2014).

The results regarding levels of agitation amongst older people with dementia in residential care were a little more definitive. One meta-analysis (n=4 trials) showed significant reduction in agitation levels ($p=0.003$) following manual-based training for dementia care staff (Fossey et al., 2014). Another meta-analysis (n=11) demonstrated greater reductions in agitation levels following short-term person-centred care interventions and those that incorporated individualised activities for residents with dementia ($p=0.002$), although no significant difference among people with more severe dementia. Overall, the authors concluded that there was 'sufficient evidence that PCC has the potential to optimize quality care for individuals with dementia in long-term care settings' (Kim and Park, 2017). Conversely, a third meta-analysis (n=8) found no evidence of a reduction in agitation following multi-factorial person-centred care approaches, although a sensitivity analysis limited to five studies with low risk of bias did report increased effect ($p<.0001$) (Chenoweth et al., 2019).

Overall, while some results are encouraging, many reviews presented mixed or limited outcomes. The heterogeneous definitions and interpretations of both person-centred care and patient safety in some reviews made it difficult to distinguish relationships between the two concepts and to draw unequivocal conclusions about the evidence.

Limitations

Many of this review's limitations relate to its broad-ranging and ambitious scope which endeavoured to bring together two complex and multi-faceted concepts: person-centred care and patient safety. Varying definitions and uncertainty about consistency, intensity and fidelity in interventions limited our capacity to attribute safety outcomes to interventions or to individual components of a person-centred approach, especially in reviews that grouped different models under a broader person-centred care heading. The relatively small number of studies within many systematic reviews that investigated each safety outcome also exacerbated the difficulty of reaching firm conclusions. Further, the variable quality and scope of the studies within the selected reviews limited the extent to which could draw convincing conclusions from this umbrella review.

The heterogeneity of participants, settings, interventions and outcomes reported made it hard to synthesise results or generalise findings. The reviews all assessed experimental studies, including many randomised controlled trials. Yet, the complexity of person-centred care as an intervention means it may not be readily quantified as a simple activity or 'dose'. The impact of interventions on clinical and other outcomes may be further affected by moderating and mediating conditions to varying degrees (Rathert et al., 2013). As Gruden and colleagues argue, positivist approaches and quantitative outcome indicators alone are insufficient to assess the impact of person-centred interventions. Despite their value in evidence-based health care, randomised controlled trials are inappropriate and inflexible tools that do not fit the concept of person-centredness in a precise way (2020). Moreover, it is also possible that an umbrella review is a blunt approach that risks overlooking the many nuances of person-centred practice.

By concentrating here on systematic reviews, we may have overlooked some relevant individual studies examining the safety impact of person-centred care interventions within the literature that have yet to be incorporated into published systematic reviews. The focus on peer-reviewed literature may have also limited the scope of this review.

CONCLUSIONS

Previous studies have focused on the abundant evidence of the positive effects of person-centred care on healthcare quality and patient wellbeing. We undertook an umbrella review to apply a broad and rigorous approach to the relationship between person-centred care and patient safety. Some results are encouraging and attest to the potential impact of person-centred care on patient outcomes. However, we acknowledge that there were relatively few systematic reviews that investigated and synthesised the impact for patient safety of comprehensive person-centred approaches. Instead, most studies assessed the impact of person-centred care on a limited number of disparate safety indicators, in diverse populations and settings. Nevertheless, given widespread international interest in person-centred approaches in health and aged care, these tentative findings suggest that person-centred approaches may contribute to patient safety initiatives globally.

There is scope for further high-quality research in nursing and other disciplines, into the impact of person-centred care interventions specifically on patient safety. Such research requires careful definition and delineation of person-centred care interventions, and a clear articulation of safety as distinct from quality in general. The complexity of person-centred approaches calls for innovative research methods to evaluate their impact, embracing qualitative as well as quantitative methods. More person-centred research designs (Klancnik Gruden et al., 2020) could ensure authentic involvement of those giving and receiving care, and provide greater insights into the effect of context in different settings and countries.

Conflict of interest statement

Conflicts of interest: none

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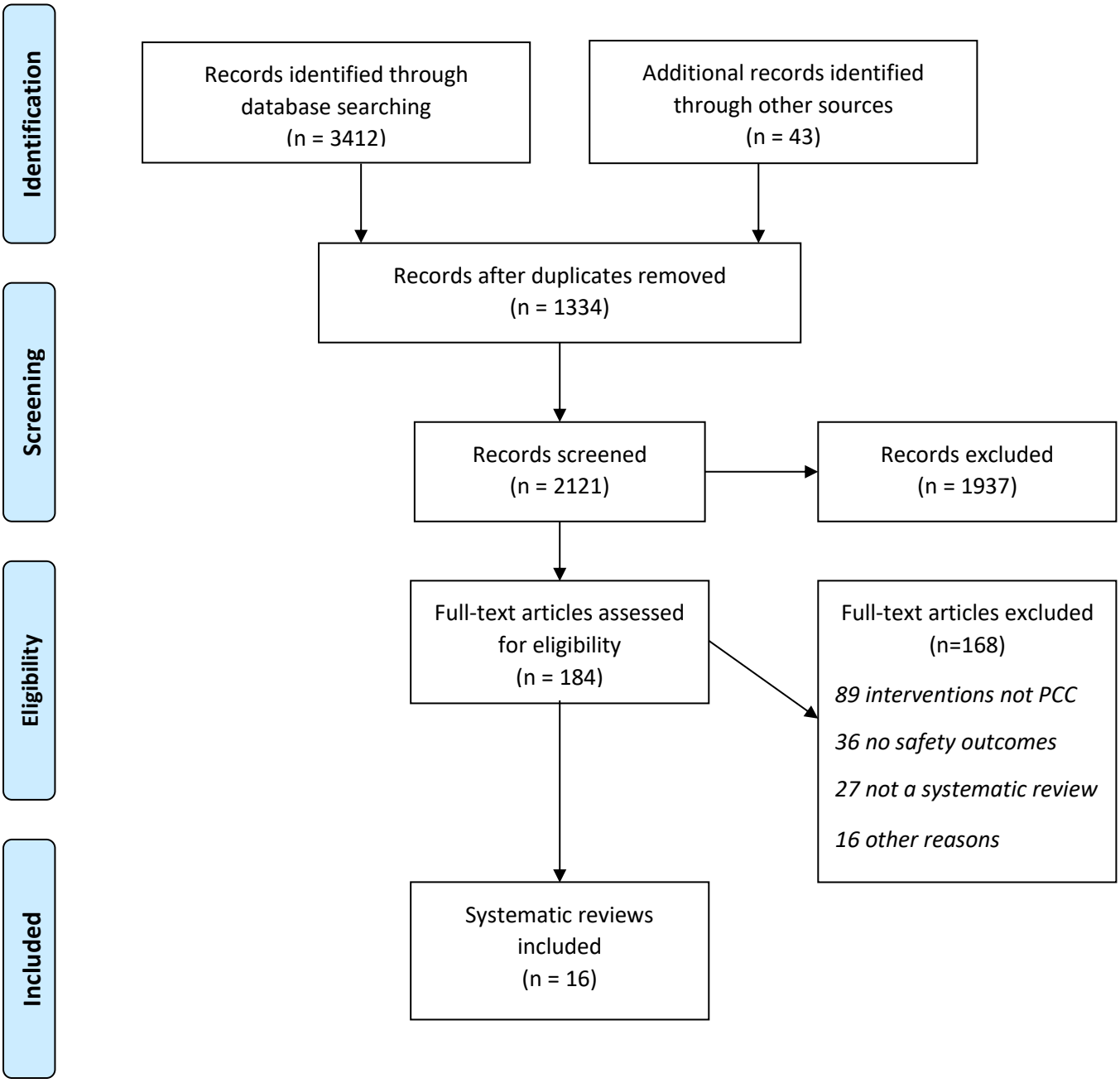
Figure 1: PRISMA flowchart



From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). *P*referred *R*eporting *I*tems for *S*ystematic Reviews and *M*eta-*A*nalyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097

Table 1: Summary of included reviews

Author. Year. Review design	Aim or objective	Setting. Participants. Total number of participants (if available)	Years searched. Number, dates and design/s of included studies	PCC intervention/s	Comparator	Study outcomes related to safety	Quality appraisal * [number of items achieved]
Avanecean et al. 2017. Systematic review	'To investigate the effectiveness of patient-centred interventions on falls and fall rates in acute care hospitals' vs usual care (p 3010)	Medical or surgical acute care units. Adults (18+) admitted for any condition or illness. Total N=53,037.	Inception – 2016. Included 5 studies (2004 – 2016), all RCTs.	'Any intervention geared toward a patient's assessed individual risk for falls, taking account of needs, values and preferences' (p 3010), often in conjunction with organisational protocol to reduce falls risk. 'Patient-centred care included but was not limited to fall risk tool assessments, patient education and specialty nurses that focused on fall prevention.' (p 3011)	Usual standard care as identified by the individual hospitals.	Rates or number of falls (primary); fall-related injuries (secondary).	10
Barnes et al. 2012. Systematic review	'To identify, appraise and synthesise the best available evidence on the effectiveness of patient centred care in the management of children with asthma' (p 840)	Outpatient health care settings. Children aged 0-17 with clinical diagnosis of asthma. N=1199 across all studies.	1970 – present. 10 experimental studies (1984 – 2011): 9 RCTs and one quasi-experimental case-controlled trial (CCT).	Patient-centred model 'that is respectful of responsive to individual patient preferences, needs and values'. Interventions include: group or individual education, interactive devices or computer programs, individualised home management plans; some were supplemented by home visits, outreach and telephone support.	Traditional Care: Standard medical treatment of asthma using medications including broncho-dilators, leukotriene inhibitors, steroids and/or oxygen	ER visits; hospitalisation; unscheduled primary care provider visits; acute asthma events.	9

Author. Year. Review design	Aim or objective	Setting. Participants. Total number of participants (if available)	Years searched. Number, dates and design/s of included studies	PCC intervention/s	Comparator	Study outcomes related to safety	Quality appraisal * [number of items achieved]
					irrespective of individual patient preferences, needs, and values… also includes generalized asthma education (p 839)		
Berntsen et al. 2013. Combined scoping and systematic review.	'To describe how the literature on whole system complex transformations directed at frail multimorbid elderly reflects (1) operationalization of intervention, (2) maturity, (3) evaluation methodology, and (4) effect on outcomes' (p1)	Primary care or hospital. People over 60 and described as frail, multimorbid or having complex care needs. N=4986 in 4 high-quality studies, not reported for remaining studies	2000 – 2017. 10 articles (2007-2016) from 7 studies: 4 RCTs, 2 before-after designs (1 with qualitative analysis), 1 observational study using patient, employee and administrative data.	Digi-PIP care: digital technology to support for individual patient pathway, incorporating care that is person-centred and integrated and proactive. PCC defined as: care decisions made in alignment with the person's answer to the question: *What matters to me?*	People 'without access to the intervention'	Mortality, ED use. Review only assessed outcomes in 4 high-quality studies and only reported primary outcomes and secondary outcomes where there was a significant effect.	9

Author. Year. Review design	Aim or objective	Setting. Participants. Total number of participants (if available)	Years searched. Number, dates and design/s of included studies	PCC intervention/s	Comparator	Study outcomes related to safety	Quality appraisal * [number of items achieved]
Brownie and Nancarrow. 2013. Systematic review.	'To evaluate the impact of PC approaches on residents and staff in residential aged-care facilities.' (p 2)	Nursing homes (NH) or other long-term aged care facility adopting PCC approach (eg Eden Alternative and Green House models) vs traditional NHs. Residents and/or staff. Total N not reported	1995 – 2012. 9[a] articles (2002 – 2009) from 7 studies using experimental designs: 6 quasi-experimental (2 pre-post without control) + 1 cluster RCT	'Interventions focused on enhancing residents' autonomy, choice, sense of personal control, independence and interactions with residents and staff' (p 3).	3 studies used 'traditional nursing home' as control; 2 studies used 'usual care' (1 described 'custodial and physical task-oriented practices'); 2 studies used pre-post design without controls.	Incidence of falls; infection rates (none reported)	8
Casimir et al. 2014. Systematic review	'To synthesize the best available evidence regarding the effectiveness of patient-centred self-care education for adult patients with heart failure (HF)' (p 193)	Hospitals (n=3), primary care centres/clinics (n=2) and one large health sciences centre. Adult (18+) patients with diagnosed HF, regardless of aetiology, severity or duration. Total N = 1098.	1990 – 2013. 6 studies (1999 – 2007): 5 RCTs and 1 pseudo randomised trial	Patient centred self-care education interventions focused on patients as individuals, delivered by any healthcare provider, taking into consideration individual's needs, preferences and values.	'Standard care or non-patient-centered education programs such as written or videotaped education materials that had not been individualized to a patient's specific needs,	HF admissions; readmissions within 12/12	10

Author. Year. Review design	Aim or objective	Setting. Participants. Total number of participants (if available)	Years searched. Number, dates and design/s of included studies	PCC intervention/s	Comparator	Study outcomes related to safety	Quality appraisal * [number of items achieved]
					preferences, or values' (p 194)		
Chenoweth et al. 2019. Systematic review and meta-analysis	To determine the effectiveness of organizational-level person-centered care for people living with dementia in relation to their quality of life, mood, neuropsychiatric symptoms and function	Long-term care homes, hospital, extra-care community housing. People with diagnosis of dementia. N=2599.	June 2016 – June 2018. 12[a,b,d] studies: 11 cluster RCTs + 1 quasi-experimental study.	Multi-modal PCC approaches at organisation level, adhering to all 4 VIPS elements (Valuing service users and staff, Individualised care, Personal perspective, Social environment –all human relationships including staff/service user relationships). Emphasis on PC, non-pharmacological approaches to reducing NPS.	Usual (non-person-centred) care.	Neuro-psychiatric symptoms, agitation (primary outcomes), adverse events.	9
Chiang et al. 2018. Systematic review and meta-analysis.	To examine existing evidence on the effectiveness of nurse-led patient-centred care for secondary cardiac prevention in patients with chronic heart disease (CHD).	Setting not specified – 7 studies commenced in inpatient setting; 5 in out-patient. Adults (18+) with index diagnosis of CHD, acute coronary syndromes,	15 articles on 12 studies (1998 – 2017): 12 RCTs.	Nurse-led PCC for secondary cardiac prevention, following American College of Cardiology Foundation policy on PCC i.e. 1) actively engage patients in care planning, 2) provide individualized information to patient's unique needs; 3) share decision making and incorporate goal seeing in care planning; and 4) empower patients to manage their health condition.	Any intervention that does not include these 4 attributes of PCC for secondary cardiac prevention – widely varied including usual care, attention placebo or	Mortality (secondary outcome)	7

Author. Year. Review design	Aim or objective	Setting. Participants. Total number of participants (if available)	Years searched. Number, dates and design/s of included studies	PCC intervention/s	Comparator	Study outcomes related to safety	Quality appraisal * [number of items achieved]
		angina pectoris, or who had received re-vascularisation. Total N=2562 at baseline.			intervention with no discussion among health professionals on medical regime.		
Fossey et al. 2014. Systematic review and meta-analysis	Two objectives: a) 'to identify and review the quality of all available training manuals (quality review)' and b) 'to determine the evidence for efficacy of person-centred care training that has been evaluated in clinical trials (efficacy review)' (p. 798). Focus on b)	Care homes for older people (not specifically defined). People with dementia (although interventions aimed at care staff). Total N not indicated.	Years searched not specified. 30 PCC manuals identified, but only 4[a,b] studies (1998 – 2009) assessed PCC training manuals, all RCTs. Another 3 studies (1996 – 2007) evaluated interventions, but manual not available to review	Training for dementia care staff to 'provide broad PCC training and approaches to improving person centred activities for people with dementia in care homes'. Length and nature of training varied.	Where indicated, 'usual care'.	Neuropsychiatric symptoms and use of anti-psychotic medication; falls.	9

Author. Year. Review design	Aim or objective	Setting. Participants. Total number of participants (if available)	Years searched. Number, dates and design/s of included studies	PCC intervention/s	Comparator	Study outcomes related to safety	Quality appraisal * [number of items achieved]
Giacco et al. 2018. Systematic review	'To review literature on existing interventions in order to identify helpful approaches to improve outcomes of involuntary treatment.' (p 41)	Psychiatric inpatient facilities. Patients receiving involuntary treatment (not coercive measures), with at least 50% of sample admitted involuntarily. Excluded if only diagnosis was substance use or eating disorders. Total N not available.	Inception to May 2018. 19 articles from 14 studies. 5 studies of patient-centred care planning: 2 RCTs, 1 quasi-RCT, 1 cluster-level controlled trial, 1 retrospective cohort study.	Structured PCC planning interventions aimed at increasing patient involvement in recovery plans. Interventions included versions of advanced directive (n=2); post-discharge preventive monitoring (n=2); personalised advocacy. All involved co-ordination with after-care.	Not described for most PCC planning interventions. 1 study compared intervention group to 'those that did not receive preventive monitoring'.	Readmission, voluntary readmission,	9
Goldfarb et al. 2017. Systematic review and meta-analysis.	'To determine whether patient- and family-centered care interventions in the ICU improve outcomes.' (p 1751)	Intensive care units. Adults (18+ years). Total N not indicated.	Inception to 2016. 46 studies (1995-2016): 35 pre-post trials; 8 RCTs, 3 cluster randomised trials.	Patient-centered care using Institute of Medicine criteria: '1) respect for patient's values, preferences and expressed needs; 2) information, education and communication; 3) access to care; 4) emotional support; 5) family involvement; 6) continuity and transition between healthcare settings; 7)	RCTs compared with usual care (n=5), communication with junior vs senior physicians (n=1) or no comparator indicated (n=4).	Mortality	8

Author. Year. Review design	Aim or objective	Setting. Participants. Total number of participants (if available)	Years searched. Number, dates and design/s of included studies	PCC intervention/s	Comparator	Study outcomes related to safety	Quality appraisal * [number of items achieved]
				physical comfort and 8) coordination of care' (p 1752)			
Gruden et al. 2020. Systematic review.	'To gather, assess, and synthesize existing research knowledge on person-centered interventions that aimed to improve patient outcomes in acute care settings with a focus on the prevention of pressure injuries, patient falls, medication errors, and cross infections' (p 2).	Acute care settings. Hospitalised patients of any age. Total N=1714 in RCTs; 1933 in pre-post studies.	January 2003 – January 2018. 6 studies (2008 – 2016): 2 x RCT, 4 x pre-post studies.	Person-centeredness: 'a complex approach to people following principles of individuality (work with patient's beliefs and values), self-determination (shared decision-making), engagement (collaboration, partnership, connectedness, and mutual understanding), compassion (sympathetic presence), holistic care, and respect for employees' wellbeing and perceptions'. PCC interventions included patient/family involvement in care and either patient self-determination or individual care or employees' perceptions	'Traditional health care (eg health care that is not specifically identified as being person-centred)'	Patient safety incidents (pressure injuries, patient falls, medication errors, and cross infections).	9
Jutkowitz et al. 2016. Systematic review and meta-analysis.	To evaluate the efficacy of non-pharmacological care-delivery interventions (staff training, care-delivery	Nursing homes and assisted living facilities. People with dementia. N=3636	Inception to July 2015. 19 studies (1999-2014): all RCTs.	Non-pharmacological intervention for agitation or aggression, including dementia care mapping (3 studies), PCC (3 studies). Also studies of emotion-oriented care, clinical protocols to reduce	Usual care (usually continuation of daily care practice, 7 studies included some	Agitation, psychotropic use, harms and adverse events (falls, injuries, drug errors,	10

Author. Year. Review design	Aim or objective	Setting. Participants. Total number of participants (if available)	Years searched. Number, dates and design/s of included studies	PCC intervention/s	Comparator	Study outcomes related to safety	Quality appraisal * [number of items achieved]
	models, changes to the environment) to reduce and manage agitation and aggression in nursing home and assisted living residents.			psychotropic use, and other different staff training or environmental change interventions.	routine staff training e.g. care of older people; aspects of dementia); 1 study used wait list control; 1 study used attention control.	behavioural events).	
Kim & Park. 2017. Systematic review and meta-analysis	'To synthesise the evidence on the effectiveness of person-centred care for people with dementia' (p 381)	Any setting: 15 studies in long-term care facilities; 2 in homecare settings. People with diagnosed dementia (at least 70% of study population), regardless of type or severity of dementia. Total N=3985 across all included studies.	1963 – 2015. 19[a,b,c,d] studies (1998 – 2016) including 15 RCTs and 4 non-RCTs. Meta-analysis combined data from 16 studies.	Approaches using PCC, client-centred care, dementia care mapping or care that high-lighted the needs and preferences of individuals studied. 8 interventions were aimed at individuals and 11 focused on staff.	'Usual care' (including usual activities, practice or supervision) or placebo intervention with no specific emphasis on PCC.	Primary outcome of either agitation or neuro-psychiatric symptoms (NPS)	11

Author. Year. Review design	Aim or objective	Setting. Participants. Total number of participants (if available)	Years searched. Number, dates and design/s of included studies	PCC intervention/s	Comparator	Study outcomes related to safety	Quality appraisal * [number of items achieved]
Mokhar et al. 2018. Systematic review	'To identify interventions that promote patient-centered treatments for inappropriate benzodiazepines (BZD) and z-drug use and to analyze their effectiveness in reducing the inappropriate use of these drugs.' (p 1).	Various clinical settings: general practice, nursing homes, medical centre, hospital, outpatient service and community pharmacy. Participants: users of BZD or z-drugs aged ≥45, health care professionals (HCP) and both. Total N not indicated	Years searched not specified. 20 studies (1992 – 2014): 14 RCTs + 6 controlled design.	Patient centred care model: dimensions including patient information, clinician-patient communication, essential characteristics of clinician (education and support for prescribers).	'Typical care'. 1 study compared 2 different interventions.	Reduction in BZD use and/or prescriptions; cessation of BZD use; appropriate prescribing	10
Ratelle et al. 2019. Systematic review	'To describe the implementation of bedside rounds in hospital settings and determine their effect on patient-reported and objectively	Hospital settings. Adults (3 studies in ICU, 17 in non-ICU) and children (4 ICU and 5 non-ICU). Total N not indicated.	Database inception – 2017. 29 studies (1988 – 2017): 8 RCTs, 20 cohort studies	Bedside rounds (BR): 'an ideal approach to promote PCC in the hospital. BR bring patients, their caregivers and clinicians together to allow for information sharing and relationship building.' (p 317). Widely varying BR interventions categorised as bundled (ie BR	'Alternative form of ward rounds'.	Outcomes framework (Coulter & Ellins) included 'health behaviour and health status' domain: mortality, adherence to	10

Author. Year. Review design	Aim or objective	Setting. Participants. Total number of participants (if available)	Years searched. Number, dates and design/s of included studies	PCC intervention/s	Comparator	Study outcomes related to safety	Quality appraisal * [number of items achieved]
	measured outcomes.' (p 318)		and one pre-post cohort.	+ other components, n=13) or not bundled.		treatment, sentinel event rates (4 studies, 0 RCTs).	
Valentijn et al. 2018. Systematic review and meta-analysis	To assess the effect of person-centred integrated care strategies for the management of chronic kidney disease (CKD) in published RCTs and to assess the extent to which differences in outcomes can be explained by different interventions using the Rainbow Model of Integrated Care.	No settings specified – most studies outpatient and/or inpatient (clinic/hospital) care. Patients with diagnosis of CKD. Total N= 4693	Inception – 2016. 15 publications (1998 – 2015) from 14 unique studies: all RCTs	Person-centred integrated care: 'multifaceted health interventions aimed at coordinating care at the clinical (e.g. self-management, case management), professional (e.g. multidisciplinary care, continuity of care), or organisational (e.g. disease management, managed care programs) levels' (p 375)	Usual care (contact with health professionals, education; 2 studies compared with enhanced usual care (feedback to nephrologist or combined contact with GP, renal clinic, education booklet, individual session with nurse).	Mortality (all cause and cardio-vascular).	9

Abbreviations:
BR=bedside rounds; BZD=benzodiazepine; CCT=case-controlled trial; CHD=chronic heart disease; CKD=chronic kidney disease; ED=emergency department; GP=general practitioner; HCP=health care professional; HF=heart failure; ICU=intensive care unit; NH=nursing home; PC=person-centred;

Author. Year. Review design	Aim or objective	Setting. Participants. Total number of participants (if available)	Years searched. Number, dates and design/s of included studies	PCC intervention/s	Comparator	Study outcomes related to safety	Quality appraisal * [number of items achieved]
PCC=person-centred care; PIP= person-centred, integrated and proactive; RCT=randomised controlled trial; VIPS=Valuing service users and staff, Individualised care, Personal perspective, Social environment (all human relationships including staff/service user relationships)							

* Quality appraisal (see Table 4) summarises the number of items that achieved a 'yes' rating on JBI *Checklist for Systematic Reviews and Research Syntheses*

[a] One study was included by Brownie & Nancarrow, Chenoweth et al., Fossey et al., Jutkowitz et al., and Kim & Park

[b] One study was included by Chenoweth et al., Fossey et al., Jutkowitz et al. and Kim & Park

[c] Four studies were included by both Kim & Park and Fossey et al.

[d] Four studies were included by Chenoweth et al. and Kim & Park

[e] Two studies were included by Jutkowitz et al. and Kim & Park

[f] One study was included by Chenoweth et al. and Jutkowitz et al.

[g] One study was included by Chenoweth et al., Jutkowitz et al. and Kim & Park

Table 2: summary of evidence for effect of PCC on outcomes
Statistically significant findings shown in **bold**.

Outcome	Study.	Setting	Studies (total number + design). Participants (total number if indicated)	Intervention – number of studies for this outcome	Findings	Comment
Acute asthma events	Barnes et al. 2012	Outpatient healthcare settings	10 studies: 9 RCTs (1 discontinued) + 1 quasi-experimental case-controlled trial (CCT). Total N=1199.	Patient-centred home management plan for asthma care – 1 study	NS difference between IG and CG (9.5% vs 14.3%, p=0.63)	
Adherence with outpatient follow-up appointments	Ratelle et al. 2019	Hospital settings, adult + child.	29 studies: 8 RCTs, 20 cohort studies and 1 pre-post cohort. Total N participants not reported	Patient-centred bedside rounds (BR) – 1 CCT	NS difference between IG and CG (7.7% vs 9.3%, p=0.46)	
Agitation	Chenoweth et al. 2019	Long-term care homes, hospital, extra-care community housing.	12 studies: 11 cluster RCTs + 1 quasi-experimental study.	Multi-modal PCC approaches at organisation level, adhering to all 4 VIPS elements – 8 studies; 5 studies with low ROB, 5 studies with low heterogeneity	Meta-analysis of all studies (n=8) found NS reduction (SMD: -0.54, 95% CI: -1.23 to 0.15); **5 studies with low ROB showed increased effect (SMD: 0.38, 95% CI: -0.50 to -0.25, p<0.00001);** 5 studies with low heterogeneity found NS reduction in agitation (SMD: -0.05, 95% CI: -0.17 to 0.07).	Authors conclude that results show 'no evidence that demonstrated a reduction in agitation' (p15).

Outcome	Study.	Setting	Studies (total number + design). Participants (total number if indicated)	Intervention – number of studies for this outcome	Findings	Comment
	Fossey et al. 2014	Care homes for older people	8 studies: 5 evaluated PCC training manuals, all RCTs; 3 studies evaluated interventions but training manual not available. Participants: staff working with people with dementia	Training for dementia care staff to 'provide broad PCC training and approaches to improving person centred activities for people with dementia in care homes' – 5 studies assessed agitation quantitatively.	**5 of these reported statistically significant improvement, at least p≤0.04. Meta-analysis (n=4 RCTs) showed significant benefit in agitation – standardised mean difference = 1.083, p=0.003**.	
	Jutkowitz et al. 2016	Nursing home	19 studies: 19 RCTs. People with dementia. Total N=3636	Dementia care mapping (DCM) – 3 studies (1 low, 2 moderate ROB)	**1 study found significantly lower agitation in IG** (SMD: -0.34, 95% CI: -0.66 to -0.02), but unlikely to be clinically meaningful. Others found NS difference. Meta-analysis (3 RCTs) found low-strength evidence of similar effect between DCM and usual care (SMD: -0.12, 95% CI: -0.66 to 0.42).	
				Person-centred care – 3 studies (1 low, 2 moderate ROB)	**1 study found significantly lower agitation in IG** (SMD: -0.44, 95% CI: -0.77 to -0.10), but	

Outcome	Study.	Setting	Studies (total number + design). Participants (total number if indicated)	Intervention – number of studies for this outcome	Findings	Comment
					unlikely to be clinically meaningful. Others found NS difference. Meta-analysis (n=3 RCTs) found low-strength evidence of similar effect between PCC and usual care (SMD: -0.15, 95% CI: -0.67 to 0.38).	
	Kim and Park. 2017	Long-term care facilities with 70% of residents diagnosed with dementia.	19 studies: 15 RCTs + 4 non-RCTs. Meta-analysis combined data from 16 studies. Total N=3985	Person-centred care approaches in residential care for older people – 15 studies	**8 studies reported favourable effect of PCC initiatives.** **Meta-analysis (n=11 RCTs) found reduced agitation (SMD: -0.226; 95% CI: -0.350 to -0.095, p=0.002).** 5 studies reported NS difference in agitation for residents with severe dementia.	Short-term interventions > effect than long-term; individualised activities > staff training or culture change
Emergency room (ER) visits	Barnes et al. 2012	Outpatient healthcare settings	10 studies: 9 RCTs (1 discontinued) + 1 quasi-experimental case-controlled trial (CCT). Total N=1199.	Patient-centred group education intervention for asthma management – 2 studies	**IG fewer ER visits than CG, p<0.05 in 1 study**; NS difference in decline between IG and CG in 1 study	
				Patient-centred technology for asthma	**2 studies found significant decline in ER visits after intervention in**	

Outcome	Study.	Setting	Studies (total number + design). Participants (total number if indicated)	Intervention – number of studies for this outcome	Findings	Comment
				management – 3 studies	IG ($p<0.001$ and $p<0.05$); 1 study trend only. IG greater decline than CG in 1 study ($p<0.01$); NS difference in 2.	
				Patient-centred individualised education for asthma management – 2 studies (including 1 RCT discontinued)	1 study found significant decrease in ER visits in IG. Lower mean number of visits in IG; CG more likely to visit ER than IG ($p=0.39$, NS); 1 study discontinued.	
	Berntsen et al. 2019	Primary care + hospital	7 studies – 4 high quality for further analysis. N=4986	Person-centred integrated and proactive digital support for patient pathways. N of studies assessing this outcome is unclear (only reported studies with significant effect)	1 study of patient-centred medical home found significantly lower ED visits per 1000 patient per year (188/1000 in IG vs 245/1000 in CG, $p<.001$).	
Adverse events (falls, injuries, drug errors and behavioural events)	Jutkowitz et al. 2016	Nursing home	19 studies: 19 RCTs. People with dementia. Total N=3636	Dementia care mapping (DCM) – 1 study (low ROB)	NS difference reported	
				Person-centred care – 1 study (low ROB)	NS difference reported	
Falls	Avanecean et al. 2017	Medical or surgical acute care units	5 studies (2004 – 2016), all RCTs. Total N=53,037	Multi-factorial patient-centred falls interventions – 5 studies	3 studies reported significant reductions in intervention group (all ≤ 0.04)	All interventions were multi-factorial and PaC,

Outcome	Study.	Setting	Studies (total number + design). Participants (total number if indicated)	Intervention – number of studies for this outcome	Findings	Comment
					2 studies reported NS differences. Reduced rates in interventions with personalised care plans and patient centred education linked to patient's falls risk	Hard to isolate specific components which caused reduction in falls.
	Brownie and Nancarrow. 2013	Nursing homes or other long-term aged care facilities	7 studies: 6 quasi-experimental studies (2 without control), 1 cluster randomised trial. Total N not specified.	Person-centred care approaches in residential care, including Eden Alternative, Green House model – 2 studies	**2 studies reported increased falls risk in intervention group**.	Authors attribute increased risk to either greater mobility and autonomy of residents or more hazardous sites in intervention.
	Chenoweth et al. 2019	Long-term care homes, hospital, extra-care community housing.	12 studies: 11 cluster RCTs + 1 quasi-experimental study.	Multi-modal PCC approaches at organisation level, adhering to all 4 VIPS elements – 4 studies assessed prevention of falls	Variable results in falls prevention, ranging from p=0.03 to 0.27.	
	Fossey et al. 2014	Care homes for older people	8 studies: 5 evaluated PCC training manuals, all RCTs; 3 studies evaluated interventions but	Training for dementia care staff to 'provide broad PCC training and approaches to improving person centred activities for	**1 study reported significant reduction in falls (p=0.02).**	

Outcome	Study.	Setting	Studies (total number + design). Participants (total number if indicated)	Intervention – number of studies for this outcome	Findings	Comment
			training manual not available. Participants: staff working with people with dementia. Total N not reported	people with dementia in care homes' – 1 study		
	Gruden et al. 2020	Acute care	6 studies: 2 x RCT (N=1714), 4 x pre-post studies (N=1933).	Person-centred interventions – 4 pre-post studies; 1 RCT (n=1661)	**1 pre-post study reported significant reduction in falls rate (3.9 pre vs 1.3 post, p=0.006);** other pre-post studies reported reduction but NS or not analysed. 1 RCT reported no difference in falls (0 vs 0, p=1.000).	
Fall-related injuries	Avanecean et al. 2017	Medical or surgical acute care units	5 studies (2004 – 2016), all RCTs. Total N=53,037	Patient-centred falls interventions – 3 studies	3 studies reported NS difference between IG and CG	
Hospitalisation	Barnes et al. 2012	Outpatient healthcare settings	10 studies: 9 RCTs (1 discontinued) + 1 quasi-experimental case-controlled trial (CCT). Total N=1199.	Patient-centred group education intervention for asthma management – 3 studies	1 study found significant decline ($p<0.05$) in hospitalisations if education aimed at children + caregivers; NS decline when aimed at caregivers only. 2 studies reported NS difference between IG and CG.	

Outcome	Study.	Setting	Studies (total number + design). Participants (total number if indicated)	Intervention – number of studies for this outcome	Findings	Comment
				Patient-centred technology for asthma management – 3 studies	No studies reported significant effect on hospitalisations.	
				Patient-centred individualised education for asthma management – 2 studies (including 1 RCT discontinued)	**Significant decrease in hospitalisations in IG after intervention.** CG more likely to be hospitalised than IG (p=0.40, NS) in 1 study. 1 study discontinued.	
Infection rate	Brownie and Nancarrow. 2013	Nursing homes or other long-term aged care facilities	7 studies: 6 quasi-experimental studies (2 without control), 1 cluster randomised trial. Total N not specified.	Person-centred care approaches in residential care – 1 study	Results of the study investigating infection not reported in review	
	Gruden et al. 2020	Acute care	6 studies: 2 x RCT (N=1714), 4 x pre-post studies (N=1933).	Person-centred interventions – 1 RCT	No difference (2 vs 1, p=1.000)	
Infection (hospital-acquired) + clinical deterioration (combined)	Ratelle et al. 2019	Hospital settings, adult + child.	29 studies: 8 RCTs, 20 cohort studies and 1 pre-post cohort. Total N participants not reported	Patient-centred bedside rounds (BR) – 1 CCT	NS difference between IG and CG (7.7% vs 9.3%, p=0.46)	Few studies in this review reported outcomes in this domain – most were about patient experience and knowledge.

Outcome	Study.	Setting	Studies (total number + design). Participants (total number if indicated)	Intervention – number of studies for this outcome	Findings	Comment
Medications – reduced use or dose of benzodiazepine (BZD) or z-drugs	Mokhar et al. 2018.	Clinical settings, mostly GP and nursing homes	20 studies: 14 RCTs + 6 controlled design. Total N not specified as participants included patients and prescribers.	Patient-centred interventions including patient information – 9 studies	9 studies reported reduced use or dose of BZD. **2 of these reported statistically significant reduction**; others did not indicate p value.	Outcome indicators varied between studies.
				Patient-centred interventions including patient-clinician communication – 5 studies	5 studies reported reduction in use or dose of BZD, of which **2 reported statistically significant reductions**. 1 study reported significant reduction in use of long-term BZD.	
				Patient-centred interventions targeting clinician ('essential characteristics of the clinician') – 6 studies	6 studies reported reductions in BZD use or dose, including **5 where the reduction was statistically significant** and one where confidence interval was unclear. 3 studies reported reduction in use of long-term BZD, including 2 statistically significant.	
Medications – discontinuation of rates of benzodiazepine	Mokhar et al. 2018.	Clinical settings, mostly GP and nursing homes	20 studies: 14 RCTs + 6 controlled design. Total N not	Patient-centred interventions including patient information – 6 studies	**6 studies reported discontinuation of BZDs, of which 3 were statistically significant.**	Outcome indicators varied between studies.

Outcome	Study.	Setting	Studies (total number + design). Participants (total number if indicated)	Intervention – number of studies for this outcome	Findings	Comment
(BZD) or z-drugs use			specified as participants included patients and prescribers.	Patient-centred interventions including patient-clinician communication – 4 studies	**4 reported discontinued use of BZD, including 3 that reported statistically significant results.**	
				Patient-centred interventions targeting clinician ('essential characteristics of the clinician') – 3 studies	**3 studies reported discontinuation of BZD, including 2 with statistically significant results.**	
Medications – appropriate prescribing of benzodiazepine (BZD) or z-drugs	Mokhar et al. 2018.	Clinical settings, mostly GP and nursing homes	20 studies: 14 RCTs + 6 controlled design. Total N not specified as participants included patients and prescribers.	Patient-centred interventions including patient-clinician communication – 1 study	1 study reported improved appropriate prescribing following a verbal intervention, but reduced appropriate prescribing following a bulletin intervention and no change in controls.	Outcome indicators varied between studies.
				Patient-centred interventions targeting clinician ('essential characteristics of the clinician') – 4 studies	**3 studies reported improved appropriate prescribing (2 statistically significant).** 1 study reported improved appropriate prescribing following a verbal intervention, but reduced appropriate prescribing following a bulletin intervention and no change in controls.	

Outcome	Study.	Setting	Studies (total number + design). Participants (total number if indicated)	Intervention – number of studies for this outcome	Findings	Comment
Medications – reductions in anti-psychotic medications	Fossey et al. 2014	Care homes for older people	8 studies: 5 evaluated PCC training manuals, all RCTs; 3 studies evaluated interventions but training manual not available. Participants: staff working with people with dementia	Training for dementia care staff to 'provide broad PCC training and approaches to improving person centred activities for people with dementia in care homes' – 3 studies	**2 studies found significant reductions in anti-psychotic use in IG – 12.8% and 21.5. Meta-analysis (n=3 RCTs) found reduction overall in use of anti-psychotics: (OR=2.86, 95% CI: 1.74-4.69, p<0.001.)**	
	Jutkowitz et al. 2016	Nursing home	19 studies: 19 RCTs. People with dementia. Total N=3636	Dementia care mapping (DCM) – 1 study (low ROB)	NS difference reported	
				Person-centred care – 1 study (low ROB)	NS difference reported	
Medication errors	Gruden et al. 2020	Acute care	6 studies: 2 x RCT (N=1714), 4 x pre-post studies (N=1933).	Person-centred interventions – 1 pre-post study	NS reduction in medication errors	
Mortality (unadjusted)	Ratelle et al. 2019	Hospital settings, adult + child.	29 studies: 8 RCTs, 20 cohort studies and 1 pre-post cohort. Total N participants not reported	Patient-centred bedside rounds (BR) – 1 CCT	**Bundled BR intervention led to significant decrease (1.1% vs 2.3%, p=0.004)**	Few studies in this review reported outcomes in this domain – most were about patient experience and knowledge.

Outcome	Study.	Setting	Studies (total number + design). Participants (total number if indicated)	Intervention – number of studies for this outcome	Findings	Comment
Mortality (all cause)	Valentijn et al. 2018	No setting specified – most studies outpatient and/or inpatient.	14 studies: all RCTs. Total N= 4693	Person-centred integrated care – 11 studies (n=4127)	Little effect overall (RR=0.86, 95% CI: 0.68 – 1.08). ***Professional integration interventions*** **(5 RCTs, N=3054) showed significant effect compared with usual care (RR=0.79, 95% CI: 0.63 – 0.98).** NS results for clinical integration or organisational integration interventions. NS effect on mortality by level of care integration.	Quality of evidence for studies of all-cause mortality rated as moderate.
	Berntsen et al. 2019	Primary care + hospital	7 studies – 4 high quality for further analysis. N=4986	PC integrated and proactive digital support for patient pathways. N of studies assessing this outcome is unclear (only reported studies with significant effect)	No studies reported significant effect on mortality.	
	Goldfarb et al. 2017	Intensive care unit	46 studies: 8 RCT, 3 cluster randomised trials, 35 pre-post	Intensive communication intervention – 1 pre-post study	**Decrease in unadjusted mortality after 4 years (31.3% to 22.7%, p<0.001)**	

Outcome	Study.	Setting	Studies (total number + design). Participants (total number if indicated)	Intervention – number of studies for this outcome	Findings	Comment
				Meta-analysis of trials of an ethics consultation and communication facilitation – 5 studies	NS difference in mortality (OR: 1.07, 95% CI: 0.95-1.21)	
Mortality (cardiac)	Chiang et al. 2018.	Inpatient and outpatient settings at outset	12 studies: all RCTs	Nurse-led PCC for secondary cardiac prevention, following American College of Cardiology Foundation policy on PCC – 1 study	IG had slightly higher death rate than CG (3.8% vs 3.1%, NS).	
Mortality (cardio-vascular)	Valentijn et al. 2018	No setting specified – most studies outpatient and/or inpatient.	14 studies: all RCTs. Total N= 4693	Person-centred integrated care – 1 study (n=65)	Uncertain treatment effects	
Neuro-psychiatric symptoms (NPS)	Chenoweth et al. 2019	Long-term care homes, hospital, extra-care community housing.	12 studies: 11 cluster RCTs + 1 quasi-experimental study.	Multi-modal PCC approaches at organisation level, adhering to all 4 VIPS elements – 6 studies; only 2 had low ROB (sensitivity analysis not conducted)	Meta-analysis of NPS (n=6 RCTs) found NS reduction compared with usual care (SMD: 0.13, 95% CI: -0.21 to 0.49)	
	Kim and Park. 2017	Long-term care facilities with 70% of residents	19 studies: 15 RCTs + 4 non-RCTs. Meta-analysis combined	Person-centred care approaches in residential care for	2 RCTs reported reduced NPS. Meta-analysis (n=5 RCTs) found that PCC reduced	

Outcome	Study.	Setting	Studies (total number + design). Participants (total number if indicated)	Intervention – number of studies for this outcome	Findings	Comment
		diagnosed with dementia.	data from 16 studies. Total N=3985.	older people – 6 studies	**NPS (SMD: -0.197; 95% CI: -0.306 to -0.088, p<0.001).**	
Pressure ulcers	Gruden et al. 2020	Acute care	6 studies: 2 RCTs (N=1714), 4 pre-post studies (N=1933).	Person-centred interventions – 1 RCT	NS difference between IG and CG (49/799 vs 84/799, p=0.644)	
Readmission with heart failure within 12/12	Casimir et al. 2014.	Hospitals (n=3), primary care centres/clinics (n=2) and one large health sciences centre.	6 studies: 5 RCTs and 1 pseudo randomised trial. Total N = 1098.	Individually targeted patient education on self-care, activity planning and nutrition – 1 study.	**Significant reduction in IG compared to CG at 1 month and 6 months (p<.01).**	
				Needs assessment, counselling and support – 1 study; Individualised advice, reinforcement and exercise plans – 1 study; Individualised instruction about medications – 1 study.	1 found NS reduction in first readmissions, but significantly lower rate of subsequent readmissions compared with CG (p=.036). 2 found NS trends towards lower readmissions.	
Readmission	Giacco et al. 2018	Psychiatric inpatient facilities	14 studies (5 of structured PCC planning): 2 RCTs, 1 quasi-RCT, 1 cluster-level controlled trial, 1 retrospective	Complex intervention with 3 components: crisis cards, personalised discharge planning and preventive	**Significant decrease in involuntary readmission at 24 months (p<0.05).** NS difference in voluntary readmission or involuntary readmission at 12 months.	

Outcome	Study.	Setting	Studies (total number + design). Participants (total number if indicated)	Intervention – number of studies for this outcome	Findings	Comment
			cohort study. Patients receiving involuntary treatment.	monitoring in the community – 1 study		
				Advanced directives for care – 1 study	NS difference in rates of voluntary or involuntary readmission	
				Personal advocacy – 1 study	Significant decrease in involuntary rehospitalisation ($p<0.05$), but NS change in voluntary hospitalisation	
				Post-discharge preventive monitoring	NS difference in readmission, but significant decrease in involuntary readmission ($p<0.05$).	
Unscheduled primary care visits	Barnes et al. 2012	Outpatient healthcare settings	10 studies: 9 RCTs (1 discontinued) + 1 quasi-experimental CCT. Total N=1199.	Patient-centred technology for asthma management – 3 studies	NS difference between IG and CG in visits after intervention reported in any studies.	
Ventilator-assisted pneumonia	Ratelle et al. 2019	Hospital settings, adult + child.	29 studies: 8 RCTs, 20 cohort studies and 1 pre-post cohort. Total N participants not reported	Patient-centred bedside rounds (BR) – 1 CCT	**Bundled BR intervention led to significantly lower incidence than in CG (23.4/1000 ventilator days vs 34.4/1000 ventilator days, p=0.04).**	Few studies in this review reported outcomes in this domain – most were about patient experience and knowledge.

Outcome	Study.	Setting	Studies (total number + design). Participants (total number if indicated)	Intervention – number of studies for this outcome	Findings	Comment
Abbreviations BR=bedside rounds; BZD= benzodiazepine; CCT=case-controlled trial; CG=control group; CI=confidence interval; GP=general practitioner; IG=intervention group; NPS=neuro-psychiatric symptoms; NS=not (statistically) significant; OR=odds ratio; PCC=person (patient) centred care; RCT=randomised controlled trial; ROB=risk of bias; RR=relative risk; SMD=standardised mean difference; VIPS=Valuing service users and staff, Individualised care, Personal perspective, Social environment (all human relationships including staff/service user relationships)						

Table 3: Summary of quality appraisal of included studies in each systematic review

Author. Year. Review design	Number and design of included studies	Quality appraisal of included studies – method	Quality appraisal of included studies – results
Avanecean et al. 2017. Systematic review	Included 5 studies, all RCTs.	JBI – SUMARI critical appraisal tool for methodological quality	All 5 studies rated 'acceptable' methodological quality. No RCTs were blinded. No studies eliminated due to poor quality.
Barnes et al. 2012. Systematic review	10 experimental studies: 9 RCTs and one quasi-experimental case-controlled trial.	JBI – MAStARI instrument for methodological quality in Randomised Control / Pseudo-randomised Trials. For inclusion, studies must score Y on 6+ items (RCTs) or on 5+ items (quasi experimental studies)	2 studies eliminated due to randomisation issues. Ratings of included studies not reported.
Berntsen et al. 2019. Scoping and systematic review	7 studies: 4 RCT + 2 before-after design (1 with qualitative analysis) + 1 observational study	Best-evidence synthesis approach (de Bruin et al. 2012) assessing randomisation, equality at baseline, compliance, dropout rates, intention to treat, adjustment for baseline differences	3 studies eliminated as they scored < 3/possible 6; 1 small exploratory RCT and 2 before-after design studies.
Brownie and Nancarrow. 2013. Systematic review.	9 articles from 7 studies using experimental designs: 6 quasi-experimental (2 without control) + 1 cluster randomised trial	JBI critical appraisal tools for 'randomized and quasi-randomized control trials'	21 articles 'assessed for methodological quality' and 12 excluded due to study design outside inclusion criteria. 8 remaining studies ranged from 0 to 5 'Yes' ratings; only 1 study scored 8 'Yes'. Urged caution in interpreting results.
Casimir et al. 2014. Systematic review	6 studies: 5 RCTs and 1 pseudo randomised trial	JBI – MAStARI instrument. For inclusion. Studies must score Yes on 5+ items (specifically items 6-10)	No studies excluded on quality. Remainder rated 'adequate' quality with range 50-100% Yes ratings.
Chenoweth et al. 2019.	12 studies included: 11 cluster RCTs + 1 quasi-experimental study.	Used Cochrane Handbook using GRADE criteria. Studies with high ROB	All studies had low risk of attrition and reporting bias; 9 studies had low risk

Author. Year. Review design	Number and design of included studies	Quality appraisal of included studies – method	Quality appraisal of included studies – results
Systematic review and meta-analysis		in each domain were excluded in sensitivity analyses and their results included in analysis only if their exclusion did not substantially change direction of effect.	of selection bias; 6 studies had low risk of detection bias (4 high risk and 2 unclear); 10 studies had high risk of performance bias (1 low ROB and 1 unclear).
Chiang et al. 2018. Systematic review and meta-analysis	15 articles from 12 studies: 12 RCTs.	JBI critical appraisal tools for experimental studies.	Overall, methodological quality was 'fair' (mean score 6/10 criteria, range: 4-9/10). The majority of articles did not demonstrate blinding of participants, allocator or assessors; outcomes of those who withdrew were described and included in analysis.
Fossey et al. 2014. Systematic review and meta-analysis	30 PCC manuals identified, but only 4 studies assessed the efficacy of PCC training manuals. 3 more studies evaluated interventions, but manuals not available to review	Studies using RCT or quasi-experimental design and with an available manual used Cochrane system for quality review, with traffic light rating system (authors cited Corbett et al., 2012)	All studies used in meta-analysis rated Green for quality and risk of bias.
Giacco et al. 2018. Systematic review	14 studies, including 5 studies of structured PCC planning interventions: 2 RCTs, 1 quasi-RCT, 1 CCT, 1 retrospective cohort study.	Mixed Methods Appraisal Tool (Pace et al., 2012), using criteria appropriate to study design for each study	Overall, authors rated studies in the review (n=14) as 'poor quality'. Of studies on PCC interventions: 1 retrospective cohort scored 3/possible 4, all others 2/possible 4. 1 RCT had difficulty with high attrition
Goldfarb et al. 2017 Systematic review and meta-analysis	46 studies: 8 RCTs, 3 cluster RCTs, 35 pre-postintervention trials.	ROB assessed for RCTs using Cochrane Collaboration tool. Did not assess quality of pre-post trials as they were assumed to have higher ROB due to non-randomised design	ROB results reported for 6 RCTs (with mortality and/or length of stay outcomes). Conducted meta-analysis with studies rated as low ROB, although all had high ROB for blinding of participants, personnel and assessors and 3 had high ROB for allocation concealment.

Author. Year. Review design	Number and design of included studies	Quality appraisal of included studies – method	Quality appraisal of included studies – results
Gruden et al. 2020	6 studies: 2 RCTs, 4 pre-post studies.	Risk of bias assessed using Cochrane Consumers and Communication rating approach (5-7 biases=high ROB; 3-4 biases=moderate; 0-2 biases=low). Quality of studies assessed with Mixed Methods Appraisal Tool	1 study had high ROB, 4 had moderate, 1 had low. 1 study rated as high quality, 3 as medium, 2 as low.
Jutkowitz et al. 2016. Systematic review and meta-analysis	19 studies: 19 RCTs	ROB assessed using AHRQ guidance for bias in selection, performance, detection, attrition and reporting. Studies with high ROB excluded from data synthesis. Strength of evidence assessed based on study limitations, directness, consistency, precision and reporting bias.	8 studies initially removed for high ROB, leaving 19 trials with low (n=3), low to moderate (4) or moderate (n=12) ROB. Studies with moderate ROB had methodological problems with underpowering, attrition, blinding of assessors and limited details of the intervention, staff training and 'usual care' (which varied between facilities).
Kim & Park. 2017. Systematic review and meta-analysis	19 studies including 15 RCTs and 4 non-RCTs. Meta-analysis combined data from 16 studies.	Cochrane Collaboration Risk of Bias and ROBANS tools. GRADE tool to assess quality of evidence (Guyatt et al., 2011)	Authors report overall study quality was low to moderate. Combined studies of reduction in a) agitation and b) NPS had serious risk of bias and low-quality evidence.
Mokhar et al. 2018. Systematic review	20 studies: 14 RCTs + 6 controlled design.	Cochrane Collaboration Risk of Bias tools (Higgins et al., 2011). Reported random sequence generation, allocation concealment, blinding of participants and personnel, blinding of outcome assessment, completeness of outcome data and selective reporting.	Considerable variation in methodological quality. Study quality affected by high ROB – one 1 study had low ROB in all 6 categories; 7 studies had low ROB in half the categories. Randomisation was performed well, but other high ROB in other categories. Presentation of selective reporting was poor.
Ratelle et al. 2019.	29 studies: 8 RCTs, 20 cohort studies and one pre-post cohort.	Randomised studies: Cochrane risk of bias assessment tool.	No studies at low risk of bias overall. 12 cohort studies and 4 RCTs at high

Author. Year. Review design	Number and design of included studies	Quality appraisal of included studies – method	Quality appraisal of included studies – results
Systematic review		Non-randomised studies: Adaptation of Risk of Bias in Non-Randomised Interventions tool (Sterne et al. 2016)	ROB on 1+ categories (especially selective reporting of items, low adherence to intervention and low response rates). 1 study reporting health behaviour and status (relevant to safety outcomes) had 2 high ROB ratings; the remainder had combination of low (range 2-6) and medium (1-4) ratings.
Valentijn et al. 2018. Systematic review and meta-analysis	4 studies: all RCTs	Risk of bias assessed with Cochrane Handbook for Systematic Reviews of Interventions (Higgins et al. 2008). Quality of evidence assessed with GRADE (Guyatt et al. 2008).	'Studies were overall of moderate quality with high risk of bias for at least one of the quality domains in eight of 14 studies (57%), and unclear or high risks in all studies.

Abbreviations

AHRQ=Agency for Healthcare Research and Quality; CCT=cluster controlled trial; CI=confidence interval; GRADE=Grading of Recommendations Assessment, Development and Evaluation; JBI=Joanna Briggs Institute; MAStARI=Meta-Analysis of Statistics Assessment and Review Instrument; NA=not available; PCC=person-centred care; NPS=neuro-psychiatric symptoms; PSP=patient safety practice; RCT=randomised controlled trial; ROB=risk of bias; ROBANS=risk of bias assessment for nonrandomised studies; SUMARI=System for the Unified Management, Assessment and Review of Information

Table 4: Critical appraisal of included systematic reviews

Authors	Q1*	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11
Avanecean et al. 2017	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y
Barnes et al. 2012	Y	Y	Y	Y	Y	Y	U	Y	N	Y	Y
Berntsen et al. 2013	Y	Y	Y	Y	Y	Y	Y	Y	N	U	Y
Brownie and Nancarrow 2013	Y	Y	Y	Y	Y	U	U	Y	N	Y	Y
Casimir et al. 2014	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y
Chenoweth et al. 2019	Y	Y	Y	Y	Y	Y	Y	Y	N	U	Y
Chiang et al. 2018	U	Y	Y	Y	Y	Y	Y	Y	N	U	U
Fossey et al. 2014	Y	Y	Y	Y	Y	U	Y	Y	N	Y	Y
Giacco et al. 2018	Y	Y	Y	Y	Y	Y	U	Y	N	Y	Y
Goldfarb et al. 2017	Y	Y	Y	Y	Y	Y	Y	Y	N	U	U

Authors	Q1*	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11
Gruden et al. 2020	Y	Y	Y	Y	Y	Y	Y	Y	N	U	Y
Jutkowitz et al. 2016	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y
Kim and Park 2017	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Mokhar et al. 2018	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y
Ratelle et al. 2019	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y
Valentijn et al. 2018	N	Y	Y	Y	Y	Y	Y	Y	Y	U	Y

Source: Joanna Briggs Institute (2017) *Checklist for Systematic Reviews and Research Syntheses*
N=No; NA=Not Applicable; U=Unclear; Y=Yes

Items by number

1. Is the review question clearly and explicitly stated?
2. Were the inclusion criteria appropriate for the review question?
3. Was the search strategy appropriate?
4. Were the sources and resources used to search for the studies adequate?
5. Were the criteria for appraising studies appropriate?
6. Was the critical appraisal conducted by two or more reviewers independently?
7. Were there methods to minimize errors in data extraction?

8. Were the methods used to combine studies appropriate?
9. Was the likelihood of publication bias assessed?
10. Were recommendations for policy and practice supported by the reported data?
11. Were the specific directives for new research appropriate?

References to Table 4

Corbett, A., Stevens, J., Aarsland, D., Day, S., Moniz-Cook, E., Woods, R., . . . Ballard, C. (2012). Systematic review of services providing information and/or advice to people with dementia and/or their caregivers. *International Journal of Geriatric Psychiatry, 27*(6), 628-636.

Guyatt, G., Oxman, A. D., Akl, E. A., Kunz, R., Vist, G., Brozek, J., . . . Jaeschke, R. (2011). GRADE guidelines: 1. Introduction—GRADE evidence profiles and summary of findings tables. *Journal of Clinical Epidemiology, 64*(4), 383-394.