

**The effectiveness of interventions to improve the care and management of people with dementia  
in general hospitals: a systematic review**

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**Running Title:** Review of hospital interventions for people with dementia.

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## Abstract

**Background:** People with dementia are at greater risk of being admitted to hospital where care may not be tailored to their needs. Interventions improving care and management are vital.

**Aim:** Assess the effectiveness of interventions designed to improve the care and management of people with dementia in hospital.

**Method:** Six medical and trial registry, and grey literature databases were searched (1999 - 8/2018). Search terms included “Dementia”, “Hospital” and, “Intervention”, and limited to experimental designs. Interventions designed to improve the care and management of people with dementia in the general hospital setting were examined. Outcomes included: behavioural, and psychological symptoms (BPSD); psychosocial, clinical, staff knowledge, and length of hospital stay. The CASP tools, Cochrane risk of bias tool, and GRADE system assessed methodological quality and certainty of evidence.

**Results:** 9,003 unique citations were identified; 24 studies were included. Studies were limited in study design and their conduct was at a risk of bias. There is very-low quality evidence that multi-sensory behaviour therapy reduces BPSD. There is low quality evidence that a multidisciplinary programme reduces post-operative complications and that robot-assisted therapy, music therapy, multimodal-comprehensive care, person-centred care, and family centred-function focused care interventions improved staff knowledge, competence, efficacy, and communication. No studies reported reduced length of stay.

**Conclusions:** Whilst we found that these interventions improved the care and management of people with dementia in hospital, it was low to very low-quality evidence. New clinical recommendations cannot be made based on current evidence, robust trial designs are necessary to inform evidence-based care.

**Key words:** Hospital; Dementia; Systematic Review; Intervention; Care and Management

**Key points:**

- An admission to hospital is associated with numerous adverse outcomes for people with dementia.
- The review provides an international insight into which interventions show the most potential when improving outcomes for people with dementia in hospitals.
- Evidence suggests that certain interventions may reduce post-operative complications and improve staff knowledge, competence, efficacy, and communication respectively but this of is low to very-low quality evidence .
- Robust trial designs are needed in the future to build upon available evidence to provide novel clinical recommendations in this setting.

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## **Introduction**

By 2050, 131.5 million people worldwide will be living with dementia <sup>1</sup>, demonstrating a 204% increase since 2017 <sup>2</sup>. A recent Lancet report <sup>3</sup> stated that until prevention or curative breakthroughs are made dementia will constitute an increasing challenge to health-care systems worldwide. It is estimated that 25% of hospital beds are used by people with dementia <sup>4</sup>, a total of 3.2 million bed days a year in the UK <sup>5</sup>, and in the USA people with dementia have twice as many hospital stays per year as other older people <sup>6</sup>. A report from the UK Alzheimer's Society "*Fix Dementia Care Hospitals*" highlighted the negative impacts, both emotional and physical, that poor care and management in hospitals can have on people with dementia and their families, and identified that once in hospital, people with dementia stay for twice as long as people without the condition <sup>7</sup>.

Behavioural and Psychological Symptoms of Dementia (BPSD) are defined as symptoms of disturbed perception, thought content, mood, or behaviour that frequently occur in people with dementia <sup>8</sup>. They may also be associated with unmet needs and an acute hospital admission may worsen BPSD, which can be distressing for both staff and carers <sup>9-11</sup>. The acute illness, the environment, and care practices "such as imposing hospital routines on the person" which do not meet the needs of the person living with dementia can result in distress, resistance to care, dehydration and malnourishment, restraint, or inappropriate treatment with psychotropic medication, and can result in poor quality care and management <sup>12</sup>. BPSD have been described as a key challenge in the hospital environment, and hospital staff report they struggle to adequately manage these symptoms <sup>13,14</sup>.

A National UK audit of NHS staff caring for people living with dementia highlighted the need for improvements in the environment, personalised care, and staff knowledge improve the management and care of people living with dementia. There have been numerous dementia-friendly initiatives and interventions (e.g. “This is me” documentation <sup>15</sup>), implemented to improve the care and management of people with dementia in the general hospital setting. To improve the clinical care they receive it is essential that previous interventions (often complex with multiple components), which aimed to improve outcomes for people with dementia, are reviewed together for their effectiveness. However, to our knowledge, no systematic review to date has examined the effectiveness of these interventions.

Our aim was to assess the effectiveness and quality of evidence of interventions designed to influence a change in outcomes relating to the care and management of people with dementia in general hospital. Specifically, the primary outcome of interest was BPSD, and secondary outcomes were: psychosocial and clinical factors relating to the person with dementia and their length of stay in hospital and staff knowledge regarding the care and management of people with dementia.

## **Methods**

This review follows the PRISMA reporting guidelines <sup>16</sup>. The protocol was registered prospectively on the PROSPERO database (CRD42017072697) on 21<sup>st</sup> July 2017 <sup>17</sup>.

### **Eligibility criteria and search terms**

Search terms were developed with a specialist systematic reviewer to reflect the domains stated below, according to the review criteria. Supplementary Material 1 details the search strategy for each database. The following criteria were applied to all studies identified in the database searches:

#### *Inclusion criteria*

##### Study design

Experimental comparative study designs (e.g. Randomised Controlled Trials (RCTs)/ Clinical Trials/ Pre-test/Post-test/ Time Series/ Repeated Measures). We did not restrict to RCTs as we were aware there may be a limited number of such trials

Participants:

- People with any type of dementia, over 18 years old and/or.
- Hospital staff caring for people with dementia.

Setting (Hospital /Secondary Care/ Geriatric):

- Hospital (not a psychiatric hospital or long-term rehabilitation wards)

Intervention

- Intervention, drug or non drug, aimed at improving care and management of people with dementia.
- Care or treatment intervention delivered in a general hospital with patients admitted for surgical or medical care.

*Exclusion criteria*

- Systematic review.
- Does not include an intervention aimed at improving care and management of people with dementia in the general hospital setting.
- Intervention focuses purely on delirium.
- Not published in the English language.

**Outcomes of interest**

*Primary outcome*

Behavioural and Psychological Symptoms in Dementia (BPSD). All data regarding BPSD were extracted (validated and unvalidated scales, self-report, proxy-report).

*Secondary Outcomes*

- Psychosocial (comfort, well-being, a quality of life, social interaction etc.).

- Clinical (pain, delirium, adverse events etc.).
- Staff knowledge.
- Length of stay.

### **Information sources**

Searches were undertaken in the following databases: MEDLINE (Ovid), CINAHL, Embase (Ovid), PsycInfo (Ovid), Cochrane Central Register of Controlled Trials, and Clinical Trial Registries (<https://clinicaltrials.gov>).

International Psychogeriatrics Association consensus conference produced the first definition of BPSD in 1999 providing the rationale for the start of search up until August 2018<sup>18</sup>.

We searched forward and backward references of included papers. To reduce the risk of publication bias, an additional search for grey literature was completed via [www.opengrey.eu](http://www.opengrey.eu) and by contacting authors of included papers for additional work.

### **Study selection**

Titles and abstracts were screened by one reviewer (AF) to assess if they met the eligibility criteria of being in a hospital setting, with people with dementia, and with an intervention. Full texts were screened by a minimum of two independent reviewers from a range of four of the study authors (NW, NK, ELS, & AF). In cases where the study gave incomplete information on the setting or intervention, the author was contacted to confirm eligibility.

### **Data extraction**

Data was extracted based on the Cochrane Public Health Group template<sup>19</sup>. Questions were expanded and removed where necessary during the piloting stage.

Extracted data included:

- Description of the study design; including aim of the study, duration, recruitment method, inclusion criteria, and method of randomisation.
- A description of the participants, including sample size, type of dementia, and demographics.
- Information about the setting, intervention, outcome and any frameworks applied.

- Results.
- Author conclusions.

### **Data synthesis and analysis**

Results were extracted in the format in which they were presented depending on the design of the study: for example a risk ratio, a difference in means between trial arms, or qualitatively described. In cases where there were missing, incomplete, or inaccurate data, the study authors were contacted. If the data was subsequently not available from the author, the study was excluded.

A narrative summary of all studies was completed to describe the characteristics of the studies involved to describe the setting, interventions, and participants included.

Originally, a meta-analysis had been planned where sufficient homogeneity in trials in key characteristics (e.g measurement and intervention) existed. However, insufficient homogeneity in included studies was found. Therefore, data were categorised by study design and described narratively by the outcome domains (e.g. the domains targeted by the intervention such as BPSD, psychosocial, and clinician training/knowledge) in order to identify which outcomes can be effectively improved via intervention.

### **Quality assessment**

The order in which the studies were reported in the results section was determined by the study design, adhering to the hierarchy of evidence proposed in the York Guidance <sup>20</sup>, reporting RCTs first, and subsequently designs with a higher potential for bias. Cochrane risk of bias tool <sup>21</sup> was used to appraise RCTs and the CASP <sup>22</sup> tools were used to assess cohort and case-control studies, depending on the study design in order to provide a quality score (low, medium, high). The GRADE system <sup>23</sup> was used to judge the certainty of evidence behind the outcomes, graded as high, moderate, low or very low. Full methodological details of the GRADE system can be found in Supplementary Material 4.

## Results

### Study selection

A summary of the review process is shown in Figure 1. A total of 15,433 records were identified, of these, 6,434 were duplicates and 7,810 were excluded after title and abstract screening. We retrieved 1,193 papers for full text screening of which 1,167 were subsequently excluded and 24 studies were included in this review of which 8 were identified through reference list checking of included papers.

### Study characteristics

A summary of the included studies is given in Table 1. Of the 24 papers, 10 (41%) were from the UK, and 5 (21%) from the USA. Other countries included in the review were Japan, Singapore, Canada, Germany, France, Sweden and Japan. There were 2 RCTs, 8 case-control studies and 14 cohort studies. A total of 4,036 participants were included in the 24 studies. Although not universally reported the majority of people with dementia were female (77%), the mean age per study varied between 72 and 83 years, were mostly diagnosed with Alzheimer's disease, but lacking data regarding disease severity. Data on ethnicity were also not well reported, but participants were predominantly Caucasian.

### Interventions

Information regarding the intervention, are reported in Tables 1 and 2, with further information given in Supplementary Material 3. Most staff delivering the interventions were nurses, and then health care assistants. Other hospital staff included: student nurses, housekeeping, pharmacists, doctors, dentists, dieticians, administrators, and social workers. Although not universally reported, most staff stated they had received no dementia training.

All interventions were delivered on the ward, other than one study where the training was delivered online for staff to access at home<sup>24</sup>. The majority (13/24, 54%) of studies evaluated multicomponent staff educational interventions aiming to improve dementia care on the ward (medical model of dementia, approaches to communication and behaviour, dementia friendly care, connecting with the carer<sup>25</sup>, communicating with patients, dementia-related behaviour, wandering and falls<sup>24</sup>, managing BPSD, nutrition and hydration, importance of activities, falls management, end-of-life care<sup>26</sup>), followed by person-centred care (3/24), specialist geriatric medical ward<sup>27</sup>, improving

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communication and relationship (using experiential learning therapy with actors trained to portray patients living with dementia<sup>28</sup>) between staff and family carers, and creative music therapy<sup>29</sup>. One technology-based intervention was a humanoid robot for psychomotor therapy. In the text below and in Table 2, the studies are described by our outcomes of interest.

### **Risk of bias within studies**

To assess reliability of the quality assessment, 19/24 studies (79%) were also scored for quality by a second reviewer. No paper was excluded on the basis of its quality score. Quality thresholds ( $\geq 70\%$  = high quality,  $\geq 50\%$  and  $< 70\%$  = moderate quality,  $\leq 50\%$  = poor quality) were imposed, based on previous studies<sup>30,31</sup>. Due to the high level of agreement between the two raters (ICC = 0.963, 95% CI = 0.908-0.986) it was agreed that independent quality assessments of the remaining 5 studies was not necessary. All RCTs were rated as poor quality conduct with the most common methodological problems being lack of blinding of participants and insufficient sample size. Full details of the quality appraisal and quality items for each study are reported in Supplementary Material 2.

### **Synthesis of results**

Table 2 reports quantitative data from studies demonstrating which interventions were effective, categorised to reflect the outcomes of interest. The text below provides a summary of interventions with quantitative data and provides a synopsis of the qualitative data, describing how the interventions were effective in the context of their study designs and in relation to their comparator group.

### **Primary Outcome**

#### *Behavioural and psychological symptoms in dementia*

Three studies assessed the impact of an intervention for BPSD.

Multi-sensory behaviour therapy: One pilot RCT<sup>32</sup> evaluated this therapy. It found at follow-up a statistically significant improvement favouring the therapy group compared with the control group in agitation (using The Pittsburgh Agitation Scale) and apathy (using Scale for the Assessment of Negative Symptoms in Alzheimer's Disease).

Person-centred volunteer programme: One non-randomised trial evaluated this therapy. It found no statistical significant difference in BPSD levels between a historical control of patient data and the intervention <sup>12</sup>.

Robot assisted therapy: One before-and-after study <sup>33</sup> evaluated this psychomotor therapy program involving a humanoid robot as a therapist's assistant. It found a statistically significant positive correlation between levels of constructive engagement with the therapy and severity of BPSD (using the Neuropsychiatric Inventory).

Using the GRADE quality of evidence tool, we rated the impact on BPSD for all three interventions that measured this outcome as very-low quality evidence. This was because all studies had critical problems. These included study design issues (e.g. case study), issues in study conduct (e.g. under reporting of key design features) and sparse data (e.g. in the pilot study there was so few data that the results are highly susceptible to the random play of chance).

## **Secondary Outcomes**

### *Psychosocial*

Three studies assessed the impact of an intervention on psychosocial outcomes. None of the studies were trials.

Music therapy: One before-and-after study <sup>29</sup> evaluated this therapy. It reported a statistically significant difference in levels of pleasure and alertness (The Lawton Observed Emotion Rating Scale; OERS). One case-control study <sup>34</sup> evaluated this therapy. It reported positive observed effects on relaxation, distraction, engagement and agitation (ArtsObs; Arts Observational Scale, measuring mood distraction and relaxation) in favour of the intervention.

Robot Assisted Therapy: One before- and after-study <sup>33</sup> evaluated this therapy. It did not report a statistically significant difference in levels of immediate wellbeing and quality of life (Instant Assessment of Wellbeing Tool; EVIBE).

We judged the evidence on the impact of these interventions on psychosocial measurements as low quality as it was based on observational studies.

### *Clinical*

Five studies assessed the impact of an intervention on clinical outcomes. All studies were limited in research design methodology (observational or secondary analysis of RCT).

Multi-disciplinary post-operative intervention: Secondary analysis of one RCT<sup>35</sup> evaluated this intervention. It found a statistically significant improvement in the number of falls, urinary tract infections, nutritional problems and postoperative delirium in favour of the intervention.

Person-centred volunteer programme: One non-RCT<sup>12</sup> evaluated this intervention. It reported no statistically significant reduction in number of falls, whereas this intervention did statistically significantly improve 28-day readmission rates.

Comprehensive geriatric assessment: One case-control study evaluated this intervention with the aim of improving hospital care for people with dementia<sup>36</sup>. There were reported improvements in recovery from eating and swallowing disorder and artificial hydration free survival after 1-year. However, there was no statistically significant difference between the intervention group and the historic control group for 1-year overall survival.

Family-centred function focused care (Fam-FFC): One case-control study evaluated this intervention<sup>37</sup>. It reported a statistically significant improvement in Activities of Daily Living (ADL) performance, and mean walking performance, but did not improve gait and balance (Tinetti gait and balance).

Specialist cognitive geriatric unit: One case-control study evaluated this intervention<sup>27</sup>. It reported a statistically significant improvement in gait and balance scores (Tinetti gait and balance), and functional ability (Barthel).

We judged the quality of evidence that these interventions improved clinical outcomes as low. Whilst three of the five studies were individually high quality observational studies overall their findings were heterogenous (in clinical outcome measured and in direction of impact).

### *Staff knowledge*

14 studies assessed the impact of an intervention on staff knowledge. None of the studies were RCTs.

Gentle Persuasive Approach Education Programme: One non-randomised controlled-trial evaluated this intervention <sup>38</sup>. This intervention was associated with a statistically significant improvement in self-efficacy in managing behaviours (SBMSE).

‘Getting to know Me’ training: One before-and-after study evaluated this training <sup>39</sup>. It found a statistically significant improvement in confidence for dementia care (CODE) and knowledge in dementia (KIDE).

Royal College of Nursing Development Programme: One before-and-after study evaluated this training <sup>40</sup>. It found a statistically significant improvement in SPACE principles (skilled staff who are informed and have enough time to care and partnership working with carers, Assessment and early identification of dementia, Care plans which are person-centred and individualized, Environments that are dementia friendly) following the intervention.

Training to improve staff attitude to dementia, satisfaction and feelings of caring efficacy: One before-and-after study evaluated this training <sup>41</sup>. It found a statistically significant improvement in staff attitudes to dementia (ADQ) following the intervention, but no significant difference for improving attitude or satisfaction and feelings of caring efficacy in providing care for people with dementia (CES and SEWDR).

Providing care and managing BPSD training: One before-and-after study evaluated this intervention <sup>42</sup>. It reported a statistically significant improvement in identifying BPSD, perceived ability to use different methods to communicate with patients with dementia and perceived ability to manage agitation following the intervention.

Communication Training, Communication training and Older Adult Unit placement and Communication Technique training: Four before-and-after studies evaluated interventions aimed at improving communication <sup>28,43,44</sup>. They reported a statistically significant improvement in communication skills and techniques, confidence when communicating (CODE), knowledge of dementia communication (KIDE), and identifying person-centred responses following the interventions.

Dementia Friendly Hospital Care - Care not Crises: One before-and-after study evaluated this intervention <sup>25</sup>. It reported a statistically significant improvement in hospital environment, patient safety, behavioural management and communication technique.

Appreciative Inquiry: One before-and-after study evaluated this intervention <sup>45</sup>. The intervention improved staff attitudes and facilitated change leading to a number of improvements in the quality of care of patients with dementia in hospital wards. System wide dementia training (train the trainer model): One before-and-after study evaluated this intervention <sup>46</sup>. At follow-up the 'sense of competence in dementia care' training showed a statistically significant improvement in the intervention group.

We judged the quality of evidence that these interventions improved staff knowledge as low quality this was because studies were either non-randomised trials or case control.

#### *Length of stay*

Four studies assessed the impact of an intervention on length of stay. None were RCTs, and none reported a significantly significant difference in length-of-stay.

Multidisciplinary postoperative programme: One non-RCT evaluated this intervention <sup>35</sup>. Person-centred volunteer intervention: One non-RCT <sup>12</sup> evaluated this intervention. Music Therapy: One case-control study measured the impact of this intervention <sup>34</sup>. Cognitive geriatric unit: One case-control study measured the impact of this intervention <sup>27</sup>.

We judged the quality of evidence that these types of interventions reduced length of stay as low. This was because studies were either non-randomised trials or case control.

## **Discussion**

### **Main findings**

The aim of this review was to identify and assess the effectiveness of interventions to improve the care and management of people with dementia who are admitted to general hospital. We identified two interventions which significantly reduced BPSD, four therapies improved psychosocial outcomes, six improved clinical outcomes, 12 improved levels of staff knowledge, and single studies which

reduced medication costs, increased the number of completed dementia assessments, and improved discharge planning. There was no evidence to indicate that any intervention significantly reduced length of stay in hospital. Evidence though for the reduction of BPSD was very-low quality, as rated by the GRADE tool, and evidence for secondary outcomes (psychosocial, clinical, staff knowledge, and length of stay) were limited due to study design and/or conduct therefore must be interpreted with caution.

### **Findings in context**

There is evidence to suggest that a varied range of interventions may have potential in improving BPSD, ranging from the use of robots to multi-sensory behaviour therapy. Although there is no explicit guidance regarding the treatment of BPSD in hospitals, National Institute of Clinical Excellence (NICE) Guidelines (2018) state that interventions should offer personalised activities which promote engagement, pleasure and interest in the first instance rather than prescribing antipsychotics. However, in the nursing home setting in the UK an intervention comprising of person-centred care training and person-centred activities has been demonstrated to significantly reduce BPSD and improve quality of life for residents<sup>47</sup>. Our review provides evidence that these psychosocial interventions may be effective in the hospital setting. Nevertheless, although recommended in the UK NICE Guidelines (2018), no interventions utilised the principles of functional analysis<sup>48</sup> or structured assessments to identify reasons/causes of distress to manage BPSD.

Music therapy and a combination of eye contact/touch/verbal communication were effective in improving psychosocial outcomes. This evidence is in line with recommendations from a number of guidelines who advocate the use of multi-sensory stimulation for communication<sup>49</sup>, opportunities for social interaction<sup>5,7,49,50</sup>, music therapy<sup>51</sup>. Although Robot Assisted Therapy was effective for reducing BPSD, it was not effective for improving psychosocial outcomes.

Forms of person-centred care on the ward, specialist wards and assessments were effective in improving clinical outcomes such as falls, and nutrition and hydration which have been recommended as important interventions in the literature<sup>49,50</sup>. Other clinical outcomes such as pain, urinary tract infections, chest infections, stroke, and falls were not identified within the scope of this review, even though they are key areas for concern according to the Royal College of Psychiatrists (2017)<sup>50</sup>.

However, interventions aimed at targeting the outcomes mentioned above are likely to have been evaluated for geriatric patients in the general hospital setting.

The majority of interventions identified in this review focused on improving knowledge and skills for hospital staff. However, it remains unclear due to conflicting evidence whether they effectively improved confidence, self-efficacy, and knowledge when caring for someone with dementia. Clarity regarding which component may be effective is further complicated by the heterogeneous nature of the interventions in terms of content, dose, and delivery method. Furthermore, there are inherent biases associated with self-report questionnaires utilised within these studies. A potential explanation for the increasing number of interventions in this area may be the numerous reports and guidelines strongly advocating dementia training for all staff<sup>5,49,50</sup>. For example, the 'Improving Dementia Care Worldwide Report'<sup>52</sup> recommends the formulation of core competencies for professionals involved in delivering dementia care, continuous education and training, and the development of career pathways or specification by commissioners of necessary dementia training for service providers.

Despite the UK Alzheimer's Report: Dementia- The True Cost<sup>53</sup>, highlighting the increasing problem of lengthy stays in hospital, only three studies in this review reported findings on this matter, and there was no evidence of effectiveness. However, one study demonstrated an improvement in discharge planning.

### **Strengths and limitations**

To our knowledge this is the first review to systematically assess the effectiveness of interventions to improve the care and management of people with dementia admitted to hospital. We used rigorous methods for systematic review, searching across seven databases, together with forward and backwards reference searches. Our review was inclusive in that we devised a broad search strategy, collecting a range of studies with experimental comparative trial designs, whilst being mindful of the quality of evidence when synthesising the results. Quality assessments were conducted by a second reviewer for the majority of studies, with high levels of agreement. It was challenging to devise a search strategy which captured all the relevant literature as the scope of this review was so broad. Therefore, despite our methodological efforts it is possible that some studies might have been missed, in addition to those which were not published in English. Due to the clinical heterogeneity and the diverse, multicomponent nature of the interventions in the included studies it was not possible to perform a meta-analysis as planned, and a narrative summary was performed. Other methods such as

a realist synthesis may have provided a deeper understanding of which interventions are effective for whom. Only three included studies provided the highest levels of evidence in the form of randomised controlled trials. Lower levels of evidence of effectiveness were mostly from before-and-after studies followed by case-controls. Furthermore, 21 studies were of medium or low quality, therefore evidence must be interpreted with caution, and many of our outcomes of interest included a limited number of studies. A number of interventions involved multiple components, such that it was not possible to accurately identify the mechanisms of action where improvements in outcomes were reported.

### **Implications for research and practice**

The general hospital is a notoriously challenging environment in which to implement dementia care interventions and measure effectiveness using the rigorous methodological constraints of high-quality research. In particular, criteria such as blinding are challenging to achieve in the hospital setting and is often unfairly reflected in the poor methodological quality ratings. Authors have reported the difficulty of recruitment (particularly using proxy consent)<sup>54</sup>, and the difficulty of collecting follow-up data due to patient mortality, carer withdrawal<sup>54</sup> and response rates<sup>25,46</sup>. Delivering effective staff training is challenging in a busy hospital, therefore it is necessary in each situation to be mindful of the practicalities, the efficacy and staff preferences when considering delivery methods. It has also been suggested that effective sustainable interventions must involve communication and negotiation with people at all levels in the organisation<sup>55</sup>. ‘Bottom up’ approaches to change management were imperative to ensure the sustainability of the changes once front-line staff had moved on, and vital that frontline staff are involved in the design of the intervention<sup>55</sup>.

There are numerous factors affecting the success of an intervention such as culture of care, staffing levels (recruitment, retention), staff fatigue, inadequate clinical leadership, lack of accountability and poor communication etc.<sup>56</sup>. Although these factors were beyond the scope, it is important to acknowledge that these contextual factors have the potential to reduce the effectiveness of these interventions. Hospital care across the world is a major concern<sup>52</sup>, it is fundamental for continuous improvement of dementia care in hospitals that the effectiveness of any intervention is routinely and measured using appropriate outcome scales. Conducting research in a hospital setting is fraught with challenges, however, this review has highlighted concerning gaps in the literature that must be addressed. No interventions were identified in this review that targeted pain or fractures for older people with dementia. Although interventions were identified which reported evidence on length of

stay, advanced care plans, and staff burnout, there was no evidence of efficacy. Therefore, further interventions must be tested in order to improve these outcomes. Furthermore, in accordance with the NICE Guidelines (2018)<sup>49</sup>, there needs to be a greater focus on improving outcomes relating to end-of-life care, as only two interventions aimed to address this area. Ideally, high-quality research in the form of RCTs are required, however given the practical challenges of research in this setting (particularly maintaining blinding and using suitable control groups) future research designs must be feasible and pragmatic whereby the best possible evidence is utilised.

In accordance with recommendations from BUPA/Alzheimer's Disease International, the ambition is for people with dementia to receive high quality, compassionate care, to be discharged in a timely and appropriate way and that all countries should provide access to hospital services which are safe and responsive to the needs of people with dementia. It is also stated in both these reports that 'a clear evidence base for what works in training on dementia for health and social care staff' is required<sup>5</sup>, and a commitment to funding is essential for 'innovation and research that can lead to improvements in treatment and care'<sup>52</sup>. The findings from this review and subsequent recommendations provide valuable information to inform targeted research and evidenced-based clinical care to improve the care and management of people with dementia in hospitals worldwide.

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**Figure 1.** PRISMA flow diagram of study selection

**Supplementary Material**

Supplementary Material 1 Search Strategies

Supplementary Material 2 Quality Appraisals

Supplementary Material 3 Description of Interventions

Supplementary Material 4: Grading of Recommendations Assessment, Development and Evaluation (GRADE)

Table 1 Characteristics of included studies

Paper, QA, GRADE	Design	Country & participant characteristics	<i>n</i>	Aim of intervention	Outcome measure	Main findings
Arahata 2017 QA: High quality GRADE: Low	Non-randomised trial	Japan People with dementia Males: 86 Females: 128	90	To improve the functional status of eating by implementing comprehensive geriatric assessment (CGA).	Withdrawal from artificial hydration and/or nutrition (AHN) and survival independent of AHN at 1 year after recovery from ESDED (Eating and Swallowing Disorder of the Elderly with Dementia). Overall survival (OS) after onset of ESDED, which was measured between the day of onset of ESDED and the day of death by any cause. An additional outcome was recovery rate in all cases of ESDED regardless of	For the intervention group, an average of 4.3 interventional strategies was recommended per participant after CGA. Serological tests, diagnostic imaging and other diagnostic examinations were much more frequently performed in the intervention group. Recovery rate from ESDED in the intervention group was significantly higher than that in the historical group. The 1-year AHN-free survival in the intervention group was significantly higher than that in the historical

Par r, QA, GRADE	Design	Country & participant characteristics	<i>n</i>	Aim of intervention	Outcome measure	Main findings
					receiving interventions in each study period.	group No significant difference between the two groups was found for 1-year overall survival.
<b>Banks 2014</b> QA: Medium quality GRADE: Low	Evaluation of training with a survey	Scotland NHS Health professionals	113	To develop, deliver, and evaluate a training programme to prepare NHS & Social Service Dementia Champions working in acute settings as	(a) Attitudes towards people with dementia Approaches to Dementia Questionnaire (ADQ)  (b) Achievement of learning outcomes: completion of three work-based tasks including submission of reports	The format of the programme provided a cost-effective means to prepare NHS and Social Service Dementia Champions as Change Agents for practice within a relatively short period of time, and

<b>Par r, QA, GRADE</b>	<b>Design</b>	<b>Country &amp; participant characteristics</b>	<b><i>n</i></b>	<b>Aim of intervention</b>	<b>Outcome measure</b>	<b>Main findings</b>
				Change Agents for practice.	(c) Confidence that they could put their learning into practice: completion of self-efficacy scale. Perceptions of training.	would be transferrable to other staff groups.
<b>Blair 2018</b> <b>QA:High quality</b> <b>GRADE:BPSD very-low quality;</b> <b>Clinical low quality, length</b>	Non-randomised controlled trial	Australia  People with dementia  Years mean (SD)  82.44 (8.63)  Female:255	458	Evaluate the clinical outcomes for patients with dementia, delirium, or at risk for delirium supported by the person-centered volunteer program in rural acute hospitals.	Medical record audits provided data on volunteer visits, diagnoses, length of stay (LOS), behavioural incidents, readmission, specialling, mortality, admission to residential care, falls, pressure ulcers, and medication use.	The Dementia and Delirium Care with Volunteer's program was successfully implemented in 7 rural hospitals of varying sizes and resulted in reductions in 28 day readmission and specialling rates. No increases in falls, pressure ulcers, mortality or institutionalization indicates the intervention is safe. The

Par r, QA, GRADE	Design	Country & participant characteristics	<i>n</i>	Aim of intervention	Outcome measure	Main findings
of stay low quality		Male: 203				implementation package and mentoring resulted in consistent implementation and results across all sites.
<b>Boltz 2015</b> QA: High quality GRADE: Low	A comparative, repeated measures study	Northeast USA  People with dementia  Years Mean (SD)  82.4 (7.6).	86	To see if hospital acquired disabilities and complications in people with dementia can be reduced through a family centred function-focused care.	Patient measures: ADL & walking performance (Barthel Index). Gait & balance (Tinetti Scale). Severity of delirium (Delirium Severity Scale). Family caregiver measures: Preparedness for caregiving (Preparedness for Caregiving Scale). 8-item self-rated instrument that asks caregivers how well prepared they	The findings from this study support the feasibility of Fam-FFC and show preliminary efficacy that implementation of Fam-FFC can improve outcomes for both hospitalized patients with dementia and their FCGs. Specifically, patients on Fam-FFC units had better ADL and walking performance, less severity and

Par r, QA, GRADE	Design	Country & participant characteristics	<i>n</i>	Aim of intervention	Outcome measure	Main findings
		<p>Most Family caregivers were in the age range of 46–65 (52%)</p> <p>Male: 35 Female: 51</p> <p>Black 45%</p> <p>White 45%</p>			<p>believe they are for multiple domains of caregiving. Caregiver anxiety and depression (HADS-A) (HADS-D Mutuality (Mutuality Scale). Caregiver (Caregiver Strain Index; CSI). Caregivers bedside log to detail FCG involvement in care by type of activity and time spent. Treatment fidelity.</p>	<p>duration of delirium and fewer hospital readmissions. FCGs on Fam-FFC units showed a significant increase in preparedness for caregiving and less anxiety from admission to 2 months post discharge.</p>

<b>Par r, QA, GRADE</b>	<b>Design</b>	<b>Country &amp; participant characteristics</b>	<b><i>n</i></b>	<b>Aim of intervention</b>	<b>Outcome measure</b>	<b>Main findings</b>
<b>Cheong 2014</b> <b>QA: Medium quality</b> <b>GRADE: Low</b>	Before-and-after study	Singapore People with dementia Years Mean (SD) 86.5 (5.7) Female: 15 Male: 10	25	This pilot study evaluates the impact of a creative music therapy (CMT) programme on mood and engagement in older patients with delirium and/or dementia (PtDD) in an acute care setting.	Menorah Park Engagement Scale (MPES) and the Lawton Observed Emotion Rating Scale (OERS).	Although the effects of CMT did not seem to extend beyond the period of music engagement, CMT can contribute to the overall well-being of PtDD if it is regularly scheduled in to their daily routines or incorporated in to other areas of care such as physical rehab and nursing to increase compliance and cooperation.
<b>Daykin 2018</b>	Mixed method	UK	85	Examining the effects of a ten	Admission, falls, length of stay, medication, specialling. Arts	Data suggest a trend towards a decrease in the number of patients

Par r, QA, GRADE	Design	Country & participant characteristics	<i>n</i>	Aim of intervention	Outcome measure	Main findings
QA: High quality GRADE: Psychosocial Low; Length of Stay low		Not stated.		week period of weekly music sessions on the wellbeing of patients.	Observational scale measuring mood, distraction and relaxation (ArtsObs)	requiring antipsychotic drugs following a participatory music intervention. The results also suggest that fewer falls were recorded on the days when the music sessions were taking place and that overall length of stay was reduced despite the average age of in-patients being higher when the music sessions were running. However, without more specific data on patients it is not possible to know whether these observed changes are attributable to the music sessions. Qualitative data show that music activities are strongly supported by

Par r, QA, GRADE	Design	Country & participant characteristics	<i>n</i>	Aim of intervention	Outcome measure	Main findings
						clinical and care staff who perceive them to be beneficial for patients' mood and wellbeing.
English 2014 QA: Medium quality GRADE: Low	Before-and-after	UK  People with dementia  Female: 73%	72	To report on the development and evaluation of a staff training intervention in dementia care designed for use in the general hospital setting for enhancing the skills in the care of people with dementia: the	Confidence in Dementia (CODE). Knowledge in Dementia (KIDE). Controllability Beliefs Scale.	Statistically significant change was identified pre-post training on all outcome measures. Clinically meaningful change was demonstrated on the CODE scale. Overall, the 'Getting to Know Me' programme was well received. The results of the study are encouraging and suggest that the 'Getting to Know Me' programme may impact on staff confidence and knowledge.

Par r, QA, GRADE	Design	Country & participant characteristics	<i>n</i>	Aim of intervention	Outcome measure	Main findings
				'Getting to Know Me' training programme.		
<b>Elvish 2018</b> <b>Medium</b> Quality <b>GRADE: Low</b>	Before-and- after	UK  People with dementia  Female: 82%	480  (including data from above study)	Second-phase roll- out of the above study.	As above.	Statistically significant change was identified between pre-post training on all outcome  Measures. Medium to large effect sizes were demonstrated on all outcome measures.

<b>Par r, QA, GRADE</b>	<b>Design</b>	<b>Country &amp; participant characteristics</b>	<b><i>n</i></b>	<b>Aim of intervention</b>	<b>Outcome measure</b>	<b>Main findings</b>
<b>Evans 2015</b> <b>QA: Medium quality</b> <b>GRADE: Low</b>	Evaluation study	UK  Not stated	31	To improve the experience of care by: 1. Supporting participants to develop effective partnerships with patients, carers and professionals. 2. Facilitating the learning and development of staff in delivering positive approaches to dementia care 3. supporting	The survey focused on: The extent to which the learning outcomes were achieved. Reflections on the programme and its effect. Suggested improvements. The level of action in each trust. 2.Interviews with the development teams and carers and observations. Self-assessment scale based on the SPACE principles (Skilled staff who are informed and have enough time to care, Partnership working with carers, Assessment and early identification of dementia, Care	The development programme was successful in the achievement of its specified objectives and learning outcomes, with all participating Trusts reporting that objectives were fully or partially achieved, and that they had improved in respect of all learning outcomes of the programme. Project teams showed an average increase of 45% in their overall SPACE scores between June 2013 and January 2014. The increase in scores on each of the five

<b>Par r, QA, GRADE</b>	<b>Design</b>	<b>Country &amp; participant characteristics</b>	<b><i>n</i></b>	<b>Aim of intervention</b>	<b>Outcome measure</b>	<b>Main findings</b>
				participants to develop practice and lead on quality improvements in the care delivered for people with dementia and their families.	plans which are person-centred and individualized, Environments that are dementia friendly). Action plans written by the development teams detailing their current and planned work to improve care.	SPACE principles was statistically significant.
<b>Gal in 2010</b> <b>QA: Medium quality</b> <b>GRADE: Low</b>	Before & after	USA  People with dementia	397	Develop, implement & evaluate “Dementia-Friendly Hospitals: Care Not Crisis.” Targeted at nurses and other	Knowledge of current practices and attitudes when caring for hospitalized patients with dementia. Confidence in assessing and recognizing dementia, managing demented patients,	Upon completion, there were significant gains in knowledge and confidence in recognizing, assessing and managing dementia. Attendees reported gains in communication skills and strategies to improve the

Par r, QA, GRADE	Design	Country & participant characteristics	<i>n</i>	Aim of intervention	Outcome measure	Main findings
		<p>Mean age 46 years</p> <p>Females: 90.4%</p> <p>83% Caucasian, 10% African American, 3% Asian, and 2% Hispanic.</p>		<p>direct-care staff to provide them with information &amp; resources to allow them to better care for patients with dementia from admission to discharge planning.</p>	<p>differentiating delirium from dementia, communication skills and discharge planning.</p> <p>Knowledge of dementia.</p> <p>Listed challenges when working with demented patients and skills or resources needed to provide better care. The post-test asked for changes attendees would make in assessment, care or management of dementia patients.</p>	<p>hospital environment, patient safety and behavioural management. At 120 days, 3 of 4 hospitals demonstrated maintenance of confidence.</p>

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<b>Par r, QA, GRADE</b>	<b>Design</b>	<b>Country &amp; participant characteristics</b>	<b><i>n</i></b>	<b>Aim of intervention</b>	<b>Outcome measure</b>	<b>Main findings</b>
<b>Hobday 2017</b> <b>QA: Medium</b> <b>quality</b> <b>GRADE: Low</b>	Before-and- after	USA	25	Test the feasibility and utility of the CARES® Dementia-Friendly Hospital™ (CDFH) program, a 4- module, online training program for nursing assistants (NAs) and allied hospital workers (AHWs) who provide care to	Dementia care knowledge (own measure). The Alzheimer’s Disease Knowledge Scale (ADKS). Satisfaction with intervention (quantitative and qualitative).	Dementia care knowledge increased. Open- and closed-ended data suggested that the delivery of online training to NAs/AHWs to enhance dementia care is feasible, useful, and efficient.

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Par r, QA, GRADE	Design	Country & participant characteristics	<i>n</i>	Aim of intervention	Outcome measure	Main findings
				individuals with dementia.		
Naughton 2018 QA: High quality GRADE: Low	Before-and-after	UK  Not stated	52	To measure the impact of dementia communication training plus older adult unit (OAU) placement on students' ability to recognise opportunities for person-centred (PC) communication	The primary outcome was students' ability to identify person centred responses and application of the training principles which was tested using bespoke case vignettes. Secondary outcomes: A Sense of Competency in Dementia Care (SCIDS), knowledge of dementia (DK-20), bespoke questionnaire to measure students' perception of readiness	In the intervention group, participants were significantly more likely to identify PC responses. In focus group interviews (the main themes were connecting with patients, training principles in practice, communication challenges, and learning environment. The training was described as a flexible approach that added to the participants' communication toolkit. The learning

Par r, QA, GRADE	Design	Country & participant characteristics	<i>n</i>	Aim of intervention	Outcome measure	Main findings
				compared to OAU placement alone.	for placement & confidence with dementia communication.	environment, complexity of patients and organisational resources were important contextual factors.
<b>O'brien 2018</b> <b>QA: Medium</b> <b>Quality</b> <b>GRADE: Low</b>	Before-and-after	UK Healthcare professionals 89% female 89% white, 9% Asian and 2% mixed	43	To develop and pilot a dementia communication skills training course that was acceptable and useful to healthcare professionals, hospital patients and their relatives).	The Confidence in Dementia Scale ('CODE'). Questions linked to confidence regarding skills taught on the course were developed by the research team (how to make a request, communicating following a refusal and how to close a healthcare conversation). Dementia Knowledge Test developed by the research team to	Healthcare professionals increased their knowledge of dementia communication (mean improvement 1.5/10; 95% confidence interval 1.0±2.0; $p < 0.001$ ). Confidence in dementia communication also increased (mean improvement 5.5/45; 95% confidence interval 4.1± 6.9; $p < 0.001$ ) and the course was well-received. One month later participants reported using the skills

<b>Par r, QA, GRADE</b>	<b>Design</b>	<b>Country &amp; participant characteristics</b>	<b><i>n</i></b>	<b>Aim of intervention</b>	<b>Outcome measure</b>	<b>Main findings</b>
					test knowledge of communication with person with dementia. Five questions, developed by the research team asking participants to rate their confidence communicating with the person with dementia. Evaluation of the training course. Blind ratings of communication behaviours during requests in evaluation simulation.	learned in clinical practice. Blind-ratings of simulated patient encounters demonstrated behaviour change in taught communication behaviours to close an encounter, consistent with the training, but not in requesting behaviours.
<b>October 2018</b> <b>QA: Medium quality</b>	Post then pre design	USA Not stated	428	Education programme to help certified nursing assistants (CNA)	Participants' ability to: 1. identify behaviours associated with dementia;	Demonstrated a positive impact on knowledge in identifying and managing difficult behaviours in dementia. Qualitative feedback from

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Par r, QA, GRADE	Design	Country & participant characteristics	<i>n</i>	Aim of intervention	Outcome measure	Main findings
GRADE: Low				provide care and manage challenging behaviours in dementia.	2. use different methods to communicate with patients with dementia; and  3. manage situations when a patient with dementia becomes agitated.  Two open-ended questions to identify two techniques they would use when caring for patients with dementia and steps they would take to implement those techniques.	participants suggests that the use of video simulations helped them to  recognize the behaviours and manage these in ways that reduced patient anxiety. The “Things I Would Like You to Know About Me” worksheet is a useful tool for patient/ family caregiver communication. This improved communication eases the transition for all involved.

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<b>Par r, QA, GRADE</b>	<b>Design</b>	<b>Country &amp; participant characteristics</b>	<b><i>n</i></b>	<b>Aim of intervention</b>	<b>Outcome measure</b>	<b>Main findings</b>
<b>Rosler 2012</b> <b>QA:Poor quality</b> <b>GRADE: Clinical Low; Length of Stay Low</b>	Before-and-after	Germany People with dementia Age Mean (SD) 84.1 years (7.8) 73% Female	48	To compare treatment outcome of dementia patients with fracture of proximal femur in a specialised cognitive geriatric unit (CGU) compared to conventional geriatric care (non-CGU).	Length of stay Functional status as measured by the Bartel Index Tinetti score. Place of discharge. Medication with neuroleptics, antidepressants, and anti-dementive drugs at the time of discharge.	Patients with a fracture of the proximal femur and additional dementia treated in a “cognitive geriatric unit” with a multidimensional therapeutic approach seemed to improve more in mobility and balance than similar patients treated with conventional geriatric care, and

Par r, QA, GRADE	Design	Country & participant characteristics	<i>n</i>	Aim of intervention	Outcome measure	Main findings
<b>Rouaix 2017</b> <b>QA: Medium quality</b> <b>GRADE: BPSD Very-low; Psychosocial Low</b>	Before-and-after	France People with dementia Mean age 86. Age range 68-92 7 women, 2 men	9	Investigate the use of a humanoid robot in a psychomotor therapy for people with dementia	Mini Mental State Examination (MMSE), Neuropsychiatric Inventory-Nursing team version (NPI-ES), Self-Identity Questionnaire (SQI), International Positive and Negative Affect Schedule Short-Form (I-PANAS-SF), Instant Assessment of Wellbeing Tool (EVIBE), Menorah Park Engagement Scale (MPES). Two adaptations were made to the MPES for the present study: (a) a “robot engagement” category was created to specify participants’	Results showed a high constructive engagement in both CT and RAT sessions. More positive emotional responses in participants were observed in RAT compared to CT. RAT sessions were better appreciated than CT sessions. The use of a social robot as a mediating tool appeared to promote the involvement of PwD in the therapeutic intervention increasing their immediate wellbeing and satisfaction.

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<b>Participant, QA, GRADE</b>	<b>Design</b>	<b>Country &amp; participant characteristics</b>	<b><i>n</i></b>	<b>Aim of intervention</b>	<b>Outcome measure</b>	<b>Main findings</b>
						<hr/> <p>emotional and behavioural responses denoting an exclusive engagement toward the robot, (b) an “at ease/relaxed” category was added to the emotional engagement dimension in order to take into account the flat affect and limited facial emotion responses commonly observed in people with dementia. Additionally, two Visual Analogic Scale (VAS) were built to assess the satisfaction of participants regarding each therapy session.</p> <hr/>

Par r, QA, GRADE	Design	Country & participant characteristics	<i>n</i>	Aim of intervention	Outcome measure	Main findings
<b>Sampson 2017</b> <b>QA: High quality</b> <b>GRADE: Low</b>	Before-and-after	UK Majority between 25 and 54 years. Healthcare professionals 81% female 27 (87%) caucasian	456	To evaluate the impact of a system wide training program in dementia care for acute hospital staff.	Number of and types of staff trained, changes in dementia care practice before-and-after training, staff's sense of competency in dementia care (SCIDS). Person, Interactions, and Environment (PIE) qualitative tool: culture of care experienced by PwD in acute hospitals (qualitative data). Evaluation of training.	There was a significant improvement in staff's sense of competence in dementia care and the quality of interactions with patients. More hospitals adopted person centred tools and pathways.

Par r, QA, GRADE	Design	Country & participant characteristics	<i>n</i>	Aim of intervention	Outcome measure	Main findings
		4 (13%) other				
Scerri 2016 QA: Medium quality GRADE: Low	Intervention development and evaluation	Canada Not reported	68	The aim of the study was to determine how person-centred dementia care can be implemented in two hospital wards using an Appreciative Inquiry (AI) approach.	Number of staff who participated in workshops, staff reaction to workshops, and quality of care using dementia care mapping.	A dementia-specific A, was successful in introducing specialized training for multidisciplinary staff employed in an acute care hospital in Ontario, Canada. This study determined that GPA addressed the concerns expressed by staff and provided the needed knowledge and skills to manage NDB with more dignity and compassion, and in a person-centered fashion that supports the organization's obligation to provide an excellent

Par r, QA, GRADE	Design	Country & participant characteristics	<i>n</i>	Aim of intervention	Outcome measure	Main findings
Schmidl-Martin 2016 QA: High quality GRADE: Low	Nonrandomized controlled, repeated-measures research design	Canada Healthcare professional Majority female	745	This study was designed to investigate the impact of the Gentle Persuasive Approaches (GPA) education program on acute care staff's SE related to delivery of person-centered dementia care.	The primary staff outcome measure was an SE in dementia care tool, the Self-Perceived Behavioural Management Self-Efficacy Profile (SBMSEP) and qualitative analyses of open ended questions.	patient experience for the community they serve.  The intervention group demonstrated significant improvement in self-efficacy scores from baseline to immediately post intervention ( $p < .001$ ), sustained at 8 weeks. There were no changes from baseline to 8 weeks post intervention evident in the wait-listed group ( $p = .21$ ). Intervention group participants described positive impacts including

Author, QA, GRADE	Design	Country & participant characteristics	<i>n</i>	Aim of intervention	Outcome measure	Main findings
						implementation of person-centered care approaches.
Smythe 2014 QA: Poor quality GRADE: Low	Mixed methods pilot and evaluation pre-post design	UK  Not stated	66	The aim of the project was to develop, pilot and evaluate a brief psychosocial training intervention (BPTI) for staff working with people with dementia in an acute hospital setting.	Inventory of Geriatric Nurse Self-Efficacy. The Approaches to Dementia Questionnaire (ADQ). The Maslach Burnout Inventory (MBI). The Alzheimer's Disease Knowledge Scale (ADKS).	Definitive conclusions cannot be drawn about the efficacy of the intervention, due to the contradictory outcomes between the quantitative and qualitative data. Further developments and research are required to explore how staff and organisations can be supported to deliver the best possible care.

Par r, QA, GRADE	Design	Country & participant characteristics	<i>n</i>	Aim of intervention	Outcome measure	Main findings
<b>Staal 2007</b>  <b>QA: Poor quality</b>  <b>GRADE: Very-low</b>	RCT	USA  People with dementia  Age mean (SD)  MSBT group: 80.33 (1.59) control group: 72.00 (0.84).  8 males and 16 females	24	To assess whether a combined treatment comprised of standard psychiatric inpatient care and a non-pharmacological intervention, multi-sensory behaviour therapy (MSBT), reduces agitation and apathy and improves ADLs in people with dementia on an	The Global Deterioration Scale (GDS) determined stage of illness.  The Pittsburgh Agitation Scale (PAS) assessed agitation.  The Scale for the Assessment of Negative Symptoms in Alzheimer's Disease (SANS-AD) measured negative symptoms in patients with dementia. The Katz Index of Activities of Daily Living (KI-ADL) assessed bathing, dressing, toileting, transfer, continence, and feeding.  The Refined Activities of Daily	Over the course of six sessions of intervention, both the MSBT group and control group had reduced agitation. Nevertheless, the MSBT group demonstrated higher decreases in agitation than the control comparison group. Improvement by both groups may reflect the efficacy of psychiatric inpatient care. However, it appears that the combination of pharmacological treatment and MSBT may reduce levels of agitation more than standard treatment alone. Behavioural

<b>Par r, QA, GRADE</b>	<b>Design</b>	<b>Country &amp; participant characteristics</b>	<b><i>n</i></b>	<b>Aim of intervention</b>	<b>Outcome measure</b>	<b>Main findings</b>
				acute care psychiatric hospital unit compared to standard psychiatric inpatient care alone.	Living Assessment Scale (RADL) assesses ADLs. The Beck Dressing Performance Scale BDP measures dressing ability. The Mini Mental Status Exam (MMSE) is an instrument for screening gross cognitive functioning.	interventions, Strategies for Promoting Independence of ADLs (SPID) has had relative success increasing independence of ADLs in people with dementia. MSBT used in conjunction with SPID may provide a comprehensive behavioural treatment for increasing ADL independence.
<b>Stenvall 2012</b>	Secondary analysis of RCT	Sweden	101	To investigate whether a multidisciplinary	Complications during inpatient stay, length of hospital stay, drugs prescribed at discharge. Clinical	There were fewer postoperative complications in the intervention

Par r, QA, GRADE	Design	Country & participant characteristics	<i>n</i>	Aim of intervention	Outcome measure	Main findings
QA: Poor quality GRADE: Clinical Low; Length of stay Low		<p>People with dementia</p> <p>Age mean (SD) Intervention: 81.0 (5.8) control 83.2: (6.4)</p> <p>47 females, 17 males.</p>		<p>postoperative intervention program could reduce postoperative complications and improve functional recovery among people with dementia.</p>	<p>Outcome Variables (S-COVS). The functional performance of ADL was measured using the Staircase of ADL including the Katz ADL index.</p>	<p>group such as urinary tract infections, <math>p = 0.001</math>;</p> <p>Nutritional problems, <math>p = 0.025</math>; postoperative delirium, <math>p = 0.002</math>; falls, <math>p = 0.006</math>. At 4 months a larger proportion in the intervention group had regained their previous independent indoor walking ability performance, <math>p = 0.005</math>. At 12 months a larger proportion in the intervention group had regained the activities of daily living (ADL) performance level they had before the fracture, <math>p = 0.027</math>.</p>

Par r, QA, GRADE	Design	Country & participant characteristics	<i>n</i>	Aim of intervention	Outcome measure	Main findings
Surr 2016 QA: High quality GRADE: Low	Repeated measures study	UK Healthcare professionals 100% female	40	Evaluate the efficacy of a specialist training programme for acute hospital staff regarding improving attitudes, satisfaction and feelings of caring efficacy, in provision of care to people with dementia.	Approaches to Dementia Questionnaire (ADQ) Staff Experience of Working with Demented Residents Scale (SEWDR).Caring Efficacy Scale (CES).	The training programme was effective in producing a significant positive change on all three outcome measures following intermediate training compared to baseline. A significant positive effect was found on the ADQ between baseline and after completion of Foundation level training, but not for either of the other measures.

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<b>Author, QA, GRADE</b>	<b>Design</b>	<b>Country &amp; participant characteristics</b>	<b><i>n</i></b>	<b>Aim of intervention</b>	<b>Outcome measure</b>	<b>Main findings</b>
<b>Weitzel 2011</b> <b>QA: Medium quality</b> <b>GRADE: Low</b>	Pre-post observational pilot study	USA Not stated	166	Describe a hospital-wide educational program developed to address proper communication techniques to use with older adults with dementia.	Communication techniques were in a present/absent format.	The educational program did have a positive impact. Healthcare workers are using six of the seven appropriate communication techniques more frequently. More staff ask permission to examine or perform a procedure and thank the elder when the task is completed. These communication techniques convey respect and should be used with all elders.

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Table 2 Studies described by outcome

Outcome of interest	Outcome of interest and number of times present	Number of studies	Evidence of effectiveness on outcome	Ineffective/inconclusive effect on outcome
BPSD	NPI =1, PAS =1, SANS-AD=1	3	<p><i>Rouaix 2017</i>: The levels of Constructive Engagement in Robot Assisted Therapy sessions and the severity of neuropsychiatric symptoms were positively correlated (<math>r = 0.68, p &lt; 0.05</math>), showing that presenting behavioural symptoms responded well to RAT.</p> <p><i>Staal 2007</i>: Multi Sensory Behaviour Therapy group improved significantly in levels of agitation (PAS) compared to the control group (<math>F(6, 120) = 3.56, p = 0.003</math>). The MSBT group significantly improved in level of apathy (SANS-AD) compared to the control group (<math>F(1, 20) = 4.47, p = 0.04</math>). Repeated measure analysis revealed a significant</p>	<p><i>Blair 2018</i>: No differences between control and the Person Centred Volunteer Group in mean number of behavioural incidents per day (<math>z = 1.725, p = 0.084</math>).</p>

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			interaction; only participants in the MSBT treatment group experienced improvement in apathy from baseline to session six $F(6, 120) = 3.15, p = 0.01$ ).	
Psychosocial	PwD (I-PANAS-SF=1, EVIBE =1), caregiver (HADS-A=1, HADS-D =1, Mutuality scale= 1, Modified Caregiver Strain Index (CSI)= 1, Observed Emotion Rating	3	<p><i>Cheong 2014:</i> Positive OERS (pleasure and general alertness) had higher occurrences during the Creative Music Therapy sessions (days 2 and 3; mean = 3.12) compared to before-and-after CMT (mean = 0.68, <math>Z = 3.188, p = 0.01</math>).</p> <p><i>Daykin 2018:</i> All 20 participants' Artsobs (Arts Observational Scale, measuring mood distraction and relaxation)scores increased by the end of each Music Therapy session (average 1.6 points), with no decreases recorded, and several participants at the end of the session appeared happy and excited. The ArtsObs data also show that the observed effects on</p>	<p><i>Rouaix 2017:</i> I-PANAS-SF only collected at baseline. EVIBE scores did not show a significant difference between control Robot Assisted Therapy.</p>

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	Scale (OERS) =1, artsobs =1, culture of care=1)	relaxation, distraction, engagement and agitation were consistently positive.	
Clinical	Falls/gait/balance=4, 5 Number of admissions=2, ADL (BHARTEL=2, Tinetti=2, KI- ADL=2, RADL=1,BPD=1), delirium=2, pain and distress=1, complications during an inpatient stay=1, Withdrawal	<i>Blair 2018</i> : 28-day readmission rates for the intervention group (8.6%) were significantly lower than the control group (17.0%; $\chi^2 (1, n = 457) = 7.501, p = 0.006$ ).  <i>Boltz 2015</i> : People with dementia who participated in family centred function focused care demonstrated better ADL performance (F [2.0] = 4.2; $p = 0.02$ , partial $\eta^2 = 0.08$ ), with improvement evident at 2 months after discharge. Mean walking performance differed significantly between intervention arms (F [2.5] = 6.1; $p = 0.001$ , partial $\eta^2 = 0.11$ ); Fam-FFC elicited less decrease in walking performance at 2 months post-discharge.	<i>Blair 2018</i> : Mann-Whitney <i>U</i> -test indicated that there were no statistically significant differences between groups (control & person-centered volunteer program) in the number of falls per day ( $z = 0.430, p = 0.667$ ).

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from artificial hydration and/or nutrition (AHN) =1, survival independent of AHN at 1 year after recovery from ESDED = 1, overall survival= 1, recovery rate AHN.

*Rosler 2012:* The increase of the Tinetti and Barthel scores was significantly higher in the patients in the cognitive geriatric unit compared to treatment intervention (Fam-FFC) as usual.

Boltz 2015: There was no significant effect of the intervention on Tinetti Gait and Balance (F [2.4] = 0.9;  $p = 0.79$ ).

*Stenvall 2012:* Significantly fewer falls ( $p = 0.006$ ), and fewer postoperative complications in the multidisciplinary postoperative intervention group such as urinary tract infections,  $p = 0.001$ ; nutritional problems,  $p = 0.025$ ; postoperative delirium,  $p = 0.002$ ; compared to control. There was no difference between the groups regarding readmissions within 30 days, 0 vs. 2 for the intervention and control groups, respectively,  $p = 0.497$ .

*Arahata 2017:* No significant difference between the two groups (Comprehensive Geriatric Assessment and control) was found for 1-year overall survival (37% vs. 28%, respectively,  $p = 0.08$ ).

*Arahata 2017:* Recovery rate from ESDED in the intervention group (Comprehensive Geriatric Assessment) was significantly higher than that in the historical group (51% vs. 34%, respectively,  $p = 0.02$ ). The 1-year AHN-free survival in the intervention group (CGA) was significantly

			higher than that in the historical group (28% vs. 15%, respectively, $p = 0.01$ ).	
Staff education/knowledge	CODE= 2, KIDE= 1, controllability belief =1, ADKS =2, SCIDS =2, DK20 =1, SBMSEP =1, Inventory of geriatric nurse self-efficacy =1, ADQ =2, MBI =1, CES =1, SEWDR=1, identifying PCC=1, identifying behaviours =2, communication techniques =2, dementia knowledge test=2, strategies to	14	<p><i>Elvish 2014</i>: Statistically significant change was identified pre–post training (Getting to Know Me training) on the CODE (<math>z = 4.81 p &lt; 0.001</math>, with effect size <math>r = -0.44</math>), and the KIDE (<math>z = 6.13 p &lt; 0.001</math> (Wilcoxon), with effect size <math>r = -0.56</math>). Clinically meaningful change was demonstrated on the CODE scale but not the KIDE.</p> <p><i>Elvish 2018</i>: Statistically significant change was identified between pre–post training (getting to Know Me training) on all outcome measures (Confidence in Dementia: eight- point increase, <math>p &lt; 0.001</math>; Knowledge in Dementia: two-point increase <math>p &lt; 0.001</math>; controllability beliefs scale: four-point decrease, <math>p &lt; 0.001</math>).</p> <p><i>Evans 2015</i>: Project teams showed an average increase of 45% in their overall SPACE scores between June 2013 and January 2014. The increase in scores on each of the five SPACE principles was statistically significant.</p>	<p><i>Hobday (2017)</i>: Appears to be an improvement on ADKS score post-intervention (CARES Dementia-Friendly Hospital Training), however no statistical analyses were performed.</p> <p><i>Naughton 2018</i>: No statistically different change on the SCIDS or DK20 between control and intervention (communication training plus older adult unit placement).</p>

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improve the hospital environment, patient safety=1, dementia care mapping=1, SPACE principles=1

*Schindel Martin 2016:* The intervention group (Gentle Persuasive Approach Education Programme) demonstrated significant improvement in self-efficacy scores (SBMSE) from baseline to immediately post intervention ( $p < .001$ ), sustained at 8 weeks.

*Surr 2016:* A significant positive effect was found on the ADQ between pre and post intervention (training regarding improving attitudes satisfaction, satisfaction & feelings of caring efficacy, in provision of care of people with dementia).

*Pfeifer 2018:* significant increase in the nursing assistant's ability to identify behaviours (training involved providing care & managing BPSD) associated with dementia ( $\mu D = 0.84687$ ,  $t(430) = 22.791$ ,  $p < .001$ , 95%CI [0.77383, 0.91990]). Results also showed a statistically significant change in nursing assistant's " perceived ability to use different methods to communicate with patients who have dementia ( $\mu D = 1.05361$ ,  $t(428) = 26.614$ ,  $p < .001$ , 95% CI [0.97580, 1.13143]). Statistically significant change in Nursing assistant's perceived ability to manage situations in which a person with dementia becomes agitated ( $\mu D = 1.04884$ ,  $t(429) = 26.454$ ,  $p < .001$ , 95% CI [0.97091, 1.12676]).

*Smythe 2014:* Do not report conclusive data regarding Inventory of geriatric nurse self-efficacy, ADKS, MBI and the ADQ during the brief psychosocial training intervention.

*Surr 2016:* No significant difference was found between intervention (training regarding improving attitudes satisfaction, satisfaction & feelings of caring efficacy, in provision of care of people with dementia) and control

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*Weitzel 2011*: Appropriate communication techniques improved significantly in the intervention group (communication technique training) including; address the patient as Mr, Mrs, Miss, asked permission to examine the elder/perform procedure, used simple direct wording, used reminiscence, thanked the elder when the task was completed.

*Naughton 2018*: In the intervention group (communication training & older adult unit placement), participants were significantly more likely to identify PC responses with a mean score of 10.5 (SD 3.0) compared with 7.5 (SD 3.0) in the control group ( $p=0.006$ ).

*O'brien 2018*: Healthcare professionals following communication training increased their knowledge of dementia communication (mean improvement 1.5/10; 95% confidence interval  $1.0 \pm 2.0$ ;  $p < 0.001$ ).

groups for CES and SEWDR.

*Weitzel 2011*; (communication technique training): Appropriate communication techniques including; identified himself/herself, explained what he/she was going to do, talked in a warm/pleasant manner did not significantly improve after the intervention. Use of inappropriate communication techniques such as addressed elder by first

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Confidence in dementia (CODE) communication also increased (mean improvement 5.5/45; 95% confidence interval 4.1± 6.9;  $p < 0.001$ )

*Galvin 2010:* (unvalidated questionnaires): Upon completion, there were significant gains ( $p < .001$ ) in knowledge and confidence in recognizing, assessing and managing dementia following intervention (Dementia - Friendly Hospitals: Care not Crises). Attendees reported gains in communication skills and strategies to improve the hospital environment, patient safety, and behavioural management.

*Sampson 2017:* SCIDS increased significantly between pre-training and three month follow-up, by 7.01 points ( $p < 0.001$ ). There was a significant improvement from pre-training to three month follow-up on each of the four subscales: the largest on the 'building relationships' subscale with an increase of 2.17 (95% CI: 1.82, 2.52); on the 'sustaining personhood' subscale, there was an increase of 1.76 (95% CI: 1.44, 2.09); on the 'care challenges' subscale, there was an increase of 1.63 (95% CI: 1.26, 2.01);

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name, talked in loud voice, told elder what he or she could not do, asked a lot of questions which relied on memory, and used reality orientation did not significantly improve after the intervention.

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and the smallest increase was seen on the ‘professionalism’ subscale with an increase of 1.31 (95% CI: 0.97, 1.65).

Scerri (2016): Appreciative Enquiry workshops were implemented to improve levels of person centred care. Data were analysed using staff questionnaires, thematic analysis of staff interviews and dementia care mapping. The workshops were positively accepted by hospital staff and helped them to reflect about how to work in a more person-centred way and to develop action plans in order to improve the quality of care.

Length of stay      Length of stay=4      4

*Stenvall 2012:* The length of the postoperative in-hospital stay, including rehabilitation, was  $20.0 \pm 12.0$  days in the intervention group (multidisciplinary

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postoperative program) compared to  $32.1 \pm 35.3$  days in the control group,  $p = 0.059$ . During the year after the femoral neck fracture the mean length of hospital stay (including both the in-hospital stay in connection with the fracture itself and any further in-hospital stays after discharge) was  $23.8 \pm 16.5$  days vs.  $41.3 \pm 57.3$  days for the intervention and control groups, respectively,  $p = 0.088$ .

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*Daykin 2018:* During the music intervention period, time B, there was a 6.2% reduction in the average length of stay and a 9.84% increase in the overall number of discharges compared with time A, where there was no music activity.

*Rosler 2012:* The length of stay was longer for patients on the Cognitive Geriatric Unit (intervention group) than patients on the non-CGU ward ( $19.9 \pm 4.9$  vs.  $17.7$

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$\pm 4.7$  days ( $t(94) = -2.188, p = 0.031$ ).

*Blair 2018*: The intervention group (person- centred volunteer) had a statistically significantly longer LOS than the control group ( $z = 3.22, p = 0.001, d = 0.30$ ).

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