Evidence review: Anticipatory care interventions for adults with case complexity

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1 Executive Summary

1.1 Introduction

This rapid review addresses the following question:

Which anticipatory care interventions have shown improvements in quality of life and/or reduced health care utilisation for the proactive management of patients with case complexity?

Anticipatory care helps people to live well and independently for longer through proactive care for those at high risk of unwarranted health outcomes. It focuses on groups of patients with complex needs who have similar characteristics and will be offered proactive care interventions to improve or sustain their health and reduce their need for reactive health care (NHS England and NHS Improvement, 2019).

This review has been conducted using a standard rapid review methodology, with a search for papers published between 1st January 2015 and 12th March 2020. It includes 56 papers, of which 14 are systematic reviews (SRs) and 42 are reports of randomised (RCTs) or quasi-randomised trials. Each has been categorised according to the intervention type and population group included in the studies reported. Five of the SRs include interventions for more than one intervention/population combination, each of which has been presented separately in these results. Evidence from all papers included, including a brief quality assessment of each study, has been recorded in evidence summary tables which are grouped by the intervention and population categories.

The majority of studies relate to elderly people with case complexity due to frailty, pre-frailty and/or multimorbidity. Others include subjects with health conditions which are often associated with complex problems or which may require co-ordinated or multiprofessional approaches to care such as heart failure, dementia or serious mental illness.

Interventions in the included studies include needs assessment and care planning, and case management or care co-ordination approaches. Others target areas such as physical activity, nutrition, cognition or polypharmacy, both singly and in various combinations. Other interventions aim to improve capabilities or function, or are targeted at outcomes for people with particular complex conditions. None of the studies referred to implementation within integrated care systems. Several referred to what they were doing as integrated care (Spoorenberg et al 2018; Di Pollina et al, 2017; Parsons et al 2017; Looman et al 2016; Hernandez et al 2015;), by which they generally meant a multiprofessional and/or multiagency approach that was patient-centred around individual needs, but not an integrated system.

Outcomes reported in this review include measures of resource utilisation such as healthcare use, admissions to hospital or institutional care, and medication use. Other outcomes include quality of life (QOL) and measures where improvements might be expected to improve QOL, such as activities of daily living (ADL), falls and frailty. Measures of specific abilities such as walking distance or muscle strength and of health outcomes

relating to particular conditions have not been included where there is no clear indication of the impact on an individual's overall quality of life or ability to function.

1.2 Assessment, care planning and/or case management approaches

There were mixed findings on the impact of **assessment approaches** which may have included care planning but did not include case management. One meta-analysis (MA) of three RCTs which were considered to be of medium or high quality found improvements in frailty measures at the end of assessment and care planning interventions for frail or pre-frail elderly people (Macdonald et al, 2020). One small RCT of assessments with some further input at home by a Mobile Geriatric Team did not find reductions in healthcare contacts (Fristedt et al, 2019) while another of nurse home assessments found improvements in frailty (Apostolo et al, 2018). A Community Geriatrics Unit providing home assessments and access to emergency support if needed was found to be linked to reductions in hospitalisations and emergency room visits but not reductions in institutionalisation, but this evaluation was not methodologically robust (Di Pollina et al, 2017). Three studies, which ranged from good to poor quality, of assessment of elderly people after discharge from hospital found no reductions in healthcare use or improvements in QOL or ADL (Lembeck et al, 2019; Røsstad et al, 2017; Thygesen et al, 2015).

Outcomes of **case management** (CM) for elderly people living in any community setting were also mixed. A well-conducted MA of up to six RCTs of CM approaches in frail elderly people found no differences in hospitalisation, institutionalisation or accidental falls, although follow-up time periods for these outcomes were not clear (van der Elst et al, 2019). One individual RCT of a multidisciplinary approach with assessment and CM found improvements in frailty scores at 12-month follow-up, while another of a multidisciplinary CM intervention did not (Apostolo et al, 2018). A large multicentre European study found a CM approach improved recurrent falls and QOL, ADL and frailty scores but it had significant methodological problems (Franse et al, 2018). A study based in UK primary care of a CM approach (including support for self-management) for adults with multimorbidity found improvements in some but not all measures of wellbeing and health-related QOL (HRQOL) at 12 months (Mercer et al, 2016). This appeared to be a reasonably well-conducted RCT which was carried out in Glasgow.

Two RCTs of CM approaches based in GP practices did not find improvements in any ADL, QOL or frailty measures (Spoorenberg et al, 2018; Looman et al, 2016), and an RCT of an Ambulatory Geriatrics Unit which appeared to take a CM approach found reductions in days in hospital but no differences in total care costs between intervention and usual care groups (Ekdahl et al, 2017).

Four studies, two of which appeared to be of reasonably good quality, which included elderly people living in their own homes receiving CM approaches found no improvements in any of the QOL, ADL or care utilisation outcomes measured compared with usual care (Parsons et al, 2017; Suijker et al, 2016; Ruikes et al, 2016; Godwin et al, 2016).

Community-dwelling elderly people with dementia receiving CM had reductions in admissions to nursing or residential home at six and 18-month follow-up, but not at 12 months or longer-term, in a well-conducted SRMA of up to nine RCTs (Reilly et al, 2017).

They had a small but statistically significant increase in days in hospital at six months but not in the longer term, and no differences in measures of QOL or function at two years compared with controls. In another well-conducted SRMA, intensive CM for people with serious mental illness (SMI) was found to reduce days spent in hospital at two years compared with those receiving usual care without CM, but there was no difference in measures of QOL and the evidence was considered of low quality (Dieterich et al, 2017).

For frail elderly people living in, or receiving services from, residential care homes, an **Advance Care Planning** intervention including facilitated conversations and preparation of an Advance Directive did not make any difference to the amount or costs of medical care used over one year (Overbeek et al, 2019).

1.3 Reablement and/or Occupational Therapy

There was evidence of limited reliability suggesting that **reablement** for elderly people with poor physical or mental health might improve ADL (Cochrane et al, 2016). There was no evidence that adding an Occupational Therapy (OT) intervention to reablement was beneficial (Whitehead et al, 2016). Improvements in ADL scores were found following **multidisciplinary interventions including OT** for physically frail elderly people, in a moderately well conducted SRMA of six RCTs (De Coninck et al, 2017), and also in one RCT of an OT-delivered intervention that included skills training and provision of assistive devices for frail or pre-frail older people (Apostolo et al, 2018).

1.4 Single interventions involving exercise, medication review or psychological approaches

A number of studies evaluated single interventions. In one reasonably well conducted SRMA, **exercise** interventions for frail elderly people, alone or in combination with other interventions, were found to improve measures of ADL (Zhang et al, 2019) while in another exercise interventions for pre-frail or mildly frail elderly did not (Frost et al, 2017). One RCT of exercise for frail older people found a reduction in accidental falls (van der Elst et al, 2019), and another of an exercise programme for elderly nursing home residents found less deterioration in ADL than in a control group (Lozano-Montoya et al, 2017), but both these were very small studies with limited details about the intervention or study quality. Self-directed exercise for elderly people did not reduce falls or fall injuries, regardless of whether the exercise group also had motivational interviewing (Tuvemo Johnson et al, 2020).

Monthly coaching for 18 months by a physiotherapist in addition to usual care for people with a recent stroke did not appear to be beneficial compared with usual care alone (weekly physiotherapy for at least three months) in a well-conducted RCT (Askim et al, 2018). For elderly people with dementia, a one-year supervised exercise programme for people living in their own homes led to significantly fewer falls, although the methodology of this study was incompletely described (Roitto et al, 2018), while a four-month exercise intervention in nursing homes appeared to have reduced moderate or serious injuries resulting from falls one year later but not the overall numbers falling (Toots et al, 2018). For community-dwelling elderly people with a history of falls, no convincing evidence was found that physical activity programmes, including both supervised and self-directed exercise, reduced their fall risk (Matchar et al, 2017; Fahlström et al, 2018; Siegrist et al, 2016). One physical activity

intervention found a reduction in falls resulting in injury (Matchar et al, 2017) but this intervention was found not to be cost-effective (Matchar et al, 2019).

Three studies evaluated **medication review** for community-dwelling elderly people. In one a multiprofessional team made recommendations on medication changes to the patients' own physicians but there were no reductions in the number of medications or the number of harmful medications used 12 months later (Toivo et al, 2019). Older people with polypharmacy recently discharged from hospital who had medication review based on pharmacogenetic testing with computerised clinical decision support had fewer hospital admissions and Emergency Room visits at 60 days than a group who had medication review based on drug interactions only (Elliott et al, 2017). Older people with polypharmacy who had clinical medication review, a care plan and follow-up by community pharmacists were reported to be taking fewer long-term medications per month after the intervention, but the impact on HRQOL was unclear (Verdoorn et al, 2019). While these studies took different approaches, it is notable that where there were positive findings there was more evidence of implementation of recommendations or arrangements for follow-up following medication review.

For community-dwelling elderly people with a history of falls, a medication review targeting fall-risk-increasing drugs was not found to reduce their fall risk (Boyé et al, 2016). Two studies evaluated medication review for elderly people in long-term care. In one, individual clinician-led medication review reduced the number of medicines being taken at up to 12-month follow-up, but there was no impact on healthcare use or QOL measures (Potter et al, 2016). In the other, medication review using a software package which identified potentially problematic medications had no impact on hospital admissions (Woodhouse et al, 2019).

A small RCT of a six-month **behaviour change** intervention focusing on mobility, nutrition, psychological well-being and socialising for community-dwelling frail or pre-frail elderly found significant improvements in ADL in the intervention group, but no significant differences in falls, frailty or QOL measures (Walters et al, 2018). One small RCT of a psychosocial intervention (van der Elst et al, 2019) and one of a problem-solving intervention (Apostolo et al, 2018) did not find any benefits.

1.5 Combined interventions involving exercise, nutrition, medication review, psychological or social approaches

A number of studies evaluated various combinations of interventions. Studies of combined **physical activity and nutrition** interventions for frail or pre-frail older people, including one well-conducted SRMA of four RCTs, generally found improvements in frailty scores after the intervention (Macdonald et al, 2020; Apostolo et al, 2018; Hsieh et al, 2019). There were limited details about the nature of some of the physical activity and nutrition interventions.

One study of a combined **exercise and cognitive** intervention (a 12-week programme of twice weekly group exercise, computer-assisted cognitive training and board games) for relatively young (mean age 62 years) pre-frail older people was found to improve frailty scores at the end of the intervention compared with a control group (Yu et al, 2020). However there was no conclusive evidence that combined **physical activity, nutrition and cognitive/ psychological** support interventions improved outcomes. A large study of a

three-year intervention including physical activity advice, nutrition advice and a cognitive intervention with or without omega-3 supplements for frail and pre-frail elderly people only found improvements in frailty scores in the intervention group on secondary analyses including those who were non-frail at 12 months, or depending on the threshold used to define frailty in the Frailty Index used (Guerville et al, 2019; De Souto Barreto et al, 2018).

One study of a six-week **exercise, nutrition supplement, cognitive and medication review** intervention for frail and pre-frail elderly people found a significant improvement in the number of drugs being taken compared with the control group at 18 months (Romera-Liebana et al, 2018). There were limited details about the medication review and no relevant outcomes reported relating to other aspects of the intervention. A study of a 12-week **physical training, social skills training, nutrition education and medication review** intervention for frail or pre-frail elderly people found no statistically significant differences in measures of ADL, QOL, frailty or healthcare consumption at up to 12 months follow-up, although this study had a number of methodological problems (van Lieshout et al, 2018). One further study of a six-month **self-directed exercise, nutrition education, medication review and social circumstances review** intervention for pre-frail elderly people found significantly better ADL scores and less progression to frailty in the intervention group compared with controls at 12-month follow-up, but no difference in Instrumental ADL scores (Gene Huguet et al, 2018). This was a small RCT which appears to have been only moderately well conducted and was not clearly reported.

1.6 Other interventions

One large well-conducted SRMA (Inglis et al, 2015) and two individual RCTs (Pedone et al, 2015; Bekelman et al, 2015) evaluated interventions which included various types of **telemonitoring or telephone support for patients with heart failure**. While there was evidence that it might reduce some hospital admissions, the findings were mixed and generally the evidence was not of good quality

One SRMA of three RCTs found no significant differences in institutionalisation for frail older people receiving **information** interventions, compared with usual care (van der Elst et al, 2019). No studies were found suitable for inclusion in a planned SR of **social prescribing** interventions for community dwelling frail elderly people for which the search took place in July 2019 (Smith et al, 2019).

One SRMA and two RCTs considered interventions for people with specific conditions. A SRMA of three RCTs (one of which was UK-based) did not find any significant differences in hospital admissions or bed days or in QOL in people with SMI subject to **compulsory community treatment** compared with those under voluntary treatment (Kisely et al, 2017). Patients with SMI attending a community mental health centre in the USA who had access to a dedicated clinic and staff to help **manage their cardiometabolic risk factors** had significantly greater improvements in measures of health-related QOL, and increases in use of primary care providers and preventive services, at 12 months compared with similar patients who did not have access to such a clinic (Druss et al, 2017). There were no differences between the groups in use of other healthcare services and the authors also reported no differences in most clinical outcomes or quality of care, but the study had some methodological problems.

Patients with clinically stable COPD and recent hospital admissions who had input from a **specialist respiratory nurse** supporting the primary care team over one year had significantly fewer Emergency Department admissions but no difference in hospital admissions compared with a usual care control group (Hernandez et al, 2017). There were no differences in measures of ADL or HRQOL at 12 months, and no difference in hospital admissions six years later.

For elderly people in long-term care, a **staff education** intervention with monthly staff working groups probably reduced hospital admissions of care home residents (Woodhouse et al, 2019). A multicomponent **podiatry** intervention for elderly fallers in care homes reduced falls immediately after the intervention but this was not statistically significant and the difference was not maintained at longer-term follow-up (Wylie et al, 2017).

1.7 Quality issues

Much of the evidence identified for this review was not very robust. While there were several well-conducted SRs, the primary studies included were often of variable quality and some of the SRs provided limited information about the interventions and populations in the included studies. Many of the trials included in this review had methodological problems such as lack of clarity on randomisation procedures, baseline differences between comparison groups, lack of blinding of outcome assessments and large loss to follow-up. Others had incomplete reporting of methodology or results, making it hard to assess the reliability of their findings. A number of studies were small and probably underpowered to detect differences in outcomes. It was often difficult to judge the clinical significance of changes in measures such as frailty or ADL scores. Some studies reported limited outcomes relevant to this review, so no conclusions could be drawn about their impact on areas such as care utilisation because this was not reported.

1.8 Applicability to the UK

Few papers included studies which had been carried out in the UK. A multicentre European study of an assessment and case management approach included subjects from Manchester (Franse et al, 2018) and found improvements in a number of outcomes, but it had significant methodological problems which are likely to have influenced the results. Five UK-based trials were identified; one trial reported an education intervention for care home staff which appeared to reduce hospital admissions (Woodhouse et al, 2019), and a small study of a behaviour change intervention found improvements in ADL but no significant differences in falls, frailty or QOL measures (Walters et al, 2018). A study based in UK primary care of a case management approach for adults with multimorbidity found improvements in some but not all measures of wellbeing and HRQOL at 12 months (Mercer et al, 2016). A small study found no benefit when OT interventions were added to the usual reablement service (Whitehead et al, 2016), and another small study found that a multicomponent podiatry intervention in care homes had no significant impact on falls (Wylie et al, 2017).

Three SRs also reported including UK-based trials. Inglis et al (2015) included up to five studies which were partly or entirely UK-based in their large SRMA of telemonitoring and telephone support interventions which found a positive impact on heart failure-related

admissions but not on all-cause admissions. One UK-based study of compulsory community treatment for people with SMI was included in Kisely et al's (2017) SRMA which found no impact on hospital use or QOL. The large SRMA by Dieterich et al (2017) which reported that intensive CM for people with SMI appeared to reduce hospital use included some trials which were partly or entirely UK-based, but it was unclear how much they contributed to this finding, and not clear how the different care models compare to current NHS care.

The possible applicability of other studies to the UK was variable. While the principles of some approaches such as CM or medication reviews might be generalisable, some were based within specific service settings in other countries which may be very different from UK settings. Interventions such as physical activity or nutrition may have cultural variations which are not directly transferable.

1.9 Conclusions

There is a clear need for more robust evidence on the impact of anticipatory care interventions on the utilisation of care and on outcomes such as ADL and QOL in UK populations. This review included publications since January 2015 only, although earlier studies were included in the SRs. It is possible that a search for earlier publications could yield further evidence, for example if there are SRs for other intervention / population combinations which were published before 2015.

A small number of possibly promising interventions applicable or adaptable to the UK context were identified but there were none with convincing and consistent evidence of effectiveness. Based on the findings of this review, interventions which might be worth exploring further with respect to their impact on care utilisation include various approaches to medication review, education programmes for care home staff, telemonitoring and telephone support approaches in patients with heart failure, assessment and care planning, and intensive CM for people with SMI. Interventions where further evidence on the impact on outcomes such as frailty, ADL or QOL might be sought include assessment or case management approaches, physical activity and nutrition or cognitive training interventions, behaviour change interventions, and reablement. While none of the studies referred to implementation within integrated care systems, many of the interventions would be appropriate for this context, for example those involving multiprofessional or multiorganisation approaches such as assessment and care planning, case management and reablement.

2 Introduction

This review addresses the following question:

Which anticipatory care interventions have shown improvements in quality of life and/or reduced health care utilisation for the proactive management of patients with case complexity?

Anticipatory care helps people to live well and independently for longer through proactive care for those at high risk of unwarranted health outcomes. It focuses on groups of patients with similar characteristics who will be offered proactive care interventions to improve or sustain their health. It aims to benefit patients with complex needs and their carers, to reduce their need for reactive health care, and to deliver better interconnectedness between all parts of the health and care systems (NHS England and NHS Improvement, 2019).

A wide range of groups of the population may benefit from anticipatory care. They may be identified by approaches including validated tools such as measures of frailty, other indicators of need or risk such as multimorbidity or a history of falls, and the professional judgement of people responsible for their care. Anticipatory care potentially encompasses many different types of intervention which may include broad approaches to assessing needs and planning and delivering the interventions required to meet them, or more specific interventions which target particular risks or health problems, singly or in combination.

The definition of anticipatory care used in this review appears to be relatively new and is not addressed by current guidance from NICE or another nationally recognised body. This review has therefore taken a broad approach to definitions of case complexity and anticipatory care interventions with the aim of identifying evidence on a wide range of possible interventions for people who may benefit from them.

3 Methodology

The methodology for this review was agreed between SPH and the NHS England project team. A description of the relevant study type, population, intervention, comparison and outcomes (PICO) to be included was agreed (see section 9 for PICO). The PICO was used to search for relevant publications in Embase, Medline and the Cochrane library (see section 10 for search strategy). The search was for publications between 1st January 2015 and 12th March 2020. The titles and abstracts of the results from the literature searches were assessed using the criteria from the PICO. In addition, titles and abstracts in the literature search carried out by NHS England were also reviewed against the PICO criteria. Full text versions of papers which appeared potentially useful were obtained and reviewed to determine whether they were appropriate for inclusion.

Systematic reviews (SRs) (with or without meta-analysis (MA)) of randomised controlled trials (RCTs) which matched the PICO were selected for inclusion in this review. The most recently published SR for each population group and intervention combination was selected for inclusion. Categories for the population groups and intervention types were defined with reference to the PICO using an iterative process to best fit the studies identified.

RCTs and quasi-randomised trials which matched the PICO were also selected for inclusion in this review. Trials addressing the same population group and intervention combination as one of the included SRs were only included if their publication date was later than the search date of the relevant SR.

Decisions regarding inclusion were made by the lead reviewer with the QA lead reviewing the rationale for inclusions and exclusions and discussing any papers where there was uncertainty. Evidence from all papers included was extracted and recorded in evidence summary tables. The papers were critically appraised and their quality assessed with reference to the Cochrane Collaboration guidance (Higgins et al, 2019). Only the outcomes reported in a SR or trial which are relevant to the PICO have been reported in this review. If relevant data were not included in the main paper but were in supplementary tables which were available online this was included. Where SRs reported information from single studies, this has been included as reported in the SR. Information from individual studies reported in SRs which were also included in a MA included in this review has not been reported separately.

4 Results

The literature search identified 834 papers. On review of abstracts, 145 were identified as possibly meeting the inclusion criteria and the full paper was obtained. After review of the full papers, 55 were selected for inclusion. In addition, 74 abstracts identified in the NHS England literature search were reviewed and after exclusion of those already identified and those that did not meet the PICO, three were identified as possibly meeting the inclusion criteria and one was selected for inclusion after review of the full papers. Of the total of 56 included papers, 14 are systematic reviews (SRs) and 42 are reports of randomised or quasi-randomised trials. Each intervention/ population combination was allocated to a category; five of the SRs included interventions for more than one intervention/ population combination which had been reported separately, each of which has been presented separately in this review.

The scoping table identifying studies by category is shown in section 7. The categories were developed to best fit the studies identified but they are not intended to be definitive and other possible groupings or combinations may be identified with reference to the scoping table and evidence review tables. The majority of studies relate to elderly people with case complexity due to frailty, pre-frailty and/or multimorbidity. Because there was considerable overlap between the definitions used in many of the studies, these are combined as single categories but split by setting in the community (where this was identified). A further category includes subjects who were not defined as having frailty or multimorbidity but had health conditions or risk factors which are often associated with complex problems or which may require co-ordinated or multiprofessional approaches to care such as heart failure, dementia or serious mental illness.

Intervention categories include needs assessment and care planning, case management or care co-ordination approaches. Others aimed to reduce risk and improve health through interventions targeted at areas such as nutrition, physical activity or cognition or through medication reviews, both singly and in various combinations. Other interventions aimed to

improve outcomes for people with particular complex conditions. Outcomes reported in this review include measures of resource utilisation such as healthcare use, admissions to hospital or institutional care, and medication use. Other outcomes include quality of life (QOL) and measures where improvements might be expected to improve QOL such as activities of daily living (ADL), falls and frailty. Measures of specific abilities such as walking distance or muscle strength and of health outcomes relating to particular conditions have not been included where there is no indication of the impact on an individual's overall quality of life or ability to function.

The evidence summary tables with details of all included studies are in section 8. The key findings for studies in each category are summarised below; further details of study subjects, interventions, methodology, findings and brief quality appraisal can be found in the evidence summary tables.

4.1 Assessment, with or without follow-up care but without case management (CM)

4.1.1 Community dwelling frail or pre-frail elderly (any setting or not stated): assessment with care plan, without CM

Macdonald et al (2020) carried out a meta-analysis (MA) of three RCTs of comprehensive geriatric assessment (CGA) approaches with frail or pre-frail elderly people in community settings. CGA was not defined but examples given included multiprofessional team involvement and care tailored to individual needs, but it did not include case management (CM) approaches. The RCTs were considered to be of good or high quality and the MA found a significant improvement in measures of frailty (based on the Fried criteria) immediately after the intervention. A small RCT of a Mobile Geriatric Team which carried out CGA and care planning at home visits for frail elderly people found no overall reduction in healthcare contacts at 12-month follow-up compared with usual care (Fristedt et al, 2019). A SR by Apostolo et al (2018) included one small RCT of nurse home visits with assessment, care planning and provision of an alert button which found significant improvements in frailty prevalence at nine months compared with the control group.

4.1.2 Community dwelling frail or pre-frail elderly (setting not stated): Community Geriatrics Unit assessment and access to follow-up

Community-dwelling elderly people with mild, moderate or severe frailty who were receiving home visiting nursing services were included in a RCT of a Community Geriatrics Unit (CGU) in Switzerland (Di Pollina et al, 2017). The CGU carried out assessments at home and made recommendations about further care, and provided some further input as needed, but without CM. At two- and three-year follow-up the intervention group had fewer first hospitalisations and Emergency Room (ER) visits and fewer hospitalisations considered unnecessary, but there was no difference in rates of institutionalisation. This study had a number of methodological problems and the generalisability of this approach to the UK is unclear.

4.1.3 *Community dwelling elderly with recent hospital discharge (setting not stated or own home): assessment*

Three studies considered approaches to the assessment of elderly people recently discharged from hospital into the community. Lembeck et al (2019) evaluated single home assessments by nurses with referrals or further advice sought if needed for elderly patients with multiple health or social problems discharged from hospital to the community. This appeared to be a well-conducted RCT and they found no difference in hospital readmissions or use of GP or municipal services for up to 180 days after discharge, compared with those receiving usual care. Elderly patients discharged from hospital to their own home, in some cases via rehabilitation or nursing home (for less than four weeks), and scheduled to receive homecare, were included in a study by Røsstad et al (2017) evaluating the impact of four scheduled assessment checklists used within the homecare service up to four weeks after discharge. They found no differences in Activities of Daily Living (ADL) or Quality of Life (QOL) outcomes, or in hospital readmissions or care being provided, at up to 12 months follow-up. This study had a number of methodological problems and the checklists were implemented as planned in only a minority of patients.

A home visit and assessment by a municipal nurse and GP within seven days of discharge from hospital to the community for elderly patients with polypharmacy, multimorbidity or a history of frequent hospital admissions was evaluated by Thygesen et al (2015). Following the assessment up to three follow-up home visits were planned if required, but most patients did not receive these. There was no difference between those receiving the intervention or usual care in the number of admissions to hospital up to 180 days after discharge or in length of stay for those admitted. The intervention group had significantly more GP consultations in the first month and received more home care and nursing care.

4.2 Case management approaches

4.2.1 *Community dwelling elderly including frail and non-frail (any setting or setting not stated): case management approaches*

Van der Elst et al (2019) carried out MA of up to six RCTs of CM approaches for frail elderly people. They defined CM as ‘a collaborative process of assessment, planning, facilitation, care coordination, evaluation, and advocacy for options and services to meet an individual’s and family’s comprehensive health needs through communication and available resources to promote quality, cost-effective outcomes’. Interventions had to include at least four of these six elements but there were no further details about individual interventions. Included studies used various definitions of frailty. No statistically significant differences on MA were found in hospitalisation or institutionalisation for the frail older people receiving CM, and there was no reduction in accidental falls in a single RCT of a CM approach. Most studies were assessed as being of medium or high quality but the included subjects and interventions appeared heterogeneous and follow-up time periods were not clear.

The SR by Apostolo et al (2018) of interventions for community-dwelling frail or pre-frail elderly people included one RCT of a multidisciplinary intervention involving assessment and CM, with various interventions such as physical activity, nutrition or medication review. Improvements in frailty scores at 12-month follow-up were reported. Another RCT of a

multidisciplinary intervention with assessment, CM and rehabilitation if required did not find any differences in frailty outcomes at 12 months.

A large multicentre European study with community-dwelling older people, including frail, non-frail and fallers, included subjects from the UK (Manchester) (Franse et al, 2018). The intervention comprised a multidimensional assessment focused on fall risk, polypharmacy, loneliness and frailty, with an agreed care plan which was overseen by a care co-ordinator, including direction to care pathways addressing identified risks if needed. Pooled 12-month outcomes were reported from the five European cities involved. Significantly fewer intervention group subjects had recurrent falls, and they had better QOL and frailty scores than the control group, but there was no difference in the total number who fell. The study population appears to have been heterogeneous, the groups were non-randomised and there were likely causes of bias and confounding which are likely to have influenced the results.

A well-conducted RCT of a case management approach with care by a multidisciplinary team based in GP practices was not found to improve measures of QOL, ADL, frailty, wellbeing, complexity of care needs, or self-management in community-dwelling elderly people at 12 months compared with usual care (Spoorenberg et al, 2018). Another GP practice-based approach using assessment and case management for frail elderly people was also not found to be cost-effective or to improve health-related QOL measures at 12 months, compared with patients in control practices receiving usual care (Looman et al, 2016).

Ekdahl et al (2017) evaluated care provided for elderly people with multimorbidity by an Ambulatory Geriatric Unit (AGU) which appeared to take a CM approach. Over three-year follow-up they found they had reduced hospital care costs but higher costs of visits to physicians and other staff, and no significant difference in nursing home admissions or costs or pharmaceutical, home help or total care costs between the intervention and usual care groups. This appeared to be a well-conducted RCT and the authors also reported a survival benefit for the intervention group but it is unclear how applicable the care model would be to the UK.

4.2.2 Community dwelling frail and pre-frail elderly (living in own home): case management approaches

Four studies included only elderly people living in their own homes receiving CM approaches, and none found improvements in the outcomes measured compared with usual care. One RCT which appeared to be reasonably well conducted found no improvements in ADL, QOL, hospitalisation or falls outcomes in pre-frail older people, assessed at 1 year (Suijker et al, 2016). The three other studies all had more methodological problems; two were with frail elderly people and found no improvements in ADL, QOL or hospital or residential care admissions (Parsons et al, 2017, Ruikes et al, 2016), and the third included ‘old elderly’ and found no significant differences in measures of QOL or healthcare use at one year (Godwin et al, 2016).

4.2.3 Community dwelling older people with dementia: case management

Up to nine RCTs were included in MA of CM approaches for elderly people with dementia living in the community (excluding 24-hour-care residential settings) (Reilly et al, 2015). Admissions to nursing or residential home were significantly lower at six and 18 months but not at 12 months or two years, compared with controls. There was a small but statistically significant increase in days in hospital at six months but not in the longer term, and no differences in measures of QOL or function at two years. The interventions and study populations included in this SRMA appeared to be quite heterogeneous.

4.2.4 Community dwelling people with SMI: intensive case management approaches

People with serious mental illness (SMI) receiving intensive case management (ICM, defined as a caseload of ≤20) spent significantly fewer days in hospital per month compared with those receiving standard care without CM, at up to 24 months follow-up, but the evidence for this was considered of low quality (Dieterich et al, 2017). There were no differences in measures of QOL. There was significant heterogeneity in study subjects and interventions in the RCTs included in this SRMA, and it is not clear how the different care models compare to current NHS care.

4.2.5 Community dwelling adults with multimorbidity: case management approach in primary care

Adults with multimorbidity who received longer primary care consultations, continuity of practitioner, care planning and follow-up, and support for self-management had significant improvements in negative wellbeing scores at 12 months compared with those receiving usual primary care, but no significant differences in other measures of wellbeing (Mercer et al, 2016). There was no significant difference in HRQOL scores at 12 months, but the improvement in HRQOL over time was reported to be statistically significantly better in the intervention group. This appeared to be a reasonably well-conducted RCT which was carried out in Glasgow.

4.3 Advance Care Planning

4.3.1 Frail elderly living in, or receiving services from, residential care homes: Advance Care Planning.

For frail elderly people living in, or receiving services from, residential care homes, an Advance Care Planning intervention including facilitated conversations and preparation of an Advance Directive did not make any difference to the amount or costs of medical care used over one year, in a RCT which had a number of methodological problems (Overbeek et al, 2019).

4.4 Reablement and/or Occupational Therapy (OT)

4.4.1 Community dwelling elderly with poor physical or mental health (living in own home): reablement with or without OT

A SR including two RCTs found that reablement interventions lasting up to 12 weeks for elderly people with poor physical or mental health living in their own home found some improvement in ADL at 9-12 months, but no difference in unplanned hospital admissions or

QOL (Cochrane et al, 2016).This evidence was considered unreliable due to the poor quality of the included studies. One very small, probably underpowered RCT of an individually tailored OT service as part of reablement for older people living in their own home found no significant differences in measures of ADL, QOL or falls at 6 months compared with people receiving the usual reablement service without OT input (Whitehead et al, 2016).

4.4.2 Community dwelling physically frail elderly (any setting or not stated): OT alone or as part of a multidisciplinary approach

A SRMA of six RCTs comparing interventions including OT, most of which were multidisciplinary, with usual care or no intervention for community dwelling physically frail elderly people found that the intervention group had a significantly greater improvement in ADL scores, although the time period was not stated (De Coninck et al, 2017). The impact of the OT component was not separated from the overall interventions which appeared to be heterogeneous. One RCT of an OT-delivered programme including skills training and provision of assistive devices for community-dwelling frail or pre-frail elderly people found improvements in ADL scores at 8-10 weeks compared with a control group, but limited details were provided in the SR (Apostolo et al, 2018).

4.5 Exercise/ physical activity alone

4.5.1 Community dwelling (any setting) frail or pre-frail elderly: exercise or physical activity interventions

A reasonably well conducted SRMA of up to five RCTs of exercise interventions, alone or in combination with other interventions, for frail or pre-frail elderly people found a significant improvement in ADL scores but no difference in QOL scores (Zhang et al, 2019). The study subjects and interventions were heterogeneous so it is difficult to be clear to what extent exercise alone contributed to the findings. One small RCT of a physical activity intervention for frail older people found a significant reduction in accidental falls, but there were no further details about this intervention or the time period (van der Elst et al, 2019). Exercise interventions with pre-frail or mildly frail older people were not found to lead to any difference in ADL scores in a reasonably well conducted SRMA of three small RCTs (Frost et al, 2017). The subjects in this SR were less frail than those in most of the other included studies which also included people identified as frail. One very small RCT of an exercise intervention with very elderly people in a nursing home reported significantly less deterioration in ADL scores in intervention compared with control subjects over 12 weeks, but there were no further details reported in the SR (Lozano-Montoya et al, 2017).

4.5.2 Community dwelling elderly (own home): self-directed exercise with motivational interviewing

No significant differences in the number of falls or injuries due to falls were reported between elderly people living in their own homes who required walking aids or home help, who undertook self-directed physical activity with or without motivational interviewing, and a usual care control group (Tuvemo Johnson et al, 2020). This was a small study and may have been underpowered but appears to have been reasonably well-conducted.

4.5.3 *Community dwelling adults with stroke (setting not stated): physical activity intervention*

A physical activity intervention over a period of 18 months for adults with a recent stroke, with monthly coaching by a physiotherapist in addition to usual care, was not found to result in any significant differences in measures of ADL, disability and dependence, vascular events or hospital admissions due to vascular events compared with usual care involving physiotherapy for at least three months (Askim et al, 2018). This appeared to be a well-conducted RCT but the usual care provided here probably does not represent usual care in the UK.

4.5.4 *Community dwelling elderly with dementia (own home or nursing home): physical activity intervention*

Elderly people with dementia who were living in their own home with a carer and had a regular supervised exercise programme for one year had significantly fewer falls at one year than those receiving usual care (Roitto et al, 2018). This was a small study and the paper included limited details about methodology. A physiotherapist-led group exercise programme lasting four months for elderly people with dementia living in nursing homes did not find a reduction in the total number of people falling at follow-up one year after the end of the intervention, but did find a reduction in the number of falls resulting in moderate or serious injury (Toots et al, 2018).

4.5.5 *Community dwelling elderly with a history of falls (various settings or not stated): exercise or physical activity interventions*

There was no significant difference in the incidence of falls in elderly people with a history of falls up to nine months after starting a physical activity programme comprising group- or home-based sessions led by a therapist for three months which they were then encouraged to continue independently, compared with controls receiving usual care (Matchar et al, 2017). The intervention subjects did have a significantly lower incidence of falls which had resulted in injury. This appears to have been a moderately well-conducted study but the study population was heterogeneous, some with significant levels of comorbidities and restriction of physical capabilities. The intervention was found not to be cost-effective; the ICER in Singaporean dollars was equivalent to approximately £68,700 per QALY at current conversion rates (Matchar et al, 2019).

Elderly people with a history of falls who were living at home, who were given an individualised home exercise programme designed by a physiotherapist, with regular nursing assistant visits to encourage them to undertake the programme, had no difference in their risk of falls at 12 months or in hospital healthcare consumption at five months compared with a usual care control group (Fahlström et al, 2018). This was a small underpowered study and there were a number of problems with the methodology and reporting of the data which mean that the results cannot be regarded as reliable.

A larger RCT of elderly people with a history falls who took part in 16 weekly group exercise sessions followed by an independent home exercise programme found that they had significantly fewer falls and fall-related injuries at 1 year than controls (Siegrist et al, 2016). However the intervention group had better physical function at baseline and when findings

were adjusted for baseline differences, the differences in falls and injuries no longer appeared to be significant.

4.6 Medication review alone

4.6.1 Community-dwelling elderly (settings not stated): medication review

Medication review by a multiprofessional team for elderly people living in their own homes did not result in reductions in the number of medications or the number of harmful medications used 12 months later (Toivo et al, 2019). The team made recommendations on medication changes to the patients' own physicians most of which were not implemented, and the results of this study were unreliable due to methodological problems. Community-dwelling older people with polypharmacy recently discharged from hospital who had medication review based on pharmacogenetic testing linked to computerised clinical decision support had fewer hospital admissions and Emergency Room (ER) visits at 60 days than a group who had medication review based on drug interactions only (Elliott et al, 2017). Over three-quarters of the recommendations on medication changes which were made to the patients' physicians were implemented. Community-dwelling older people with polypharmacy who had clinical medication review, a care plan and follow-up by community pharmacists were reported to be taking fewer long-term medications per month after the intervention and to have improvements in HRQOL measured by a Visual Analogue Scale, but not a HRQOL questionnaire (Verdoorn et al, 2019). While these three studies used different approaches it is notable that where there were positive findings there was more evidence of implementation of changes or follow-up following medication review.

4.6.2 Community dwelling elderly who have fallen (any setting): medication review

Elderly people who had fallen and had a medication review with withdrawal of fall-risk-increasing drugs (FRIDs) where possible had no significant difference in the number of falls or in GP consultations or ED visits due to a fall over the following 12 months compared with a control group (Boyé et al, 2016). FRIDs were withdrawn in 39% of the intervention group patients who were taking them. This was a relatively large study but some details were lacking or not clearly reported.

4.6.3 Elderly in long term care: medication review

A computerised medication review which aimed to prevent delirium in care home residents was not found to have a significant effect on falls or hospital admissions for older people in long term care, based on a large study in care homes in the USA (Woodhouse et al, 2019). This study appeared to be of poor quality and it is unclear how applicable the findings would be to care homes in the UK which may not have similar computerised prescribing systems, although it may be possible to take a similar approach using GP prescribing systems.

Individual clinician-led medication review with planned medicine withdrawal significantly reduced the number of medicines being taken by elderly people with polypharmacy and multimorbidity living in residential aged care facilities at six- and 12-month follow-up (Potter et al, 2016). No significant differences were found in QOL or health service use outcomes. This was a small RCT which was underpowered for the outcomes apart from medication use.

4.7 Behavioural or psychosocial intervention alone

4.7.1 Community dwelling frail or pre-frail elderly (any setting or not stated): behavioural or psychosocial intervention

A RCT of a 6-month behaviour change intervention focusing on mobility, nutrition, psychological well-being and socialising for community-dwelling frail or pre-frail elderly found significant improvements in ADL in the intervention group, but no significant differences in falls, frailty or QOL measures (Walters et al, 2018). This was a small feasibility study which was not powered to detect these changes, but appeared to have been well-conducted. One RCT of a psychosocial intervention (defined as treatment of psychological (eg anxiety) or social (eg financial) problems) with frail elderly people found no differences in accidental falls, but there were no further details (van der Elst et al, 2019). An RCT of a problem-solving intervention in pre-frail or frail elderly people found no improvements in frailty at three months, but no further details were provided (Apostolo et al, 2018).

4.8 Exercise/ physical activity and nutrition interventions

4.8.1 Community dwelling frail or pre-frail elderly (any setting or not stated): exercise or physical activity and/or nutrition interventions

A SRMA of up to four RCTs of exercise and/or nutrition interventions in pre-frail or frail elderly people reported that those receiving exercise and nutrition supplements, exercise and nutrition education or exercise alone had significantly greater improvements in frailty measures immediately after the intervention than control groups, but nutrition supplements alone did not have any effect (Macdonald et al, 2020). Included studies were of medium to high quality but there were limited details about the nature of the interventions. A small RCT of a group exercise and nutrition advice intervention with pre-frail or frail elderly people also found greater improvements in frailty at three months in the intervention group (Apostolo et al, 2018).

4.8.2 Community dwelling frail or prefrail elderly (excluding nursing home): self-directed exercise with nutrition supplements

A small study found that frail or pre-frail elderly people receiving self-directed exercise alone, a nutrition intervention alone, or a combined intervention had better improvement in their frailty score three months after the intervention than those in a control group (Hsieh et al, 2019). The study appeared to be reasonably well conducted but it took place in Taiwan and it was not clear how applicable the content of the nutritional intervention would be to the UK.

4.9 Exercise/ physical activity and cognitive intervention

4.9.1 Community dwelling prefrail older people (setting not stated): combined exercise and cognitive interventions

A 12-week programme of twice-weekly group exercise, computer-assisted cognitive training and board games was found to improve frailty scores at the end of the intervention compared with a control group (Yu et al, 2020). The group were relatively young (mean age 62 years) and met criteria for pre-frailty.

4.10 Exercise/ physical activity, nutrition and cognitive/ psychological support interventions

4.10.1 Community dwelling frail elderly (setting not stated): exercise, nutrition supplement and psychological support interventions

Frail elderly people receiving an individually tailored combined physical training, nutritional supplement and psychological intervention for 12 months were not reported to have any significant differences in measures of ADL or falls compared with those receiving usual care (Lozano-Montoya et al, 2017). This finding was based on one RCT which this review's authors assessed as having a serious risk of bias.

4.10.2 Community dwelling frail or pre-frail elderly (setting not stated): physical activity advice, nutrition advice +/- nutritional supplement and cognitive interventions

Two papers reported findings from a large study of an intervention for frail or pre-frail elderly people involving group-based physical activity advice, nutrition advice and cognitive training, with or without omega-3 supplements, lasting up to three years. Intervention groups receiving the group intervention with or without omega-3 supplements, or omega-3 supplements alone, were compared with a placebo control group. No differences between intervention and control groups were found at three years in changes in frailty scores or incidence of frailty (based on a five-dimension scale) compared with baseline measures (Guerville et al, 2019). In a subgroup analysis which was not pre-planned, subjects who were non-frail at 12 months and received the group intervention together with omega-3 supplements did have a lower incidence of frailty at three years compared with the control group. No other differences were found in those who were non-frail at 12 months.

Another analysis of the above study, comparing those who had the group intervention with those who did not (both groups including some who had omega-3 supplements) did not find any significant differences in Frailty Index (FI) score (based on a 32-item scale) over time compared with controls (De Souto Barreto et al, 2018). The incidence of frailty and of persistent frailty were both significantly lower in the intervention group at three years, but the significance of this finding depended on the FI threshold used to define frailty and the rationale for different FI thresholds was not explained. There was no significant difference between groups in reversal of frailty in those who had been frail at baseline.

4.11 Exercise/physical activity, nutrition, cognitive and medication review intervention

4.11.1 Community dwelling frail or pre-frail elderly (setting not stated): exercise, nutrition supplement, cognitive and medication review intervention

Frail and pre-frail elderly people who took part in a six-week multifactorial intervention, including medication review, had a significant improvement in the number of drugs they were taking compared with the control group at 18 months (Romera-Liebana et al, 2018). The medication review was said to be based on STOPP criteria but there were no further details. The intervention group were taking significantly more drugs at baseline. The intervention also involved physical activity, nutrition supplements and memory workshops,

but no other outcome measures relevant to this review were reported so it is not possible to judge what the effects of the combined intervention were.

4.12 Exercise/physical activity, nutrition, social skills training and medication review intervention

4.12.1 Community dwelling frail or pre-frail elderly (setting not stated): exercise, nutrition education, social skills training and medication review intervention

No statistically significant differences in measures of ADL, QOL, frailty or healthcare consumption were found at up to 12 months follow-up between elderly frail or pre-frail patients taking part in a multicomponent intervention, compared with a control group having usual care (van Lieshout et al, 2018). The intervention was for a maximum of 12 weeks and comprised weekly physical training group sessions run by a physical therapist, weekly social skills training sessions, three nutrition education sessions and a medication review. This study had a number of methodological problems and may have been underpowered.

4.13 Exercise/physical activity, nutrition, medication review and social circumstances review intervention

4.13.1 Community dwelling pre-frail elderly (non-institutionalised): self-directed exercise, nutrition education, medication review and social circumstances review intervention

Pre-frail elderly people receiving a multicomponent intervention lasting up to six months including medication review, nutritional advice, physical exercise instruction sessions and recommendations for home exercise, and review of social circumstances had improved ADL scores at 12-month follow-up while in the control group ADL scores had deteriorated (Gene Huguet et al, 2018). The difference between groups was statistically significant. IADL scores had deteriorated in both groups with no significant differences. Significantly more in the control group had progressed to frailty and significantly more in the intervention group had reversed from frailty to robust. This was a small RCT which appears to have been only moderately well conducted and was not clearly reported.

4.14 Interventions including telemonitoring

4.14.1 Community dwelling adults with heart failure (setting not stated): telemonitoring or telephone support

A SRMA of up to 16 RCTs found that both structured telephone support and non-invasive telemonitoring resulted in fewer heart-failure-related hospital admissions in adults with chronic heart failure compared with usual care (Inglis et al, 2015). The evidence for these outcomes was considered to be of moderate quality. There was no significant difference in all-cause hospital admissions with non-invasive telemonitoring and for structured telephone support the difference was borderline significant; this evidence was considered to be of very low quality. A single RCT included elderly people with heart failure who had been recently discharged from hospital or seen in outpatients, who were randomised to a telephonic monitoring system with telephone access to a geriatrician or usual care. The intervention group had significantly fewer hospital admissions due to any cause over the following six

months (Pedone et al, 2015). This was a small study which did not appear to be methodologically robust.

4.14.2 Community dwelling adults with heart failure: multicomponent intervention including telemonitoring

Patients with limited functional status due to heart failure who were being cared for by a Veterans Administration medical centre in the USA and received a multicomponent intervention including care recommendations by a multidisciplinary team, telemonitoring and screening and management of depression had the same rate of hospitalisations at 1 year as those receiving usual care (Bekelman et al, 2015). This appeared to be a reasonably well-conducted RCT although it is not clear how generalisable the findings would be to the NHS.

4.15 Information, social prescribing

4.15.1 Community dwelling frail elderly (settings not stated): information provision

One SRMA of three RCTs found no significant differences in institutionalisation for frail older people receiving information interventions, compared with usual care (van der Elst et al, 2019). Information provision was defined as an emphasis on self-care and preventive approaches as well as information for community-wide dissemination and use, but there were no further details about the interventions in these studies.

4.15.2 Community dwelling frail or pre-frail elderly (settings not stated): social prescribing

No studies were identified suitable for inclusion in a SR of social prescribing interventions for community dwelling frail elderly people (Smith et al, 2019). The search took place in July 2019 and included studies of any type evaluating social prescribing, community referral, referral schemes and wellbeing programmes or interventions where a non-health link worker was the intervention provider.

4.16 Specific condition/ risk management

4.16.1 Community dwelling people with SMI: compulsory community treatment

A SRMA of three RCTs did not find any significant differences in hospital admissions or bed days or in QOL in people with SMI subject to compulsory community treatment (CCT) compared with those under voluntary treatment (Kisely et al, 2017). One study was UK-based and included clinician-ordered compulsory treatment orders, while two included court-ordered CCT in the USA which may have limited applicability in the UK. The SRMA was well-conducted but the included studies were of low to medium quality only.

4.16.2 Community dwelling people with SMI: cardiometabolic risk management

Patients with SMI and cardiometabolic risk factors attending a community mental health centre in the USA who had access to a dedicated clinic and staff to help manage their risk factors had significantly greater improvements in measures of health-related QOL, with increases in use of primary care providers and preventive services, at 12 months compared with similar patients who did not have access to such a clinic (Druss et al, 2017). There were no differences between the groups in use of other healthcare services and the authors also

reported no differences in most clinical outcomes or quality of care. It is not clear how applicable this model would be to the UK, although it appeared to take a case management approach and it is likely some elements would be transferable. The study had some methodological problems which limit the reliability of the findings.

4.16.3 Clinically stable community-dwelling COPD patients: specialist respiratory nurse supporting primary care

Patients with clinically stable chronic obstructive pulmonary disease (COPD) and recent hospital admissions who had input from a specialist respiratory nurse supporting the primary care team over one year had significantly fewer ED admissions but no difference in hospital admissions compared with a usual care control group (Hernandez et al, 2017). There were no differences in measures of ADL or HRQOL at 12 months, and no difference in hospital admissions six years later. This was a small RCT with a number of methodological problems which mean that the findings cannot be regarded as very reliable.

4.17 Staff education intervention

4.17.1 Elderly in long-term care: education for care home staff

An educational intervention for care home staff in the UK which aimed to prevent delirium in care home residents was found to probably reduce hospital admissions over 10-month follow-up, although the measure of hospital admissions used was not precise (Woodhouse et al, 2019). The intervention involved three interactive educational sessions plus monthly facilitated working groups for staff. The hospital admissions outcome included almost 500 subjects and the study was considered of good quality.

4.18 Podiatry intervention

4.18.1 Care home residents with history of falls: podiatry intervention

A small RCT of a multicomponent three-month podiatry intervention compared with usual podiatry care for elderly care home residents with a history of falls found fewer falls immediately after the intervention in the intervention group but this was not statistically significant, and there was no significant difference in the number of falls or in measures of health or ADL up to 6 months after the end of the intervention (Wylie et al, 2017).

5 Discussion

This review includes 14 Systematic Reviews (SRs) and 42 reports of randomised (RCT) or quasi-randomised trials evaluating different approaches to anticipatory care for people with case complexity. Most of the subjects in the included studies were elderly people with frailty, pre-frailty or multimorbidity or groups with complex health problems. All were community-dwelling, which may have included people in their own home, sheltered or supported housing, or other residential or institutional settings. Only a minority of studies specified that the subjects were in one particular community setting.

The interventions were heterogeneous. One of the largest group of papers evaluated case management (CM) approaches, generally involving an assessment with care planning and approaches to ensure the implementation and co-ordination of the care that was considered to be required. A number of studies also considered assessment alone or with care plans but without a CM approach. A large number of studies evaluated specific interventions either singly or in combination, targeting areas such as physical activity, nutrition, cognition or medications. A number included interventions for people who had complex conditions or risk factors such as heart failure, serious mental illness (SMI) or risk of falls. The relevant outcomes most commonly reported in these studies related to care utilisation (for example admissions to hospital or an institution, consultations or care costs), then measures of activities of daily living (ADL), quality of life (QOL) or frailty. A number of studies reported falls or numbers of medications used.

Most of the evidence identified on CM approaches, including a systematic review and meta-analysis (SRMA) of six RCTs (van der Elst et al, 2019), did not suggest that they were effective in reducing healthcare utilisation for community-dwelling older people with case complexity. Intensive CM for people with SMI appeared to reduce days in hospital compared with usual care with no CM, but the evidence for this was of low quality (Dieterich et al, 2017). Community-dwelling elderly people with dementia receiving CM had reductions in admissions to nursing or residential home at six and 18-month follow-up, but not at 12 months or longer-term, in a well-conducted SRMA of up to nine RCTs (Reilly et al, 2017). They had no differences in measures of QOL or function at two years compared with controls. One study in UK primary care found that adults with multimorbidity who received a CM approach with longer consultations and support for self-management had improvements in some but not all measures of wellbeing and QOL (Mercer et al, 2016). A large but methodologically flawed study found improvements in measures of recurrent falls, frailty and QOL with a CM approach (Franse et al, 2018).

There was some evidence (including a SRMA of three RCTs, (Macdonald et al, 2020)) that comprehensive geriatric assessment (CGA) and care planning, without CM, improved frailty measures post-intervention, but little evidence that it reduced healthcare utilisation; one study of assessment with further input by a community geriatrics unit (CGU) found reductions in first hospitalisations up to three years, but this study was not methodologically robust (Di Pollina et al, 2017). Evidence of mixed quality on assessment at home immediately after hospital discharge did not find reductions in healthcare use or improvements in QOL or ADL measures (Lembeck et al, 2019; Røsstad et al, 2017; Thygesen et al, 2015).

A variety of interventions were designed to more specifically reduce frailty or improve capabilities or function. One SRMA of reablement interventions found improvements in ADL but no effect on hospital admissions (Cochrane et al, 2016), but the quality of the original studies was considered poor. An SRMA of heterogeneous multicomponent interventions which included occupational therapy (OT) also found improvements in ADL (De Coninck et al, 2017), and an 8-10 week OT-delivered programme including skills training and provision of assistive devices for community-dwelling frail or pre-frail elderly people found improvements in ADL scores immediately after the intervention compared with a control group, but limited details were provided (Apostolo et al, 2018).

In other SRMAs, exercise or physical activity interventions, alone or in combination with other interventions, were found to improve ADL in frail elderly people (Zhang et al, 2019), but exercise interventions did not improve ADL in pre-frail or mildly frail elderly people (Frost et al, 2017). Supervised physical activity interventions for elderly people with dementia may have reduced falls or injurious falls in two small studies (Roitto et al, 2018; Toots et al, 2018), but two studies of self-directed physical activity, one involving patients with stroke (Askiim et al, 2018; Tuvemo Johnson et al, 2020), did not find any improvements in falls or ADL. For community-dwelling elderly people with a history of falls, no convincing evidence was found that physical activity programmes, including both supervised and self-directed exercise, reduced their fall risk (Matchar et al, 2017; Fahlström et al, 2018; Siegrist et al, 2016). One physical activity intervention found a reduction in falls resulting in injury but not overall number of falls (Matchar et al, 2017) but this intervention was found not to be cost-effective (Matchar et al, 2019).

A SRMA of combined physical activity and nutrition interventions found reductions in frailty measures for the combined interventions but not for nutrition alone (Macdonald et al, 2020). A small RCT of a behavioural intervention focusing on mobility, nutrition, psychological well-being and socialising in frail and pre-frail elderly people found improvements in ADL but no improvements in falls, frailty or QOL measures (Walters et al, 2018). There were improvements in frailty after a 12-week programme of exercise and cognitive training for younger (mean age 62) pre-frail people (Yu et al, 2020), and improvements in ADL at 12-month follow-up of an exercise, nutrition, medication review and social circumstances review intervention (Gene Huguet et al, 2018), although this study was not methodologically robust. Other combinations of exercise, nutrition and cognitive or social skills training interventions produced negative or equivocal results (Guerville et al, 2019; De Souto Barreto et al, 2018; Lozano Montoya et al, 2017; van Lieshout et al, 2018).

Three studies evaluated different approaches to medication review for community-dwelling older people with variable results, but those where there was evidence of implementation of medication changes or follow-up had more positive findings (Toivo et al, 2019; Verdoorn et al, 2019; Elliott et al, 2017). A study which used pharmacogenetic testing linked to computerised clinical decision support found reductions in hospital readmissions and Emergency Room visits at 60 days compared with review of drug interactions only (Elliott et al, 2017). For community-dwelling elderly people with a history of falls, a medication review targeting fall-risk-increasing drugs was not found to reduce their fall risk (Boyé et al, 2016). For older people in long-term care, a clinically-led medication review reduced the number of medications being taken but not healthcare use or QOL measures (Potter et al, 2016), while a large study of a computerised medication review in residential care facilities found no impact on hospital admissions (Woodhouse et al, 2019).

One large SRMA (Inglis et al, 2015) and two RCTs (Pedone et al, 2015; Bekelman et al, 2015) considered telemonitoring or telephone support approaches for patients with heart failure, and while there was evidence that they might reduce some hospital admissions the findings were mixed and the evidence was of variable quality. Compulsory community treatment was not found to reduce hospital use for people with SMI compared with voluntary care (Kisely et al, 2017), and a service to manage cardiometabolic risk for people with SMI had mixed results (Druss et al, 2017). Patients with clinically stable COPD who had input

from a specialist respiratory nurse supporting primary care had significantly fewer Emergency Department admissions but no difference in hospital admissions or measures of ADL or HRQOL at 12 months compared with usual care, and no difference in hospital admissions six years later (Hernandez et al, 2017).

For elderly people in long-term care, an education programme for staff with monthly working groups which aimed to prevent delirium was found to probably reduce hospital admissions (Woodhouse et al, 2019). A podiatry intervention for people in care homes at risk of falls did not find a significant reduction in falls (Wylie et al, 2017).

Much of the evidence identified for this review was not very robust. While there were several well-conducted SRs, the primary studies included were often of variable quality and some of the SRs provided limited information about the interventions and populations in the included studies. Many of the trials included in this review had methodological problems such as lack of clarity on randomisation procedures, baseline differences between comparison groups, lack of blinding of outcome assessments and large loss to follow-up. Others had incomplete reporting of methodology or results, making it hard to assess the reliability of their findings. A number of studies were small and probably underpowered to detect differences in outcomes. It was often difficult to judge the clinical significance of changes in measures such as frailty or ADL scores. Some studies reported limited outcomes relevant to this review, so no conclusions could be drawn about their impact on areas such as care utilisation because this was not reported. A wide range of other outcomes which were not specified in the PICO for this review were reported including functional and clinical measures, and in a small number of studies, survival or mortality.

Few papers included studies which had been carried out in the UK. A multicentre European study of an assessment and CM approach included subjects from Manchester (Franse et al, 2018) and found improvements in a number of outcomes, but it had significant methodological problems which are likely to have influenced the results. Five UK-based trials were identified; one trial reported an education intervention for care home staff which appeared to reduce hospital admissions (Woodhouse et al, 2019), and a small study of a behaviour change intervention found improvements in ADL but no significant differences in falls, frailty or QOL measures (Walters et al, 2018). A study based in UK primary care of a CM approach for adults with multimorbidity found improvements in some but not all measures of wellbeing and HRQOL at 12 months (Mercer et al, 2016). A small study found no benefit when OT interventions were added to the usual reablement service (Whitehead et al, 2016), and another small study found that a multicomponent podiatry intervention in care homes had no significant impact on falls (Wylie et al, 2017).

Three SRs also reported including UK-based trials. Inglis et al (2015) included up to five studies which were partly or entirely UK-based in their large SRMA of telemonitoring and telephone support interventions which found a positive impact on heart failure-related admissions but not on all-cause admissions. One UK-based study of compulsory community treatment for people with SMI was included in Kisely et al's (2017) SRMA which found no impact on hospital use or QOL. The large SRMA by Dieterich et al (2017) which reported that intensive CM for people with SMI appeared to reduce hospital use included some trials

which were partly or entirely UK-based, but it was unclear how much they contributed to this finding, and not clear how the different care models compare to current NHS care.

The possible applicability of other studies to the UK was variable. While the principles of some approaches such as CM or medication reviews might be generalisable, some were based within specific service settings such as a CGU in Switzerland (Di Pollina et al, 2017) or a community mental health centre in the USA (Druss et al, 2017), which may be very different from UK settings. Interventions such as physical activity or nutrition may have cultural variations which are not directly transferable. Computerised medication review may not currently be possible in community residential settings in the UK but may be feasible in General Practice.

There is a clear need for more robust evidence on the impact of anticipatory care interventions on the utilisation of care and on outcomes such as ADL and QOL in UK populations. This review included publications since January 2015 only, although earlier studies were included in the SRs. It is possible that a search for earlier publications could yield further evidence, for example if there are SRs for other intervention and population combinations which were published before 2015.

A small number of possibly promising interventions applicable or adaptable to the UK context were identified but there were none with convincing and consistent evidence of effectiveness. Based on the findings of this review, interventions which might be worth exploring further with respect to their impact on care utilisation include various approaches to medication review, education programmes for care home staff, telemonitoring and telephone support approaches in patients with heart failure, assessment and care planning, and intensive CM for people with SMI. Interventions where further evidence on the impact on outcomes such as frailty, ADL or QOL might be sought include assessment or CM approaches, physical activity and nutrition or cognitive training interventions, behaviour change interventions, and reablement. While none of the studies referred to implementation within integrated care systems, many of the interventions would be appropriate for this context, for example those involving multiprofessional or multiorganisation approaches such as assessment and care planning, CM and reablement.

6 Conclusions

This rapid evidence review includes 14 SRs and 42 trials of anticipatory care interventions for adults with complex care needs. There is limited evidence which is applicable to the UK that they are effective in reducing care utilisation or improving outcomes such as frailty, ADL or QOL. A small number of potentially promising interventions have been identified but further robust evidence would be needed to be clear about their likely impact for this group of patients.

7 Scoping table of included studies

Numbered rows correspond to sections in the evidence tables (see section 8).

Categories were defined by an iterative process during study selection and review to best fit the studies identified. These are not intended to be definitive and other possible groupings or combinations may be identified using this table.

This table shows publication dates; search dates for Systematic Reviews (SRs) are shown in the evidence summary tables. RCTs have been included in each category when their publication date was later than the SR search date.

Where there is more than one SR in a category, this is either because at least one SR contributed only a single study, or because there were clear differences in the study populations (for example the degree of frailty).

Systematic Reviews in italics

	Community dwelling elderly with frailty, pre-frailty and/or multimorbidity (any setting or not stated)	Community dwelling elderly with frailty, pre-frailty and/or multimorbidity (house/ flat/own residence)	Community dwelling elderly with frailty, pre-frailty and/or multimorbidity (institution only)	Community dwelling people with specific health condition or risk (various settings or not stated)
1. Assessment, with or without follow-up care but without Case Management				
Assessment +/- follow-up care, no case management	*Macdonald (2020)* *Apostolo (2018)* Fristedt (2019) Lembeck (2019) (recent discharge) Thygesen (2015 (recent discharge)	Rosstad (2017)		
Community Geriatrics Unit assessment and access to follow-up	Di Pollina (2016)			
2. Case Management approaches				
Case management approaches	*van der Elst (2018)* *Apostolo (2018)* Franse (2018) Spoorenberg (2018) Looman (2016) Ekdahl (2016)	Parsons (2017) Suijker (2016) Ruikes (2016) Godwin (2016)		*Dieterich (2017)* (SMI) *Reilly (2015)* (dementia) Mercer (2016) (multimorbidity)
3. Advance care planning				
Advance care planning	Overbeek (2019)			

	Community dwelling elderly with frailty, pre-frailty and/or multimorbidity (any setting or not stated)	Community dwelling elderly with frailty, pre-frailty and/or multimorbidity (house/ flat/own residence)	Community dwelling elderly with frailty, pre-frailty and/or multimorbidity (institution only)	Community dwelling people with specific health condition or risk (various settings or not stated)
4. Reablement and/or Occupational Therapy				
Reablement +/- Occupational Therapy		*Cochrane (2016)* Whitehead (2016)		
Occupational Therapy	*Apostolo (2018)* *De Coninck (2017)*			
5. **Exercise/ physical activity alone**				
Exercise/ physical activity alone	*Zhang (2019)* *van der Elst (2018)* *Frost (2017)*	Tuvemo Johnson (2020)	Lozano-Montoya (2017)	Askim (2018) (stroke) Toots (2018) (dementia, nursing homes) Roitto (2018) (dementia, community dwelling) Matchar (2019) (falls) Matchar (2017) (falls) Fahlstrom (2018) (falls) Siegrist (2016) (falls)
6. Medication review alone				
Medication review alone	Verdoorn (2019) Elliott (2017)	Toivo (2019)	**Woodhouse (2019)** Potter (2016)	Boye (2017) (falls)
7. Behavioural/ psychosocial intervention alone				
Behavioural/ psychosocial intervention alone	*van der Elst (2018)* *Apostolo (2018)* Walters (2018)			
8. Exercise/ physical activity and nutrition interventions				
Exercise/ physical activity and/ or nutrition	*Macdonald (2020)* *Apostolo (2018)* Hsieh (2019)			
9. **Exercise/ physical activity and cognitive intervention**				
Exercise/ physical activity and cognitive	Yu -(2020)			
10. Exercise/physical activity, nutrition and cognitive/ psychological support interventions				
Exercise/ physical activity, nutrition and cognitive/ psychological	*Lozano-Montoya (2017)* Guerville (2019) De Souto Barreto (2018)			
11. Exercise/physical activity, nutrition, cognitive and medication review intervention				
Exercise/ physical activity, nutrition, cognitive and medication review	Romera-Liebana (2018)			

	Community dwelling elderly with frailty, pre-frailty and/or multimorbidity (any setting or not stated)	Community dwelling elderly with frailty, pre-frailty and/or multimorbidity (house/ flat/own residence)	Community dwelling elderly with frailty, pre-frailty and/or multimorbidity (institution only)	Community dwelling people with specific health condition or risk (various settings or not stated)
12. Exercise/physical activity, nutrition, social skills training and medication review intervention				
Exercise/ physical activity, nutrition, social skills training and medication review	Van Lisehout (2018)			
13. Exercise/ physical activity, nutrition, medication review and social circumstances review intervention				
Exercise/ physical activity, nutrition, medication review and social circumstances review		Gene Huguet (2018)		
14. Interventions including telemonitoring				
Interventions including telemonitoring and/or telephone support				*Inglis (2015) (heart failure)* Pedone 2015 (heart failure) Bekelman (2015) (heart failure)
15. Information, social prescribing				
Information provision	*van der Elst (2018)*			
Social prescribing	*Smith (2019)*			
16. Staff education intervention				
Education for care home staff			*Woodhouse (2019)*	
17. Specific condition/ risk management				
Compulsory community treatment				*Kisely (2017) (SMI)*
Cardiometabolic risk management				Druss 2017 (SMI)
Specialist respiratory nurse				Hernandez 2015 (COPD)
18. Podiatry intervention				
Podiatry				Wylie (2018) (falls, care home)

8 Evidence Summary Tables

Key to the evidence summary tables (numbers correspond to table numbers).

1. Assessment, with or without follow-up care but without case management
   1.1 Community dwelling frail or pre-frail elderly (any setting or not stated): assessment with care plan, without CM
   1.2 Community dwelling frail or pre-frail elderly (setting not stated): CGU assessment and access to follow-up
   1.3 Community dwelling elderly with recent hospital discharge (setting not stated or own home): assessment

2. Case management approaches
   2.1 Community dwelling elderly including frail and non-frail (any setting or setting not stated): case management approaches
   2.2 Community dwelling frail and pre-frail elderly (living in own home): case management approaches
   2.3 Community dwelling older people with dementia: case management
   2.4 Community dwelling people with SMI: intensive case management approaches
   2.5 Community dwelling adults with multimorbidity (setting not stated): case management approach in primary care

3. Advance Care Planning
   3.1 Frail elderly living in, or receiving services from, residential care homes: Advance Care Planning.

4. Reablement and/or Occupational Therapy
   4.1 Community dwelling elderly with poor physical or mental health (living in own home): reablement with or without OT
   4.2 Community dwelling physically frail elderly (any setting or not stated): OT alone or as part of a multidisciplinary approach

5. Exercise/ physical activity alone
   5.1 Community dwelling frail or pre-frail elderly (settings not stated): exercise or physical activity interventions
   5.2 Community dwelling elderly (own home): self-directed exercise with motivational interviewing
   5.3 Community dwelling adults with stroke (setting not stated): physical activity intervention
   5.4 Community dwelling elderly with dementia (own home or nursing home): physical activity intervention
   5.5 Community dwelling elderly with a history of falls (various settings or not stated): exercise or physical activity interventions

6. Medication review alone
   6.1 Community-dwelling elderly (setting not stated): medication review
   6.2 Community-dwelling elderly who have fallen (any setting): medication review
   6.3 Elderly in long term care: medication review

7. Behavioural or psychosocial intervention alone
   7.1 Community dwelling frail or pre-frail elderly (any setting or not stated): behavioural or psychosocial intervention

8. Exercise/ physical activity and nutrition interventions
   8.1 Community dwelling frail or pre-frail elderly (any setting or not stated): exercise or physical activity and/or nutrition interventions
   8.2 Community dwelling frail or prefrail elderly (excluding nursing home): self-directed exercise with nutrition supplements

9. Exercise/ physical activity and cognitive intervention
   9.1 Community dwelling prefrail older people (setting not stated): combined exercise and cognitive interventions

10. Exercise/ physical activity, nutrition and cognitive/ psychological support intervention
    10.1 Community dwelling frail elderly (setting not stated): exercise, nutrition supplement and psychological support interventions
    10.2 Community dwelling frail or pre-frail elderly (setting not stated): physical activity advice, nutrition advice +/- nutritional supplement and cognitive interventions

11. Exercise/ physical activity, nutrition, cognitive and medication review intervention
    11.1 Community dwelling frail or pre-frail elderly (setting not stated): exercise, nutrition supplement, cognitive and medication review intervention

12. Exercise/ physical activity, nutrition, social skills training and medication review intervention
    12.1 Community dwelling frail or pre-frail elderly (setting not stated): exercise, nutrition education, social skills training and medication review intervention

13. Exercise/ physical activity, nutrition, medication review and social circumstances review intervention
    13.1 Community dwelling pre-frail elderly (non-institutionalised): self-directed exercise, nutrition education, medication review and social circumstances review intervention

14. Interventions including telemonitoring
    14.1 Community dwelling adults with heart failure (setting not stated): telemonitoring or telephone support
    14.2 Community dwelling adults with heart failure: multicomponent intervention including telemonitoring

15. Information, social prescribing
    15.1 Community dwelling frail elderly (settings not stated): information provision
    15.2 Community dwelling frail or prefrail elderly (settings not stated): social prescribing

16. Specific condition/ risk management
    16.1 Community dwelling people with SMI: compulsory community treatment
    16.2 Community dwelling people with SMI: cardiometabolic risk management
    16.3 Clinically stable community-dwelling COPD patients: specialist respiratory nurse supporting primary care

17. Staff education intervention
    17.1 Elderly in long term care: education for care home staff

18. Podiatry intervention
    18.1 Care home residents with history of falls: podiatry intervention

19. Systematic reviews with two or more interventions of different types reported separately
    This table presents the overall SR findings, but findings from each SR relating to different interventions are also shown in the relevant tables:

    Macdonald et al (2020)
        1.1 Community dwelling (any setting) frail or pre-frail elderly: assessment with care plan, without CM
        8.1 Community dwelling (any setting) frail or pre-frail elderly: exercise or physical activity and/ or nutrition interventions
    Woodhouse et al (2019)
        6.3 Elderly in long-term care: medication review
        17.1 Elderly in long-term care: education for care home staff
    van der Elst et al (2019)
        2.1 Community dwelling (any setting) elderly, including frail and non-frail: case management approaches
        5.1 Community dwelling (any setting) frail or pre-frail elderly: exercise or physical activity interventions
        7.1 Community dwelling (any setting) frail or pre-frail elderly: behavioural or psychosocial intervention
        15.1 Community dwelling (any setting) frail elderly: information provision
    Apostolo et al (2018)
        1.1 Community dwelling (any setting) frail or pre-frail elderly: assessment with care plan, without CM
        2.1 Community dwelling (any setting) elderly, including frail and non-frail: case management approaches
        4.2 Community dwelling (any setting) physically frail elderly: OT alone or as part of a multidisciplinary approach
        7.1 Community dwelling (any setting) frail or pre-frail elderly: behavioural or psychosocial intervention
        8.1 Community dwelling (any setting) frail or pre-frail elderly: exercise or physical activity and/ or nutrition interventions
    Lozano-Montoya et al (2017)
        5.1 Community dwelling (any setting) frail or pre-frail elderly: exercise or physical activity interventions
        10.1 Community dwelling (any setting) frail elderly: exercise, nutrition supplement and psychological support interventions

    For abbreviations see table 20 after end of evidence tables.
    For details about key assessment measures used see table 21.

1. Assessment, with or without follow-up care but without Case Management

1.1 Community dwelling frail or pre-frail elderly (any setting or not stated): assessment with care plan, without case management (CM)										
Population type	**Intervention type**	**Study author, year of publication. Years of study (RCTs). Search timescale, language restrictions (SRs).**	**Study type and aim**	**Population, including setting and country**	**Intervention**	**Control**	**Outcomes, including time points (outcomes relevant to PICO only)**	**Results (Intervention (I) vs Control (C) (including for subgroups relevant to PICO)**	**Brief comment re key quality issues**	**Conclusions**
Community-dwelling frail or pre-frail elderly, setting not stated.	'Primary care' interventions to treat, delay or reverse physical frailty. This row includes Comprehensive Geriatric Assessment (CGA) interventions.	Macdonald et al, 2020. Search May 1996 - June 2019. Papers published in English.	Systematic review and meta-analysis (SRMA). To assess the effectiveness of primary care interventions for physical frailty among community-dwelling adults	Community-dwelling (setting not stated). Age ≥60 years. In 10/12 studies included in meta-analyses (MAs), subjects were defined as prefrail or frail. Countries not stated.	Relevant interventions included Comprehensive Geriatric Assessment (CGA). This was not defined but examples given included multiprofessional team involvement and care tailored to individual needs. It did not include CM approaches (see section 2 for CM). Other interventions included physical exercise programmes, nutritional supplementation, nutritional education.	Control (no intervention or placebo).	Frailty (using Fried criteria or adaptations of Fried criteria); change in frailty prevalence. MA included the results from the immediate post-intervention time point (time periods of interventions varied, max duration 12 months).	Change in prevalence of frailty: CGA (3 RCTs, n=786, 2 high, 1 medium quality): RR 0.77 (95%CI 0.64 to 0.93), p=0.006. Results for exercise and nutrition interventions shown in separate table.	Studies assessed for risk of bias in seven domains. All studies included in MA had at least four domains assessed as at low risk of bias suggesting they were of medium or high quality. All studies included in MA were randomised controlled trials (RCTs). MA was carried out where intervention and outcome measure type were similar. All studies used the Fried frailty criteria or an adaptation of these. The study descriptions of frailty status of their eligible populations were reported but the baseline levels of frailty of subjects included in the MAs was not reported.	Frail or pre-frail older people receiving CGA were reported to have a statistically significantly greater improvement in frailty compared with control groups. This appeared to be a reasonably well-conducted SRMA and the RCTs included in the MA were of medium or high quality. Similar criteria for assessing frailty were used in all studies, but subjects may have been heterogeneous as frailty status at recruitment was not reported. The clinical significance of the reported changes in frailty scores is not clear. Limited detail was provided on the interventions but the interventions within each type were reported to be

										heterogeneous. These factors are likely to have affected the findings.
Community-dwelling frail elderly. Setting not stated, but nursing home excluded.	CGA and individualised care plan by mobile geriatric team.	Fristedt et al, 2019. Study dates not stated.	RCT. To perform a mixed methods analysis to measure the effectiveness and user satisfaction of Mobile Geriatric Teams.	Community-dwelling (excluding nursing home). Aged >75 years. More than three chronic diagnoses and prescribed six or more pharmaceutical drugs for continuous use With ≥ three hospital stays during the last six months. Mean age 84 years (I), 86 years (C). Mean diagnoses 6.8 (I), 5.4 (C). Mean prescribed drugs 10. Sweden.	Mobile geriatric team (MGT) replacing primary care. Home visit and CGA by geriatrician and nurse; individualised care plan; further contacts as required. Duration of input varied according to need. Standard hospital and social care.	Standard care (hospital, social and primary care)	Number of healthcare contacts. Difference-in-difference (DiD) (ie. the difference between the change in number of contacts for intervention (I) compared with control (C)), controlled for baseline differences in cohabitation status and number of chronic conditions. 12-month outcomes.	I n=32, C n=30 Difference-in-difference (DiD): number, standard error (SE), p value. Number of Emergency Room visits: DiD I vs C: 0.209 (0.859), p=0.809. Number of hospital OP visits: DiD I vs C: 0.946 (1.033), p=0.365. Number of hospital admissions: DiD I vs C 0.162 (0.905), p= 0.859. Total non-primary care days: DiD I vs C: 5.364 (8.403), p=0.526. Contacts with primary care physician outside MGT: DiD I vs C: -3.379 (0.803), p<0.001. Contacts with primary care nurse outside MGT: DiD I vs C -1.141 (0.930), p=0.225. Average number of contacts with primary care physician, including MGT: I group 11.87, C group 3.22. Average number of contacts with primary	Randomisation procedure appears to have been adequate. There were baseline differences between groups; intervention subjects were more likely to be cohabiting (p=0.04) and had more chronic conditions (p=0.08). Analyses were carried out controlling for these differences. Personnel were not blinded to group. Outcome measures were from patient records. Numbers randomised to each group (n=31 in each) differed from the numbers reported for the outcome measures (I n=32, C n=30); the reason for this was not clear. Some subjects had died during the 12-month follow-up period but all appear to have been included in the analysis.	No significant differences in any type of hospital healthcare utilisation were found between the group of frail elderly people looked after by the mobile geriatric team (MGT) and those receiving standard care. The MGT group had significantly fewer contacts with primary care physicians. However when contacts with the MGT clinicians were included the MGT group had many more contacts. This was a small study and appeared to be of moderate quality.

								care nurse, including MGT: I group 4.68, C group 1.42. No p values reported.		
Community-dwelling frail or pre-frail elderly, any setting.	Interventions focusing on prevention of frailty progression. This row includes a nurse home visit intervention.	Apostolo et al, 2018. Search dates Jan 2001 to Nov 2015. Studies in English, Portuguese, Spanish, Italian and Dutch.	SR. To identify the effectiveness of interventions to prevent progression of pre-frailty and frailty in older adults.	Aged ≥65 years. Pre-frail or frail. Community-dwelling. Intervention in any setting. Countries of included studies were Taiwan, Sweden, Australia, Mexico, Belgium.	Interventions in included studies with relevant outcomes were: Nurse home visit, assessment, plan, (no CM), provision of alert button for emergency calls. Other interventions included exercise + nutritional advice, problem-solving therapy, multiprofessional assessment and CM, and an OT-delivered programme.	Usual care, alternative therapeutic interventions or no intervention.	Frailty Index (Rockwood scale). Outcomes post-intervention (9 months).	Frailty prevalence. Assessment and plan at nurse home visit, alert button (1 RCT, n=89, good quality) Frailty prevalence: Baseline: I 46.7%, C 45.5% 9 months: I 23.3%, C 58.3% p<0.05 Results for other interventions shown in separate tables.	Methodological quality of the studies was assessed against 10 criteria; included studies met ≥5 criteria. All studies used a recognised scale or index to define pre-frailty and frailty. Findings and their statistical significance were not reported for all measures in all groups. It was not clear whether this was due to missing original data or incomplete reporting in the SR.	Improvements in frailty post-intervention were found in one small RCT of an intervention involving a nurse home visit assessment and care plan with provision of an alert button. The clinical significance of the change in levels of frailty is not clear. This appeared to be a reasonably well-conducted SR and the included RCTs appear to have been of moderate or high quality. All studies used defined criteria for assessing frailty. The interventions and study populations were heterogeneous and the SR only reported results of individual studies with no attempt to combine study findings. Reporting of some outcomes appeared to be incomplete but it was not clear if this was due to limited information in the original study.

1.2 Community dwelling frail or pre-frail elderly (setting not stated): Community Geriatrics Unit assessment and access to follow-up										
Population type	**Intervention type**	**Study author, year of publication. Years of study (RCTs). Search timescale, language restrictions (SRs).**	**Study type and aim**	**Population, including setting and country**	**Intervention**	**Control**	**Outcomes, including time points (outcomes relevant to PICO only)**	**Results (Intervention (I) vs Control (C) (including for subgroups relevant to PICO)**	**Brief comment re key quality issues**	**Conclusions**
Community-dwelling elderly with mild, moderate or severe frailty receiving home visiting nursing services (setting not stated).	Assessment by a community geriatrics unit physician, with recommendations and access to co-ordinated follow-up.	Di Pollina et al, 2017. Study took place July 2009 to Dec 2012.	RCT. To test the efficacy of providing integrated care at home to reduce unnecessary hospitalizations, emergency room visits, institutionalization, and mortality in community dwelling frail and dependent older adults.	Aged ≥60 years. Community-dwelling (setting not stated). Receiving home visiting nursing services. Frail: nine-item frailty measure including four ADL, two social environment items and three health status items. Score 1-5 = mild to moderate frailty, ≥6 = severe frailty. Mean age 82 years. 64-67% female. 75% had mild to moderate frailty, 25% had severe frailty. Switzerland.	In-home assessment by community geriatrics unit (CGU) doctor, covering cognition, mood, gait, nutrition, pain and medication. Recommendations to primary care and nursing teams. CGU home intervention team included doctors, physical and occupational therapists, psychologists, dieticians and social workers. CGU acts as second-in-line for emergencies if primary care not available.	Usual primary care and home visiting nursing services.	Rates of: Hospitalisation. Emergency room visits (ERVs). Institutionalisation. (cumulative rates using Kaplan-Meier's approach to account for varying length of follow-up). 'Unnecessary' hospitalisation, identified by chart review by the research nurse; defined as those occurring in the absence of an acute medical problem, that could have been handled by a	I n=122, C n=179 <u>Rate of first hospitalisation</u> At one year: I 53.6% (95% CI 43.9 to 63.3) C 55.4% (95% CI 47.0 to 63.8) p=0.78 At two years: I 67.8% (95% CI 58.1 to 77.4) C 82.3% (95% CI 72.6 to 92.1) p=0.04 At three years: I 69.8% (95% CI 59.9 to 79.6) C 87.6% (95% CI 78.2 to 97.0) p=0.01 <u>Rate of first ERV</u> At one year: I 8.3% (95% CI 2.6 to 13.9) C 13.4% (95% CI 7.8 to 19.0) p=0.21 At two years: I 8.3% (95% CI 2.6 to 13.9)	Nurses were randomly assigned to one of four home visiting nursing teams (8 nurses in each), two of which were the I and two the C groups. Patients were randomly allocated to one of the nursing teams. Sample size calculation was 300; I=122, C=179 were recruited. Similar numbers were identified as eligible for each group but 67 potential I subjects declined. There were no significant differences in baseline measures including frailty scores and comorbidities. Follow-up periods varied; 52.5% of the I group and 49.7% of the C group were still in the study at the end of data collection. Those who were not had discontinued the home nursing service, died or had been institutionalised. Overall rates of hospitalisation, ERVs and institutionalisation were based on variable	Frail elderly people receiving assessment and support from a CGU in addition to usual primary care and home visiting nursing had lower rates of first hospitalisation and of ER visits at two and three years compared with those receiving usual primary care and home visiting nursing services only. They also had fewer hospitalisations considered 'unnecessary'. There was no difference in rates of institutionalisation up to three years. It was not clear what input patients had received from the CGU apart from the initial assessment. This study had a number of methodological problems as

							GP or home care programme. Mean 16.3 months follow-up (range 5-41 months).	C 17.8% (95% CI 10.3 to 25.2) p=0.045 At three years: I 8.3% (95% CI 2.6 to 13.9) C 23.2% (95% CI 13.1 to 33.3) p=0.01 <u>Rate of institutionalisation</u> At one year: I 11.2% (95% CI 5.1 to 17.2) C 10.3% (95% CI 5.3 to 15.4) p=0.83 At two years: I 21.6% (95% CI 12.9 to 30.4) C 28.2% (95% CI 18.4 to 37.9) p=0.33 At three years: I 39.4% (95% CI 25.1 to 53.6) C 31.8% (95% CI 21.3 to 42.3) p=0.40 <u>'Unnecessary' hospitalisations</u> (out of total hospitalisations): I 5/122 (4.1%) C 24/205 (11.7%) p=0.03	follow-up. Analyses reported here used Kaplan-Meier's approach which allowed for variable length of follow-up. The paper refers to a range of professionals available at the CGU and 'co-ordinated follow-up' but it was not clear what input had been provided by the CGU apart from the initial assessment and some out-of-hours support. There may have been confounding due to differences between the nursing teams. I and C nursing teams worked from the same locations which may have caused contamination. Outcome measures were collected by an independent nurse but it is not stated whether they were blinded.	allocation was by nursing team which may have led to confounding and contamination. It was not clear if the assessment of unnecessary hospitalisation was blinded. These factors may have affected the findings. There are differences in service provision between the UK and Switzerland, where primary care services are private while the home visiting nursing and CGU are public services. This may affect the generalisability of this study's findings to the UK.

1.3 Community dwelling elderly with recent hospital discharge (setting not stated or own home): assessment										
Population type	**Intervention type**	**Study author, year of publication. Years of study (RCTs). Search timescale, language restrictions (SRs).**	**Study type and aim**	**Population, including setting and country**	**Intervention**	**Control**	**Outcomes, including time points (outcomes relevant to PICO only)**	**Results (Intervention (I) vs Control (C) (including for subgroups relevant to PICO)**	**Brief comment re key quality issues**	**Conclusions**
Elderly patients with multiple health or social problems discharged from hospital to the community (settings not stated).	Single assessment at home following hospital discharge.	Lembeck et al, 2019. The study was carried out during 2013-2014.	RCT. To determine whether discharge planning including a single follow-up home visit reduces readmission rate.	Aged ≥65 years. Community-dwelling (setting not stated). Discharged with any diagnosis from the Medical, Geriatric, Emergency, Surgical or Orthopaedic departments. Three of: cognitive and psychiatric disorders; drug or alcohol abuse; lack of social network; low level of functioning; >six medications; hospital contacts within six months before index hospitalisation; falls history; concerns about housing conditions.	Project nurse accompanied patient home on discharge and together with municipal nurse conducted a comprehensive structured assessment (cognitive skills, medication, nutrition, home environment, mobility, level of functioning). Referrals or minor home adjustments made or further advice sought if indicated. Nurses were described as experienced in care of the elderly.	Usual care.	Unplanned readmissions at any hospital in Denmark. GP consultations. Use of municipal services. p values – significance of difference in proportions or means. OR based on logistic regression or β coefficient based on linear regression adjusted for discharging department and municipality.	I n=270, C n=267 <u>Number readmitted</u> (number (%), p value, adjusted OR (95% CI)). At 8 days: I 31 (11%), C 27 (10%). p= 0.61 OR 1.16 (95% CI 0.67 to 2.00) At 30 days: I 80 (30%), C 70 (26%) p=0.38 OR 1.18 (95% CI 0.81 to 1.73) At 180 days: I 150 (56%), C 144 (54%) P=0.71 OR 1.07 (95% CI 0.75 to 1.51). <u>Number of readmissions</u> (number, p value, adjusted β coefficient (95%CI)). At 8 days: I 32, C 32, p=0.97, β= – 0.00 (95% CI −0.06 to 0.06). At 30 days:	Randomisation procedures appeared adequate. There were reported to be no significant baseline differences between groups. Planned sample size was 216 in each group. 537 patients were randomised (I 270, C 267). 238 of the I group received the intervention (some did not receive it, usually because discharge plans changed after randomisation). Data on admissions and GP contacts were obtained from Danish national registers and on municipal services from municipal registers. There was no loss to follow-up as all outcome data were register-based. 23% of subjects were reported to have died within 180 days. There was no protocol describing interventions required following the assessment so these may have varied	There was no difference in hospital readmissions or use of GP or municipal services in elderly people receiving a single home visit and assessment following hospital discharge, for up to 180 days after discharge, compared with a control group who did not receive a home visit. This was a vulnerable group of elderly people with high levels of health and social care use. This was a large well-conducted RCT. The assessment was structured but decisions based on the assessment findings may have varied between individual nurses.

				Mean age of participants 82.5 years. Denmark.			Various time periods up to 180 days after discharge.	I 92, C 87, p=0.77, β= – 0.01 ((95% CI −0.09 to 0.11). At 180 days: I 274, C 293, p=0.49, β= −0.09 (95% CI − 0.32 to 0.14). <u>Number of days in hospital</u> (number, p value, adjusted β (95%CI)). At 8 days: I 81, C 55, p=0.28 β= – 0.09 (95% CI −0.08 to 0.26). At 30 days: I 545, C 440, p=0.30, β= – 0.36 (95% CI −0.34 to 1.06) At 180 days: I 1660, C 1830, p=0.48, β= −0.76 (95% CI −2.70 to 1.18) <u>Number of GP services used</u> (number, p value, adjusted β (95%CI)). At 28 days: I 1344, C 1393, p=0.52, β= −0.26 (95% CI − 0.97 to 0.46) At 180 days: I 5209, C 5730, p=0.10, β= −2.17 (95% CI −4.77 to 0.42). <u>Proportion receiving municipal services up to 6 months</u> (number, (%), p value, adjusted OR (95% CI)). Practical help: I 192 (75%), C 188 (72%) p=0.40, OR 1.18 (95% CI 0.79 to 1.76).	between nurses. Total number of nurses involved was not stated.	

								Personal care I 215 (84%), C 224 (86%) p=0.63, OR 0.88 (95% CI 0.54 to 1.43) Nursing I 228 (89%), C 232 (89%) p=0.85, OR 1.09 (95% CI 0.62 to1.92).		
Elderly patients discharged from hospital to the community (own home), in some cases via rehabilitation or nursing home, and scheduled to receive home care.	Four assessments within home care following hospital discharge. Treatment plan for home care but not CM.	Røsstad et al, 2017. Patients recruited Oct 2009 to March 2011.	RCT. To establish the effect of PaTH compared to usual care for elderly in need of home care services after discharge from hospital.	Aged ≥70 years. Discharged to community setting (own home). Served by one of the home care clusters or scheduled to receive home care after discharge. Mean age 82.4-83.1 years. Two-thirds lived alone. Mean of 3.5-3.8 chronic conditions. Some patients were discharged via an intermediate facility (rehabilitation or nursing home) expected to be for less than four weeks. Norway.	Patient Trajectory for Home-dwelling elders (PaTH): comprised four assessment checklists used within the home care service: 1. Day of discharge including information from hospital; 2. Assessment by home care nurse within 3 days; 3. GP consultation at 2 weeks to review medication and follow-up; 4. evaluation by home care nurse after four weeks. Checklists did not specify management – home care nurses used professional judgement. Individual care plan.	Usual care (involved contact between hospital and home care before discharge but no standardised follow-up procedures).	ADL: Nottingham extended ADL scale (NEADL) QOL: SF-36 MCS SF-36 PCS Readmissions Care provided Care use 12-month follow-up.	I=163, C=141 <u>NEADL sum score</u> Mean (SD) at baseline, 6 and 12 months: I 33.3 (15.3), 36.1 (17.0), 35.5 (17.1) C 34.0 (16.0), 34.9 (15.8), 32.1 (16.2). Mean difference: 6 months: 1.4 (95% CI −2.1 to 5.0), p=0.43. 12 months: 2.4 (95% CI −1.3 to 6.2), p=0.21. <u>SF-36 PCS</u> Mean (SD) at baseline and 12 months: I 30.7 (7.2), 37.3 (9.6) C 29.1 (8.2), 34.8 (10.1) Mean difference: 12 months: 1.3 (95% CI −1.6 to 4.3), p=0.38 <u>SF-36 MCS</u> Mean (SD) at baseline and 12 months: I 38.6 (9.9), 46.7 (10.9) C 38.0 (11.6), 46.1 (12.5) Mean difference: 12 months: 1.1 (95% CI −2.6 to 4.8), p=0.56 <u>Readmissions in 30 days</u>*, number (%):	Randomisation was by home care cluster (12 clusters, six randomised to each group). Randomisation procedures appeared adequate. I=163, C=141. Sample size calculations estimated 151 would be required per group but did not account for the cluster design. There were no dropouts apart from deaths (61 (20%) at 12 months). There were reported to be no difference in baseline characteristics between groups apart from a lower functional level in the I group (p value not stated). Service data was from registries and electronic health records. NEADL and SF-36 assessments did not appear to be blinded. Documented use of the PaTH checklists occurred as planned in only a minority of patients: 21% patients had no checklists used, 16% had one, 27% had two and 36% had three or four.	There were no differences in ADL or QOL outcomes, or in hospital readmissions or care being provided at 12 months in elderly patients being discharged from hospital and receiving home care who were randomised to receive four scheduled assessments within home care, compared to those receiving usual care in home care. The only difference in care use was a significantly higher number of GP encounters in the intervention group. However given the number of outcomes assessed it is likely that at least one would find a positive result. The intervention was incompletely implemented with use of the checklists as planned in only a minority of patients. The study was probably also

								I 27 (16.6%), C 25 (17.7%) OR 0.8 (95% CI 0.4–1.7), p=0.65 <u>Care at 12 months</u>*, number (%): No care I 30 (18.4%), C 24 (17.0%) OR 1.0 (95% CI 0.5–1.9), p=0.95 Home care I 86 (52.8%) C 78 (55.3%) OR 1.1 (95% CI 0.7–1.8), p=0.60 Permanent nursing home stay I 13 (8.0%) C 12 (8.5%) OR 0.7 (95% CI 0.3–1.7), p=0.47 <u>Care use during 12 months</u>*, mean (SD): Days in hospital I 10.3 (15.0), C 11.0 (15.7) OR 0.8 (95% CI 0. 5 to 1.4), p=0.43 Days in nursing homes, I 41.4 (76.8) C 45.9 (76.9) OR 0.7 (95% CI 0.2 to 2.2), p=0.55 Days at home I 267.5 (123.7) C 260.9 (127.6) OR 1.8 (95% CI 0.9 to 3.4), p=0.08 GP encounters I 5.1 (5.0) C 4.4 (4.47) OR 1.4 (95% CI 1.0–1.8), p=0.04 *adjusted for inpatient length of stay, number		underpowered as sample size calculations had not allowed for the cluster RCT design. This study had a number of methodological problems. It suggests that assessment checklists may not be routinely implemented in home care but does not provide any evidence that use of the checklists might be beneficial compared with usual home care.

								of chronic conditions and living alone.		
Elderly patients with polypharmacy, multimorbidity or history of frequent hospital admissions discharged from hospital to the community.	Assessment at home by GP and nurse following hospital discharge.	Thygesen et al, 2015. Patients discharged between 16 Feb 2012 and 14 Sept 2012.	RCT. To evaluate whether a systematic municipality-based post-discharge follow-up intervention could reduce readmission and the use of primary and secondary health care.	Aged ≥65 years. Discharged from hospital (setting not stated). Had dementia or two of: ≥two hospital admissions within previous 12 months*; loss of physical functioning; treatment of ≥two concurrent medical or surgical conditions*; mental disorder; ≥six prescription medications*; symptoms of cognitive disturbance; substance abuse problem; disadvantaged social network; need for increasing home care. *commonest reasons (each >50% of participants). Denmark.	Home visit by municipal nurse and GP within seven days of discharge, to carry out assessment. Plan for up to three further visits, up to eight weeks after discharge.	Usual post-discharge care.	Hospital admissions. Length of stay number of days in hospital). GP consultations. Home care, nursing care or nursing home. Outcomes up to 180 days after initial discharge.	Numbers included in these analyses not stated. <u>Number (%) admitted</u> By 30 days: I 64 (23.7), C 61 (23.4), p=0.93 By 180 days: I 140 (51.9), C 134 (51.3) p=0.91 <u>Number of admissions</u> (mean per patient): At 30 days I 84 (0.3), C 73 (0.3), p=0.72 At 180 days I 288 (1.1), C 252 (1.0), p=0.81. <u>Length of stay</u> (mean per patient): At 30 days I 355 (1.3), C 465 (1.8), p=0.90 At 180 days I 1846 (6.8), C 1638 (6.3), p=0.63 <u>Number of GP consultations</u>* (mean per patient): At 30 days I 588 (2.2), C 516 (2.0), p=0.04 At 180 days I 2654 (9.8), C 2405 (9.2), p=0.18 *excluding consultations as part of the intervention.	Randomisation procedures appeared adequate. Planned sample size was 240 per group. 531 were randomized into intervention (n=270) and control (n=261). Baseline characteristics appeared similar although no statistical comparisons were shown. 149 (55%) of the patients received the first home visit, 49 (18%) the second visit, and eight (3%) the third visit. No patients were lost to follow-up, but 22 died during the follow-up period (no significant difference in mortality between I and C). Data on service use were obtained from Danish national registers and municipal services. Analyses appeared to be ITT. The authors stated that per-protocol analyses were also carried out (defined as a visit by the GP at least once during the intervention period), which showed the same overall results as ITT analyses, but these were not shown. It is not clear how many subjects were included in these analyses.	There was no difference in number of admissions to hospital up to 180 days after discharge, or length of stay between elderly patients with polypharmacy, multimorbidity or history of frequent hospital admissions discharged from hospital who were randomised to receive assessment at home by a GP and nurse, compared with those receiving usual care. The intervention group had significantly more GP consultations (excluding those as part of the intervention) at 30 days but not at 180 days. Up to 6 months after discharge, intervention patients received more home care and nursing care. The majority of patients did not receive the intervention as planned. This appears to have been a moderately well-conducted study. The numbers included in the

								Number (%) receiving services 1-6 months after discharge: Home care I 130 (56%), C 103 (47%), p=0.04 Nursing home I 23 (10%), C 20 (9%), p=0.75 Nursing I 149 (64%), C 85 (38%), p<0.001		analyses were unclear.

2. Case management approaches

2.1 Community dwelling elderly including frail and non-frail (any setting or setting not stated): case management approaches										
Population type	**Intervention type**	**Study author, year of publication. Years of study (RCTs). Search timescale, language restrictions (SRs).**	**Study type and aim**	**Population, including setting and country**	**Intervention**	**Control**	**Outcomes, including time points (outcomes relevant to PICO only)**	**Results (Intervention (I) vs Control (C) (including for subgroups relevant to PICO)**	**Brief comment re key quality issues**	**Conclusions**
Community dwelling frail elderly, settings not stated.	Interventions to prevent adverse outcomes in frail elderly. This row includes case management approaches.	Van der Elst et al, 2019. Search to 17 June, 2016. Papers published in English, French, German or Dutch.	SRMA. To investigate the effect of an intervention on adverse outcomes in frail older adults.	Community-dwelling (settings not stated). Age ≥60 years. Frail (various definitions, not all included specific criteria or measures). Country of individual studies not stated.	Any. Nine RCTs with relevant outcomes included case management (CM). Definition: a collaborative process of assessment, planning, facilitation, care coordination, evaluation, and advocacy for options and services to meet an individual's and family's comprehensive health needs through communication and available resources to promote quality, cost-effective outcomes. Other RCTs included information	Care as usual.	Institutionalisation, Hospitalisation, Accidental falls. Time periods not stated; vary between studies.	Institutionalisation: CM interventions (6 RCTs, n=2226): OR 0.92 (95% CI 0.63 to 1.32), p=0.64. Hospitalisation: CM interventions (5 RCTs, n=2059): OR 1.13 (95% CI 0.95 to 1.35), p=0.18. Accidental falls: CM interventions (1 RCT, n=237): IRR 1.12 (95%CI 0.78 to 1.63), p value not stated Results for other interventions shown in separate tables.	Studies were assessed for risk of bias in seven domains: quality assessed as low (meeting two or fewer criteria), medium (meeting three or four criteria) or high (meeting more than four criteria). CM MA included 4 medium, 1 high quality studies. MA was carried out where interventions were provided in more than one study. No further details were provided on the individual interventions of each type, which may have been heterogeneous. Subjects were defined as having been diagnosed as frail; various definitions of frailty were used.	No statistically significant differences were found in hospitalisation or institutionalisation for frail older people receiving CM. No reduction in accidental falls was found in a single RCT of a CM approach. There were no further details about the interventions in these studies. This appears to have been a well-conducted SRMA. Most studies were assessed as being of medium or high quality and the MAs included between around 1000-2000 subjects. However the interventions may have been heterogeneous and a range of frailty

					provision (three), physical (one), and psychosocial (one).					definitions were used, which may mean the subjects were also heterogeneous, which may have affected the results.
Community-dwelling frail or pre-frail elderly, any setting.	Interventions focusing on prevention of frailty progression. This row includes case management approaches.	Apostolo et al, 2018. Search dates Jan 2001 to Nov 2015. Studies in English, Portuguese, Spanish, Italian and Dutch.	SR. To identify the effectiveness of interventions to prevent progression of pre-frailty and frailty in older adults.	Aged ≥65 years. Pre-frail or frail. Community-dwelling. Intervention in any setting. Countries of included studies were Taiwan, Sweden, Australia, Mexico, Belgium.	Two RCTs with relevant outcomes included case management (CM): Multiprofessional assessment and CM, rehab and other interventions as needed. Multidisciplinary intervention, assessment and CM, including physical activity / nutrition/medication review. Other interventions included group exercise + nutritional advice, problem-solving therapy, nurse home visit, assessment, plan, and alert button, and an OT-delivered programme.	Usual care, alternative therapeutic interventions or no intervention.	Frailty (various measures). Length of follow-up varied between studies.	Frailty status. <u>Multiprofessional assessment and CM +/- rehab</u> (1 RCT, n=161, moderate quality): Non-frail/ pre-frail/ frail at baseline: I 5%, 26%, 69% C 0%, 24%, 76% Frailty status improved/ maintained/ decreased 12 months post-discharge: I 12%, 74%, 14% C 22%, 68%, 9%. No significant difference between groups. <u>Multidisciplinary intervention, assessment and CM, including PA/ nutrition/ medication review</u> (1 RCT, n=241, good quality): Frailty prevalence: Baseline: I 100%, C 100% 12 months: I 62%, C 77% p=0.02. Results for other interventions shown in separate tables.	Methodological quality of the studies was assessed against 10 criteria; included studies met ≥five criteria. All studies used a recognised scale or index (eg Fried) to define pre-frailty and frailty. Findings and their statistical significance were not reported for all measures in all groups. It was not clear whether this was due to missing original data or incomplete reporting in the SR.	Improvements in frailty at 12-month follow-up were found in one RCT of a multidisciplinary intervention involving assessment and CM, with various interventions such as physical activity, nutrition or medication review. The clinical significance of the change in frailty score was not clear. A multidisciplinary intervention with assessment, CM and rehab if required did not find any differences in frailty outcomes. Limited further details were provided in this SR. This appeared to be a reasonably well-conducted SR and the included RCTs appear to have been of moderate or high quality. All studies used defined criteria for assessing frailty. The interventions and study populations were heterogeneous and the SR only reported results of individual studies with no

										attempt to combine study findings. Reporting of some outcomes appeared to be incomplete but it was not clear if this was due to limited information in the original study.
Community-dwelling older people, including frail and non-frail, settings not stated.	Assessment and case management targeting fall risk, appropriate medication use, loneliness and frailty.	Franse et al, 2018. Study took place between May 2015 and June 2017.	Controlled study (geographical controls). To explore the effects of a coordinated preventive health and social care approach on the lifestyle, health and quality of life of community-dwelling older persons in five European cities.	Age ≥75 years. Community dwelling (settings not stated but 38% lived alone). Average age of subjects 79.5 years. 60.8% were women. 30.2% had fallen in past year. 20.2% were physically frail. 17.4% had severely limited function. 69.1% had 'healthy lifestyle'. Study took place in five European cities: Greater Manchester, UK; Pallini, Greece; Rijeka, Croatia; Rotterdam, the Netherlands; Valencia, Spain.	Urban Health Centres Europe (UHCE) approach: Preventive multidimensional assessment of health risks; If indicated, coordinated follow-up health and social care. Assessment focused on fall risk, polypharmacy, loneliness and frailty. Care plan agreed with subject, care co-ordinator and GP. Subjects directed to care pathways addressing identified risks, overseen by care co-ordinator. Around half of the subjects enrolled in care pathways during the study.	Usual care.	Falls. Recurrent falls. Physical frailty. Frailty score (Tilburg Frailty indicator, TFI). ADL (Groningen Activity Restriction Scale, GARS). HRQOL.: SF-12 PCS SF-12 MCS SF-36. AEE = adjusted effect estimate (adjusted for clustering by city, and for age, gender, education, living situation and baseline status of the outcome measure). OR based on logistic	I n=986, C n=858. No (%) with fall in past year: I 280 (28.9%), C 267 (31.3%): AEE OR 0.92 (95% CI 0.74 to 1.14), p=0.441. No (%) with recurrent falls in past year: I 102 (10.5%), C 126 (14.8%): AEE OR 0.65 (95% CI 0.48 to 0.88), p=0.005. No (%) with physical frailty: I 236 (24.8), C 245 (29.4) AEE OR 0.78 (95% CI 0.60 to 1.02), p=0.065. Frailty (TFI) score*, mean (SD): I 4.9 (3.3), C 5.5 (3.4): AEE β −0.43 (95% CI −0.65 to −0.22), p<0.001. GARS score*, mean (SD): I 26.4 (10.8), C 27.4 (11.9), AEE β -0.11 (95% CI -0.73 to 0.52), p=0.742 HRQOL SF-12 PCS #, mean (SD):	GP practices or primary health centres were allocated to intervention or control based on location. Subjects were selected by GPs as able to participate. Baseline characteristics were the same apart from fear of falling score and loss of independence score (lower) and mental health-related QOL and mental well-being (higher) in intervention compared with control group (p<0.05). The non-randomised design means that there may have been biases in the way subjects were selected and there are likely to be confounding variables and differences between the intervention and control groups which will have affected the findings. 2325 were recruited, 12-month follow-up data was available for 1844 (79%). Baseline and outcome data were only shown for those with complete follow-up and there are likely to be biases associated with loss to follow-up. Study subjects and personnel were not blinded to group. It was not stated	After a 12-month assessment and case management intervention, statistically significantly fewer intervention group subjects had recurrent falls in the past year, and their scores on the Tilburg frailty indicator, the SF-36 and the physical component of the SF-12 were significantly better than those in the control group. The clinical significance of the differences in scores is not clear. There were no differences between the groups on the total number who fell, the GARS (ADL) score or the mental component of the SF-12. The study population appears to have been heterogeneous, about one-fifth were frail and almost a third had a history of recent falls. This was a large multicentre European study which included UK

							regression or β coefficient based on linear regression. 12-month follow-up, compared with baseline.	I 41.8 (12.1), C 40.4 (11.5): AEE β 0.95 (95% CI 0.14 to 1.76), p= 0.022. SF-12 MCS #, mean (SD): I 50.6 (11.2), C 48.8 (11.3): AEE β 0.52 (95% CI −0.32 to 1.37), p=0.224. SF-36 #, mean (SD): I 74.9 (20.5), C 71.8 (21.3): AEE β 1.50 (95% CI 0.15 to 2.84), p=0.029. *TFI and GARS: higher score worse # SF-12 and SF-36: higher score better	who carried out the outcomes assessments or whether they were blinded.	(Manchester) subjects but was probably subject to important causes of bias due to the non-randomised design and other methodological problems which are likely to have influenced the results. The findings should therefore be treated with caution.
Community-dwelling elderly (at home or in a home for the elderly) including people with complex care needs, frail and robust.	Case management and care by a multidisciplinary team.	Spoorenberg et al, 2018. Study took place between Jan 2012 and March 2013.	RCT. To evaluate the effects of the population-based, person-centred and integrated care service `Embrace' at twelve months on three domains comprising health, wellbeing and self-management among community-living older people.	Age ≥75 years. Community-dwelling (at home or in a home for the elderly, excluding nursing home residents). Stratified within GP practice by risk profile on Intermed-E-SA (IESA) (a measure of complexity of care needs) and Groningen Frailty Index (GFI) scores into Complex Needs (IESA ≥16), Frail (IESA <16, GFI ≥5) or Robust (GFI <5).	Multidisciplinary Elderly Care Team (ECT) consisting of GP, nursing home physician and two case managers. Interventions included: Monthly ECT meetings to discuss patients; Case management for complex needs and frail patients; individual care plan agreed by ECT with delivery navigated by case manager; Robust patients encouraged to contact team if	Usual care.	Self-report questionnaires at baseline and 12 months, including: Frailty (GFI); Complexity of care needs (Intermed-E-SA); Katz ADL; Groningen Wellbeing Indicator (GWI); HRQOL (EQ-5D-3L); General QOL; Self-management ability scale (SMAS).	Complex needs (CN) I n=129, C n=123 Frail I n=95, C n=90 Effect size (ES) I vs C, p value. Frailty (GFI)* CN ES 0.06, p=0.552 Frail ES 0.07, p=0.586 Intermed-E-SA* CN ES 0.15, p=0.149 Frail ES 0.06, p=0.608 Katz ADL * CN ES 0.13, p=0.204 Frail ES 0.06, p=0.660 EQ-5D-3L # CN ES 0.07, p=0.521 Frail ES 0.16, p=0.223 GWI # CN ES 0.07, p=0.512 Frail ES 0.09, p=0.478 QOL general *	Randomisation procedure appeared adequate. 15 GP practices took part; randomisation was stratified within each practice by risk profile and frailty. Sample size calculations estimated 1062 subjects were required. A total of 1456 were recruited and 1131 (77.4%) completed the follow-up questionnaire. Numbers recruited, included in follow-up (% follow-up) in each group were: Robust 854 (I 438, 346 (79%); C 416, 348, 84%)). Frail 237 (I122, 95 (78%); C115, 90 (78%)). Complex Needs 365 (I187, 129 (69%), C178, 123 (69%)).	A case management approach with care by a multidisciplinary team based in GP practices was not found to improve measures of QOL, ADL, frailty, wellbeing, complexity of care needs, or self-management in community-dwelling elderly people at 12 months compared with usual care. Both intervention and control groups included subjects who were robust, frail or had complex care needs, and no improvements were found for any of these groups separately or the whole study population.

				Mean age 80.6 years (I), 80.8 years (C). 55% female. Median of two chronic conditions. Netherlands.	their health or living situation changed; Embrace community meetings, including information on health maintenance, physical and social activities, and diet.			CN ES 0.06, p=0.587 Frail ES 0.03, p=0.818 SMAS # CN ES 0.26, p=0.015 Frail ES 0.05, p=0.705 * higher score worse # higher score better Outcomes were also shown for robust subjects but these are not relevant to this review.	There were no significant baseline differences between I group and C group, for the whole sample or by risk profile. Self-report questionnaires were completed by study subjects with support from family member, friend or volunteer if needed. Baseline assessments took place before randomisation so were blinded, but follow-up assessments were not. Volunteer assistants were blinded. A selection of the outcomes which are relevant to this review have been shown here. Given the large number of measures and groups only ES and p values have been shown. The authors also reported outcomes for I and C for the three groups combined, which also did not show any significant improvements.	This appears to have been a well-conducted RCT although outcomes were based on self-report measures so were not blinded at follow-up. Randomisation within practices may have led to contamination.
Community-dwelling frail elderly (including nursing home).	Assessment and case management (described as an 'integrated care model').	Looman et al, 2016. Dates of study not stated.	Controlled study (geographic controls). To report on the cost-effectiveness of the Walcheren Integrated Care Model (WICM) after 12 months	Community-dwelling (including nursing home). Score of ≥four on the Groningen Frailty Index (GFI) (Index range 0-15). Average age 82 years.	Home visit by nurse practitioner to assess functional, cognitive, mental and psychological functioning. Multidisciplinary treatment plan involving GP, nurses, and	Usual care (GP referral required for any additional care).	HRQOL: EQ-5D (higher score better). Total costs. Cost-effectiveness. Costs of different	I n=184, C n=193 Change in EQ-5D (mean (SD), p value of difference): I 0.00 (0.19) C−0.01 (0.17) p=0.80 Total costs (mean (SD), p value of difference): I €17 089 (21 468)	Three GP practices implementing the care model were allocated to I and six in a different geographical area to C. Patients with GFI ≥four were identified in both practice populations. Unclear how C practices were selected. I n=222, C n=224 at baseline, I n=184, C n=193 at 12 months (15% loss to follow-up).	A GP practice-based approach using assessment and case management for frail elderly people was not found to be cost-effective or to improve health-related QOL measures at 12months, compared with patients in control

			from a societal perspective.	Average GFI score =6. Netherlands.	other professionals as needed. Case management by nurse practitioner.		types of care. Outcomes after 12 months.	C €15 189 (21 709) p=0.38 ICER €412,450 per QALY (95% CI -4,131,743 to 4,210,593). Costs of different types of care (mean, p value of difference). GP: I €315, C €245, p=0.001 Hospital care I €1,096, C €709, p=0.154 Nursing home and assisted living I €1,244, C €820, p=0.593 Home care I €7,084, C €6,410, p=0.525 Informal care costs I €6,608, C €6,469, p=0.929 Total intervention costs (I only) (mean): €340	Significantly more of the I group were female and were living in an assisted living facility; other baseline characteristics reported were not significantly different. It was not stated whether EQ-5D assessments were blinded. Costs were based on Dutch guidelines. Health care volumes were collected through questionnaires to study participants and from GP files. Intervention costs were estimated from case manager and team meeting records. It is unclear how accurate these sources were, and they may have been subject to bias. Numerical values for the differences between groups were not shown.	practices receiving usual care. There were significant methodological problems with this study including the non-randomised design, lack of clarity about blinding and about data sources for outcomes measures, which mean that the findings cannot be regarded as reliable.
Community-dwelling elderly with multimorbidity and frequent hospital admissions	CGA and follow-up in an ambulatory geriatric unit	Ekdahl et al, 2016. Recruitment between February 2011 and December 2013, with a 36-month follow-up period.	RCT To compare the effects of care based on comprehensive geriatric assessment (CGA) as a complement to usual care in an outpatient setting with those of usual care alone.	Aged ≥75 years. Community-dwelling (setting not stated). Had received inpatient hospital care 3 or more times in the previous 12 months. Had 3 or more concomitant medical diagnoses. Mean age 82.5 years. 52% male.	CGA and follow-up in Ambulatory Geriatric Unit (AGU). Intervention included tailored care with home visits, visits to the AGU, and/or telephone calls. AGU staffed by a MDT. Input included provision of information of the importance of physical activity and	Usual care not involving AGU.	Nursing home and hospital use. Costs of different types of care. Care costs included the AGU costs. 36-month follow-up.	I = 208, C = 174 <u>Care use</u> Nursing home admissions, number (%) I 30 (14.4%) C 32 (18.4%) HR 1.36 (95% CI 0.83 to 2.24), p=0.23. Hospitalisations, mean number, (SD) I 2.8 (3.0), C 3.4 (3.3) p=0.06 Inpatient days, mean number (SD)	Randomisation procedures appeared adequate. There were no significant differences in baseline characteristics, including ADL and QOL measures and diagnoses. Assessors of baseline measures were blinded to group. Data on care consumption and costs were obtained from patient registries or municipal services records. This included the costs of AGU	Elderly patients with multimorbidity and a history of frequent hospital admissions who underwent CGA and care provided by an AGU had significantly fewer days in hospital and lower costs of inpatient care than patients receiving usual care. However the intervention group had significantly higher costs of visits to physicians and other staff, and there were

				Sweden.	proper nutrition, continuous updating of medication lists, and support to ensure good compliance with prescriptions. AGU closed due to lack of funding in November 2013. Patients received AGU care for between 24-31 months (mean 28.5 months for survivors).			I 15.1 (18.4), C 21.0 (25.0) p=0 .01 <u>Care costs</u> Total mean costs per patient (SD) I US$ 71,905 (85,560) C US$ 65,626 (66,338) Difference US$ 6,279, p=0.43 In-hospital care costs, mean (SD) I US$ 8,315 (10,675) C US$ 11,580 (14,650) Difference US$ -3,266, p=0.015 Visits to physicians costs, mean (SD) I US$ 5,074 (2,914) C US$ 3,272 (2,576) Difference US$ 1,802, p=0.000 Visits to other staff costs, mean (SD) I US$ 4,865 (5,431) C US$ 3,603 (5,845) Difference US$ 1,263, p=0.029 Pharmaceuticals costs, mean (SD) I US$ 3,237 (5,343) C US$ 2,559 (2,607) Difference US$ 678, p=0.127 Other health care costs, mean (SD) I US$ 2,946 (2,697) C US$ 2,638 (3,090) Difference US$ 308, p=0.299 Home help services costs, mean (SD) I US$ 23,164 (60,800)	provision. There was no loss to follow-up for this data. This paper included limited detail about the CGA and AGU interventions which had been described in other publications, but it appeared to follow a case management approach with a plan of care and regular follow-up.. The authors also reported a significant survival benefit for those attending the AGU (HR= 1.49, p=0.026)	no significant differences in nursing home admissions or costs, costs of pharmaceuticals or home help. Total care costs did not differ significantly between the two groups. The authors also reported a significant survival benefit for the intervention group. This appeared to be a well-conducted RCT. There were limited details about the intervention in this paper and it is unclear how applicable the findings would be to the UK

								C US$ 21,498 (39,341) Difference US$ 1,666, p=0.756 Nursing home costs, mean (SD) I US$ 14,973 (46,208) C US$ 12,523 (37,492) Difference US$ 2,450, p=0.575		

2.2 Community dwelling frail and pre-frail elderly (living in own home): case management approaches										
Population type	**Intervention type**	**Study author, year of publication. Years of study (RCTs). Search timescale, language restrictions (SRs).**	**Study type and aim**	**Population, including setting and country**	**Intervention**	**Control**	**Outcomes, including time points (outcomes relevant to PICO only)**	**Results (Intervention (I) vs Control (C) (including for subgroups relevant to PICO)**	**Brief comment re key quality issues**	**Conclusions**
Community dwelling frail elderly, living in own home.	Comprehensive assessment with case management: The Community Flexible Integrated Responsive Support Team (FIRST).	Parsons et al, 2017. Study dates not stated.	RCT. To establish the effectiveness of a restorative home support service on institutional-free survival in frail older people referred for needs assessment.	Age >65 years. Community-dwelling (living in own home). Assessed at high risk of permanent institutional care (eg dementia, with associated behavioural problems; incontinence; carer stress; repeated falls; frailty. Mean age of study participants: 82.7 years (I), 83.5 years (C).	Community FIRST: Targeted assessments by nurse care manager; Integrated care plan with goals; Functional ADL exercises; Support worker training and enhanced supervision; Care management; Health professional co-ordinators.	Usual care.	Exit from programme by death or permanent residential home placement. Instrumental ADL (IADL) ADL QOL Timescale for collection of ADL and QOL outcome measures not stated.	I n=56, C n=57 for all analyses. Analyses adjusted for age, gender, baseline health, disability needs, living circumstances. Death or permanent residential care: I 45%, C 55%, HR 0.69 (95%CI 0.4 to 1.16). IADL* treatment effect, I vs C 0.80 (95% CI -0.45 to 2.05). ADL* treatment effect, I vs C 0.40 (95% CI -1.04 to 1.83).	Randomisation done 'by computer', no details provided. The planned sample size was 240 but the study only recruited 113 subjects. Study personnel were not blinded due to the nature of the intervention but assessors were blinded and analyses were ITT. No details were provided in the paper of the ADL and QOL measures used which were part of a Home care dataset which was said to have established validity and reliability.	A comparison of a case management approach for frail older people living in their own home with usual care found no significant differences in the number of subjects who died or moved to permanent residential care, or in measures of ADL or QOL. This study was significantly underpowered as the authors were unable to recruit to their planned sample size, but

				New Zealand				EuroQOL# treatment effect, I vs C -3.07 (95% CI -9.47 to 3.33). No p values were reported. *ADL scales: lower score better #EuroQOL scale: higher score better.		appeared to be of moderate quality.
Community-dwelling older people at increased risk of functional decline (pre-frail), living in own home (>85% of subjects) or home for the elderly (nursing home excluded).	Comprehensive assessment, care plan and care management.	Suijker et al, 2016. Study carried out between Dec 2010 and May 2014.	Cluster RCT. To evaluate the effects of nurse-led multifactorial care to prevent disability in community-living older people.	Age ≥70 years. Community dwelling (excluding nursing home; >85% in own home). Score ≥two on the Identification of Seniors At Risk—Primary Care (ISAR-PC) scale, to identify community-living older persons at increased risk of functional decline. Median age of subjects 83 years. Netherlands	Comprehensive assessment during home visit, assessing somatic, psychological, functional and social domains. Individually tailored care treatment plan. Care coordination with multiple follow-up visits by trained community nurses.	Usual care.	Katz ADL index (a combination of basic ADL and IADL measures). HRQOL (EQ-5D). Self-perceived QOL. Hospitalisation. Number of falls. 12-month follow-up.	I n=1209, C n=1074. Outcomes adjusted for age, sex, socio-economic status, level of education, and modified Katz-ADL index score. All below outcomes at 12 months. Katz ADL score *: I 3.31 (95% CI 3.20 to 3.43); C 3.39 (95% CI 3.26 to 3.51): Intervention Effect -0.07 (95% CI -.022 to 0.07), p value not reported. EQ-5D score #: I 0.74 (95%CI 0.73 to 0.75); C 0.74 (95%CI 0.72 to 0.75): Intervention Effect 0.00 (95% CI -0.01 to 0.02), p=0.84. QOL ˜: I 7.05 (95% CI 6.98 to 7.11); C 7.07 (95% CI 7.00 to 7.15): Intervention effect -0.03 (95% CI -0.13 to 0.08), p=0.61. Hospitalisation incidence rate: I 0.11 (95%CI 0.09 to 0.13); C 0.12 (95% CI 0.10 to -0.14)	A statistician performed computerised cluster randomisation, stratified for socioeconomic status, number of participants and general practices. Groups were similar at baseline apart from a higher socioeconomic level in the intervention group. The study was cluster randomised but analysed at individual level. The authors reported that their target sample size was 1281 per group, meaning that the study was somewhat underpowered. Overall follow-up was 77%. Analyses were ITT. The authors reported that they conducted sensitivity analyses allowing for missing data but found no difference in the significance of the results. All outcome assessors were blinded to treatment allocation.	There was no difference between the intervention group of pre-frail older people receiving comprehensive assessment and care management and the control group receiving usual primary care in any of the ADL, QOL, hospitalisation or falls outcomes assessed at 1 year. This appears to have been a reasonably well conducted cluster RCT. Individual analyses and baseline group differences would have tended to overestimate the results, but no significant impact of the intervention was found.

								p value not reported. Falls incidence rate: I 0.26 (95% CI 0.21 to 0.30); C 0.22 (95% CI 0.19 to 0.26) p value not reported. *Katz ADL: lower score better # EQ-5D: higher score better ˜QOL: higher score better		
Community-dwelling frail elderly (excluding residential or nursing home).	Assessment, care plan and case management involving multidisciplinary team.	Ruikes et al, 2016. Study carried out between Sept 2011 and Sept 2012.	Cluster controlled (geographical controls). To evaluate the effectiveness of a general practitioner–led extensive, multicomponent program integrating cure, care, and welfare for the prevention of functional decline.	Age ≥70 years. Community-dwelling (excluding residential or nursing home). Frail (based on assessment using the EASY-Care Two-Step Older Persons Screening (TOS) instrument, together with GP/ nurse view). Mean age of participants 80-83 years. 64-67% female. Netherlands	Care Well programme: Multidisciplinary team meetings (GP, nurse, geriatrician, social worker); Assessment and individually tailored care plan; Case management by nurse or social worker; Annual medication review.	Usual care.	Katz ADL index. HRQOL (EQ-5D + C). Residential and nursing home admissions. Hospital admissions. 12-month follow-up.	I n=204, C n= 165. Follow-up measures at 12 months. Change at follow-up (mean (SD)); Estimated Intervention Effect (EIE), (95% CI), p value. Katz ADL score*: I 0.8 (SD 1.9), C 0.5 (SD 2.1) EIE 0.37 (95% CI -0.1 to 0.8), p=0.10 EQ-5D + C #: I 0.0 (SD 0.3), C 0.0 (SD 0.3); EIE -0.031 (95% CI -0.1 to 0.0), p=0.37. Number (%), OR (95% CI), p value. Residential/ nursing home admissions: I 24 (8.3%), C 13 (5.2%); OR 1.32 (95%CI 0.64 to 2.71), p=0.46. Hospital admissions: I 52 (18.1%), C 57 (22.9%); OR 0.74 (95%CI 0.48 to 1.14), p=0.17.	Practices were recruited based on number of elderly patients, practice facilities, and motivation. The practices were allocated to intervention or control based on suitability. There were significant baseline differences in socioeconomic status, education level, living alone, cognition score, health-related limitations in social functioning and care complexity. Analyses were adjusted for differences in baseline characteristics. The planned sample size was 600, 536 were recruited (I 287 and C 249) and a total of 31% lost to follow-up. Analyses of ADL and QOL appeared to exclude those who were institutionalised or hospitalised. Outcome assessors were blinded to previous measures but not to intervention.	No significant differences were found in measures of ADL and QOL or in admissions to hospital or residential and nursing homes at 12 months, between frail elderly patients receiving an assessment and case management approach and those receiving usual care. This study had many methodological problems including significant baseline differences between groups, high rates of loss to follow-up and lack of blinding of assessments which mean that the findings cannot be considered reliable.

								*ADL: lower score better # EQ-5D + C: higher score better		
Community dwelling, independently living 'old elderly' (excluding nursing home).	Assessment, case management approach.	Godwin et al, 2016. Dates of study not stated.	RCT. To determine if a nurse-based programme of home-delivered care, linked directly with the primary care team, would provide benefits for the elderly and lessen the burden on the primary health care system.	Age ≥80 years. Living independently in the community (excluding nursing home). Not cognitively impaired. Subjects were described as 'old elderly' with good quality of life but significant numbers reported impairments of function or symptoms. Mean age of participants 85.5 years. 62-71% female. Canada	Assessment by Primary Care Nurse Specialist based on patient file and home visit; care plan agreed including referral to other services as needed; up to 8 further home visits over 1 year to assess progress and assist with getting needs met.	Usual care.	QOL: SF-36 Use of medical services. 12-month follow-up.	I n=95, C n=86. SF-36: scores for eight separate scales reported; no significant differences between I and C on any scale at follow-up (p values between 0.16 to 0.93). <u>Use of health services</u> (number, (%)): Family physician visits: I 66 (91.7%), C 67 (94.4%), p=0.76 Emergency room visits: I 32 (44.4%), C 32 (45.1%), p=0.94 Hospitalisations: I 18 (25%), C 11 (15.5%), p=0.23 Diagnostic services: I 38 (52.8%), C 42 (59.2%), p=0.55	Randomisation procedure was not clear. There were no significant differences between groups in three baseline measures reported, the I group had a significantly higher education level. 12-month outcomes data used 6-month outcomes for those who were lost to follow-up between 6 and 12 months (23/95 in I group and 15/86 in C group). A total of 236 were recruited and 53 were lost to follow-up (77% follow-up). QOL outcomes were assessed by a research assistant but it was not stated whether they were blinded to group. The study only reported follow-up outcome measures with no assessment of change in outcomes over the study period.	This study did not find any significant differences in measures of QOL or healthcare use at 12 months in independently living 'old elderly' (mean age 85.5 years) receiving a case management approach compared with usual care. The subjects were not described as frail or prefrail although significant numbers reported symptoms or impairments of function. This was a relatively small study and may have been underpowered. There were significant methodological problems associated with randomisation, outcomes assessment and loss to follow-up which mean the findings cannot be regarded as reliable.

2.3 Community dwelling older people with dementia: case management										
Population type	**Intervention type**	**Study author, year of publication. Years of study (RCTs). Search timescale, language restrictions (SRs).**	**Study type and aim**	**Population, including setting and country**	**Intervention**	**Control**	**Outcomes, including time points (outcomes relevant to PICO only)**	**Results (Intervention (I) vs Control (C) (including for subgroups relevant to PICO)**	**Brief comment re key quality issues**	**Conclusions**
Community-dwelling older people with dementia, not living in an institution with 24-hour care.	Case management.	Reilly et al, 2015. Search to 31 December 2013. No language restrictions stated.	SRMA. To evaluate the effectiveness of case management approaches to home support for people with dementia.	Any age, with dementia of any type. Community-dwelling (excluding institutions with 24-hour care). Most studies included subjects with mild or moderate dementia, or both. Some studies included people with comorbidities. Countries (number of RCTs): USA (four), Hong Kong (HK) (three), Finland (two), UK (one), Netherlands (one), Canada (one), India (one). Hospital admission data were from USA, Hong Kong,	Case management (CM): delivered in the community; focused on the planning and coordination of care required to meet identified needs. Interventions were described as complex and variable. There were variations including frequency of contact, type of contact (face-to-face/ telephone), caseload, components of case management, whether part of a MDT.	Usual care, standard community treatment, other non-case management interventions.	Hospital admissions: nights admitted and number of subjects admitted. Institutionalisation: number admitted to residential or nursing home. QOL: PWIID, DQOL or HUI3. Function/ dependency measures: EASI, ADCS-ADL, ADL (Barthel). Various time periods up to 24 months.	Hospital admissions at 6 months (3 RCTs, n=341): Mean difference in nights hospitalised 0.63 (95%CI 0.4 to 0.86), p<0.0001 Hospital admissions, number admitted at 6 months (4 RCTs, n=439): OR= 1.06 (95%CI 0.61 to 1.84), p=0.84. Hospital admissions, number admitted at 12 months (5 RCTs, n=585): OR= 0.87 [0.59, 1.30), p=0.51. Hospital admissions, number admitted at 18 months (5 RCTs, n=613): OR= 0.76 [0.53, 1.10], p=0.14. Institutionalisation at 6 months (6 RCTs, n=5741): OR 0.82 (95%CI 0.69 to 0.98) p=0.02.	Risk of bias in the included studies was assessed in line with Cochrane methodology and was considered overall to be low to moderate. The studies included various approaches to CM and the baseline characteristics of study populations varied with respect to severity of dementia and presence of comorbidities. MA of QOL and function involved pooling results from different assessment tools which may have measured different domains. The findings for institutionalisation up to 12 months were dominated by one large study with over 5000 subjects. Although the SR included one UK study this did not contribute any of the data on relevant outcomes.	This SRMA found a statistically significant decrease at six and 18 months in admissions to nursing or residential home among older people with dementia receiving CM compared with controls, but there was no significant difference at 12 or 24 months. It also found a small but statistically significant increase at six months in the number of nights hospitalised (a mean of 0.63 more nights hospitalised for those receiving CM compared with controls). There was no difference in numbers admitted to hospital up to 18 months or in measures of QOL or function. This was a well-conducted Cochrane review. There

				Finland, Netherlands. Institutionalisation data were from USA, HK, Canada, Finland, Netherlands. QOL data were from Netherlands, HK, USA. Functional measures data were from Finland, USA, India.				Institutionalisation at 10-12 months (9 RCTs, n=5990): OR 0.95 (95%CI 0.83 to 1.08), p=0.43 Institutionalisation at 18 months (4 RCTs, n=363): OR 0.25 (95%CI 0.10 to 0.61) p=0.003. Institutionalisation at 24 months (2 RCTs, n=201): OR 1.03 (95% CI 0.52 to 2.03) p=0.94. QOL at 12 months (5 RCTs, n=681): Standardised mean difference 0.03 (95%CI -0.06 to 0.12), p=0.47. Functional measures at 6 months: (3 RCTs, n=318): Standardised mean difference -0.03 (95% CI -0.25 to 0.19), p=0.81. Functional measures at 12 months: (2 RCTs, n=251): Standardised mean difference 0.04 (95% CI -0.21 to 0.29), p=0.76.		appears to have been significant heterogeneity in what CM comprised and in the study populations, with respect to severity of dementia and the presence of comorbidities which might also affect their care needs and outcomes. While most of the studies were relatively small one large US study with over 5000 subjects dominated the results for care home admission. It is unclear how applicable the findings would be to the UK.

2.4 Community dwelling people with SMI: intensive case management										
Population type	**Intervention type**	**Study author, year of publication. Years of study (RCTs). Search timescale, language restrictions (SRs).**	**Study type and aim**	**Population, including setting and country**	**Intervention**	**Control**	**Outcomes, including time points (outcomes relevant to PICO only)**	**Results (Intervention (I) vs Control (C) (including for subgroups relevant to PICO)**	**Brief comment re key quality issues**	**Conclusions**
People with serious mental illness living in the community.	Intensive case management.	Dieterich et al, 2017. Search to April 2015. No language restrictions stated.	SRMA. To assess the effects of intensive case management (ICM) as a means of caring for severely mentally ill people in the community in comparison with non-ICM and with standard community care.	Age 18-65. SMI. Cared for in a community setting. Countries (number of RCTs): Australia, Canada and the USA (27): Europe, some including UK (12); China (one).	Intensive case management (ICM) (caseload ≤20). Case management, defined as: A case manager takes primary responsibility for a group of patients in the community, assessing needs, developing a care plan, arranging suitable care and keeping contact with the patient.	Standard community care, not within a designated package or model of care. Analyses also compared ICM with non-ICM (caseload >20). These results have not been presented as non-ICM does not meet the review definition of usual care.	Days in hospital. Admissions to hospital. QOL, average endpoint score: LQOLP (Lancashire QOL profile) (high=better). LQOLI (Lehman QOL scale) (high=better). Time periods: Short term (six months); Medium term (12 months); Long term (>12 months, average 23.5	Days in hospital per month by 24 months, ICM vs standard care (24 RCTs, low quality evidence, n=3595): Mean Difference, -0.86 (95%CI -1.37 to -0.34), p=0.001. Admissions to hospital by short term, ICM vs standard care (2 RCTs, n=244, RR 0.61 (95%CI 0.22 to 1.69), p=0.34. Admissions to hospital by medium term, ICM vs standard care (5RCTs, n=1303): RR 0.85 (95%CI 0.77 to 0.93), p value not reported. Admissions to hospital by long term, ICM vs standard care (11 RCTs, n=1516): RR 0.96 (95%CI 0.74 to 1.23), p=0.72. LQOLP by long term, ICM vs standard care (3RCTs, n274):	Risk of bias in the included studies was assessed in line with Cochrane methodology. The authors concluded that there was an overall unclear risk of bias in the trials, which would mean a moderate risk of overestimate of positive effect. Study subjects were heterogeneous in terms of diagnosis and social circumstances (eg several studies included homeless subjects, but others did not). The authors considered that this reflected the range of patients encountered in normal clinical practice. There were also variations in models of ICM, non-ICM and standard care.	There was a statistically significant reduction in average days spent in hospital per month for people with SMI receiving ICM compared with standard care, at up to 24 months follow-up, but the evidence for this was considered of low quality. There were also reductions in hospital admissions but these were not statistically significant except possibly at 12 months, although the p value was not reported. No differences were found in QOL measures between ICM and standard care. The reviewers also reported that they found moderate quality evidence of no significant difference between ICM and non-ICM in

							months, max four years).	Mean Difference -0.13 (95%CI -0.38 to 0.12), p=0.29. LQOLI by long term ICM vs standard care (2RCTs, n=132): Mean Difference 0.09 (95%CI -0.24 to 0.42), p=0.58.		hospital admissions or number of days in hospital. This was a large well conducted Cochrane SRMA but there was significant heterogeneity in study subjects and interventions, and risk of bias in the included studies means that estimated effects reported may not be accurate. It is not clear how the different care models compare to current NHS care.

2.5 Community dwelling adults with multimorbidity (setting not stated): case management approach in primary care										
Population type	**Intervention type**	**Study author, year of publication. Years of study (RCTs). Search timescale, language restrictions (SRs).**	**Study type and aim**	**Population, including setting and country**	**Intervention**	**Control**	**Outcomes, including time points (outcomes relevant to PICO only)**	**Results (Intervention (I) vs Control (C) (including for subgroups relevant to PICO)**	**Brief comment re key quality issues**	**Conclusions**
Adults with multimorbidity.	CARE Plus: Longer primary care consultations, practitioner continuity and follow-up, care planning and focus	Mercer et al, 2016. The trial started in Oct 2012.	RCT. To evaluate a whole-system primary care-based complex intervention, called CARE Plus, to improve quality of life	Aged 30-65. Community-dwelling (setting not stated) Two or more long-term conditions. Mean age 52 years. Mean no. of long-term conditions: five.	CARE Plus: 30-45 minute consultations; Relationship continuity and follow-up with practitioner; Practitioner support and training to use longer structured consultations;	Usual care.	HRQOL: EQ5D-5L. score. EQ5D-5L Area Under the Curve (AUC) based on linear regression. Wellbeing: W-BQ12.	I n=76, C n=76. Effect size (ES) at 12 months. EQ5D-5L score* ES 0.14 (95% CI -0.10 to 0.39), p=0.15 EQ5D-5L AUC* ES 0.36, p=0.002. General wellbeing*	Eight practices were selected from those serving most deprived populations and which expressed interest in participating. Practices of similar list size were randomised in pairs. No significant differences between groups at baseline. Designed as a pilot study so no sample size	Adults with multimorbidity who received longer primary care consultations, continuity of practitioner, care planning and follow-up, and support for self-management had significant improvements in negative wellbeing

	on self-management.		in multimorbid patients living in areas of very high deprivation.	Female 61% (I), 51% (C).	Focus on self-management; Agreeing on a care plan; Patient self-management support materials.		General wellbeing and three components: Negative wellbeing, Positive wellbeing, Energy. Cost of healthcare utilisation (primary and secondary care and prescribing). Cost-effectiveness (using EQ5D-5L AUC and healthcare utilisation costs). Outcomes at 12 months.	ES 0.23 (95% CI -0.03 to 0.49), p=0.083 Negative wellbeing ES 0.33 (95% CI 0.11 to 0.55), p=0.0036 Positive wellbeing ES 0.16 (95% CI -0.16 to 0.48), p=0.32 Energy ES 0.11 (95% CI -0.20 to 0.42), p=0.47. Estimated total costs I £312,449, C £243,793. Adjusted mean difference £929 (95 % CI £86 to £1788) per patient. QALYs gained over 12 months: 0.076 (95 % CI 0.028 to 0.124). ICER £12,224 per QALY gained. *positive/ larger ES better	calculations were carried out. Practices each identified approx. 25 patients who met inclusion criteria. 76 were recruited in each group. Follow-up 88% (67 in each group) at 12 months. It was not stated how missing data were dealt with. Analyses adjusted for clustering effects. Researchers who collected outcome data and analysts were blinded. There was little detail on how healthcare costs were calculated or the health economic analysis.	scores at 12 months compared with those receiving usual primary care, but no significant differences in other measures of wellbeing. There was a significant improvement in the EQ5D-5L AUC compared with usual care, but no significant differences in EQ5D-5L scores. The intervention was reported to have an ICER of £12,224 per QALY gained. This appeared to be a reasonably well-conducted RCT but was not powered to detect differences in outcomes. There were limited details about how the analysis was conducted which make the findings on costs and cost-effectiveness difficult to evaluate.

3. Advance Care Planning

3.1 Frail elderly living in, or receiving services from, residential care homes: Advance Care Planning.										
Population type	**Intervention type**	**Study author, year of publication. Years of study (RCTs). Search timescale, language restrictions (SRs).**	**Study type and aim**	**Population, including setting and country**	**Intervention**	**Control**	**Outcomes, including time points (outcomes relevant to PICO only)**	**Results (Intervention (I) vs Control (C) (including for subgroups relevant to PICO)**	**Brief comment re key quality issues**	**Conclusions**
Frail elderly living in, or receiving services from, residential care homes.	Advance Care Planning.	Overbeek et al, 2019. Study dates 2014 to 2016.	Cluster RCT. To determine the costs of an Advance Care Planning (ACP) programme and its effects on the costs of medical care and on concordance of care with patients' preferences.	Aged ⩾75 years. Frail (Tilburg Frailty Index (TFI) score ⩾five; TFI score range is 0-15). Able to consent to participation. Living in a residential care home, or living in its immediate surroundings and receiving non-residential care from the care home. Mean age 86-87 years. 66-70% female. Mean TFI 7.4-7.5 at baseline. Netherlands.	Offered facilitated planning conversations based on the Respecting Choices ACP programme. Three core elements: Information provision supported by leaflets; Facilitated ACP conversations based on scripted interview cards; Completion of an Advance Directive, potentially including the appointment of a surrogate decision maker. Delivered by nurses trained in the programme.	Usual care.	Use of hospital care. Costs of hospital care, diagnostic procedures, interventions and medication. Data on service use taken from subjects' GP medical files and care organisation records. All outcomes measured over 12 months following recruitment.	I n=97, C n=97. Hospital care, mean per participant: ED visits: I 0.41, C 0.43; Hospital days: I 3.50, C 3.62; ICU days: I 0.15, C 0.03. No p values reported. Total cost of hospital care, mean per participant: I €1944, C €1874 p=0.38 Diagnostic procedure costs, mean per participant: I €53, C €52 p=0.69 Intervention costs (surgery or CPR), mean per participant: I €349, C €504 p=0.55 Medication costs, mean per participant: I €134, C €7 p=0.21	16 residential care homes were randomly allocated to the intervention or control group. Randomisation procedure was not described. Numbers allocated to groups were I n=101, C n=100. No significant baseline differences apart from a higher level of education in the intervention group. Total loss to follow-up was 20%: 21 deaths (10%) and 20 (10%) declined or lost to follow-up. 77 I and 83 C completed follow-up assessment after 12 months. Care organisation files were examined for 97 in each group. Medical files were examined for 96 I and 92 C. No sample size calculations were shown and the study may have been underpowered. It was cluster randomised	There was no significant difference in the amount or costs of medical care used by frail elderly people living in or receiving services from residential care homes who took part in an ACP programme, compared with those who did not take part in ACP (although for some outcome measures, eg care costs and hospital care usage, p values were not reported so it is not possible to judge whether differences were statistically significant). This analysis included use of various types of hospital, nursing home and home care and medication costs only, so there are likely to have been additional costs such as for

								Total costs of medical care, mean per participant: I €2,360, C €2,235 p=0.36 Care home/ nursing home costs, mean per participant: I €41,551, C €46,533 p value not reported. Home care costs, mean per participant: I €14,091, C €17,361 p value not reported. ACP set-up fixed costs: €21,754 ACP costs per participant: mean €76	but analysed individually. It is not clear whether GP and care organisation records will have provided a complete record of hospital and other service use.	primary care, social care and personal costs which were not included. The ACP intervention was relatively inexpensive. This study had a number of methodological problems and may have been underpowered.

4. Reablement and/or Occupational Therapy

4.1 Community dwelling elderly with poor physical or mental health (living in own home): reablement with or without Occupational Therapy										
Population type	**Intervention type**	**Study author, year of publication. Years of study (RCTs). Search timescale, language restrictions (SRs).**	**Study type and aim**	**Population, including setting and country**	**Intervention**	**Control**	**Outcomes, including time points (outcomes relevant to PICO only)**	**Results (Intervention (I) vs Control (C) (including for subgroups relevant to PICO)**	**Brief comment re key quality issues**	**Conclusions**
Elderly with poor physical or mental health living in own home.	Reablement as part of home care.	Cochrane et al, 2016. Search to April 2015. No language restrictions were set.	SRMA. To assess the effects of time-limited home-care reablement services for maintaining and improving the functional independence of older adults when compared to usual home-care or wait-list control group.	Living in own home. 80% aged ≥65 years. Require assistance to perform tasks of daily living and to participate in normal activities due to poor physical or mental health. Countries (number of RCTs): Australia (one), Norway (one.	Reablement: Intensive; time-limited (up to 12 weeks); delivered in subject's own home; interdisciplinary team (including Occupational Therapy (OT) and Physiotherapy (PT); person-centred; goal directed, focused on maximising independence.	Usual home care consisting of several weekly visits, help with personal care or practical assistance.	Functional status (ADL or IADL in one study, COPM (Canadian Occupational Performance Measure) in one study). Unplanned hospital admission. QOL. Period of follow-up: 9-12 months for functional status and QOL; 24 months for hospital admissions.	Functional status (2 RCTs, n=249, 1 low, 1 adequate quality), Standardised mean difference in functional status score, I vs C: -0.30 (95%CI -0.53 to -0.06) (favouring intervention). Unplanned hospital admission (1 RCT, n=750, low quality): RR I vs C 0.94 (95%CI 0.85 to 1.03). QOL (2 RCTs, n=249, 1 low, 1 adequate quality), Standardised mean difference in QOL score, I vs C: -0.23 (95%CI -0.48 to 0.02). No p values were reported.	Studies were assessed for risk of bias in nine domains (in line with Cochrane methodology). The largest study (total n=750) had high risk of bias in all domains, while the other (total n=61) was considered 'largely adequate' with low risk of bias in four domains and high risk in three. Changes in scores in two different functional status measures were pooled, but because the COPM measures domains which are defined by the subject while the ADL and IADL measure predefined domains it is not clear whether these would have been equivalent. The poor quality of included studies (particularly the largest which contributed most of the data) meant that the quality of evidence	A statistically significantly greater improvement in scores of functional measures were found in the subjects receiving reablement compared with usual home care. No significant difference was found in QOL or unplanned hospital admissions between the two groups. The clinical significance of the change in functional scores is not clear. This appeared to be a well-conducted Cochrane review and SRMA but due to the poor quality of the included studies this evidence cannot be considered very reliable.

									for all outcomes was considered very low.	
Community-dwelling (in own home) older people receiving reablement services.	Occupational therapy as part of reablement services.	Whitehead et al, 2016. Study took place April 2014 to July 2015.	RCT. To test the feasibility of conducting a randomised controlled trial of an intervention targeted at activities of daily living, delivered by an occupational therapist, in homecare reablement.	Community-dwelling (in own home). Referred to reablement service. Mean age 82 years. 67% living alone. Male: I 27%, C 60% UK.	Usual reablement service with home-based, time-limited, individually tailored programme delivered by an occupational therapist (OT) aiming to maximise ADL. (goal-setting, skills building, equipment provision and environment adaptations). Duration not stated; varied with length of reablement intervention.	Usual reablement service with no access to OT (max duration six weeks).	ADL: Barthel Index (BI); Nottingham Extended Activities of Daily Living (NEADL). QOL: EQ-5D SF-36 PCS SF-36 MCS Falls (self-reported). 6-month outcomes.	I n=10, C n=12. Mean (SE) difference in change at 6 months, I-C: BI: 0.28 (1.12), 95% CI−2.06 to 2.61 NEADL: 1.58 (5.28), 95% CI −9.47 to 12.64 EQ5D: 0.23 (0.22), 95% CI −0.23 to 0.69 SF-36 PCS: 0.09 (5.33), 95% CI −11.06 to 11.24 SF-36 MCS: 3.39 (4.90), 95% CI −6.88 to 13.66 Analyses adjusted for difference in gender between groups. Number of participants with a fall within each time period; 2 weeks: I 2/13 (15%), C 4/13 (31%) 3 months: I 2/11, (18%), C 3/12 (25%) 6 months: I 2/10 (20%), C 6/12 (50%)	Randomisation procedure appears adequate. 30 were recruited, 15 to each group, with 8 (27%) lost to follow-up at 6 months, 6 of whom had died. More of the I group than the C group were male and had musculoskeletal problems, and fewer had neurological problems. There were no significant differences in median baseline outcome measures between the groups. Assessments were blinded.	Older people receiving a tailored programme of OT as part of a reablement service did not have significant differences in measures of ADL, QOL or falls at 6 months compared with people receiving the usual reablement service without OT input. This was a small feasibility RCT and was not powered to detect difference in outcomes between the groups.

4.2 Community dwelling physically frail elderly (any setting or not stated): OT alone or as part of a multidisciplinary approach										
Population type	**Intervention type**	**Study author, year of publication. Years of study (RCTs). Search timescale, language restrictions (SRs).**	**Study type and aim**	**Population, including setting and country**	**Intervention**	**Control**	**Outcomes, including time points (outcomes relevant to PICO only)**	**Results (Intervention (I) vs Control (C) (including for subgroups relevant to PICO)**	**Brief comment re key quality issues**	**Conclusions**
Community-dwelling physically frail elderly, setting not stated.	Multicomponent interventions (OT, either alone or as part of a multidisciplinary team).	De Coninck et al, 2017. Search to June 2015. No language restrictions were set.	SRMA. To assess the effectiveness of OT interventions as mono-disciplinary intervention or as part of a multidisciplinary approach, for community-dwelling physically frail older people.	Community-dwelling (any setting; settings not stated). Age ≥60 years. No specific definition of frailty was used. Subjects in individual studies were described as having either difficulties with ADL, falls risk, or both. Countries not stated.	Home- and community-based multidisciplinary interventions that included OT (seven studies), interventions by OT alone (one study) or by OT and GP (one study). Frequency of OT intervention with subjects ranged from one to seven. OT interventions consisted of assessment, education and information, prevention strategies, exercises, use of assistive technology, home hazard modification, advice on aids and services, coaching, and/or follow up session.	Usual care or no intervention.	ADL. Instrumental ADL (IADL) was used if available, basic ADL if IADL not available. Time period not stated.	Functioning in ADL (6 RCTs, n=1841, individual study quality not shown): standardised mean difference, I vs C: -0.30 (95%CI -0.50 to -0.11) (favouring intervention). p value not reported.	Studies were assessed for risk of bias in six domains. Overall they were considered to be of reasonable quality with low risk of bias, except for performance bias (details not shown in this paper). Study results were pooled where studies were considered to be similar in population, intervention, and outcome measures. Scores from IADL and basic ADL were pooled but these scales measure different levels of functioning (IADL assesses specific daily living tasks). There was considerable heterogeneity across the interventions in the different studies, most including OT as part of a multidisciplinary intervention, but with wide variation in the OT input. Study populations also appear likely to vary significantly as no specific definition of frailty was used.	A statistically significantly greater improvement in ADL score was found in physically frail elderly people receiving interventions which included OT compared with the controls. This was based on a MA including over 1800 subjects. The interventions and study populations appear to have been heterogeneous and the impact of the OT component was not separated from the overall intervention which was multidisciplinary in most of the studies. Scores for different types of ADL were combined and the clinical significance of the change in ADL scores is not clear. It is therefore difficult to draw clear conclusions about the impact of OT

										from this SRMA which appeared to be moderately well conducted.
Community-dwelling frail or pre-frail elderly, any setting.	Interventions focusing on prevention of frailty progression This row includes an OT-delivered intervention.	Apostolo et al, 2018. Search dates Jan 2001 to Nov 2015. Studies in English, Portuguese, Spanish, Italian and Dutch.	SR. To identify the effectiveness of interventions to prevent progression of pre-frailty and frailty in older adults.	Aged ≥65 years. Pre-frail or frail. Community-dwelling. Intervention in any setting. Countries of included studies were Taiwan, Sweden, Australia, Mexico, Belgium.	One RCT included an OT-delivered programme involving assessment, plan, delivery of interventions (eg assistive devices, skills training). Other interventions included a group exercise programme + nutritional advice, problem-solving therapy, case management approaches and a nurse home visit, assessment, plan, and alert button.	Usual care, alternative therapeutic interventions or no intervention.	ADL. After 8-10 week intervention.	OT intervention (1 RCT, n=168, moderate quality): Basic ADL (mean (SD)) at baseline, and change after 8-10 week intervention: I 66 (25), +3.6 C 69 (23), -3.1 p=0.013. Results of other interventions shown in separate tables.	Methodological quality of the studies was assessed against 10 criteria; included studies met ≥five criteria. All studies used a recognised scale or index (eg Fried) to define pre-frailty and frailty. Findings and their statistical significance were not reported for all measures in all groups. It was not clear whether this was due to missing original data or incomplete reporting in the SR.	Improvements in ADL were found in one moderate quality RCT of an OT intervention with frail or pre-frail elderly people. This appeared to be a reasonably well-conducted SR and the included RCTs appear to have been of moderate or high quality. All studies used defined criteria for assessing frailty. The interventions and study populations were heterogeneous and the SR only reported results of individual studies with no attempt to combine study findings. Reporting of some outcomes appeared to be incomplete but it was not clear if this was due to limited information in the original study.

5. Exercise/ physical activity alone

5.1 Community dwelling frail or pre-frail elderly (settings not stated): exercise or physical activity interventions										
Population type	**Intervention type**	**Study author, year of publication. Years of study (RCTs). Search timescale, language restrictions (SRs).**	**Study type and aim**	**Population, including setting and country**	**Intervention**	**Control**	**Outcomes, including time points (outcomes relevant to PICO only)**	**Results (Intervention (I) vs Control (C) (including for subgroups relevant to PICO)**	**Brief comment re key quality issues**	**Conclusions**
Community dwelling frail elderly, settings not stated.	Exercise interventions.	Zhang et al, 2019. Search to July 2019 Papers published in Chinese or English.	SRMA. To report current evidence on the effect of exercise interventions, alone or in combination with other interventions, on improving physical function, daily living activities and quality of life.	Community-dwelling (settings not stated). Age ≥65 years. Frail according to standardised criteria or considered frail due to significant reduction of physical function. Frailty criteria not defined. Country of individual studies not stated.	Exercise of any form, alone or in combination with other interventions. Included aerobic or endurance exercise, resistance or strength exercise, flexibility training and balance training, and multi-component training. Various settings, duration (range eight-48 weeks) and frequency (range one to seven sessions/ week), Group or individual.	Included: usual care, health education, social meeting or other types of exercise interventions.	Daily living activities: including FSQ (Functional Status Questionnaire), GARS, Barthel Index and ADL score. QOL: including EQ-5D, EQ-5D VAS. Time periods varied.	ADL (5 RCTs, none had high risk of bias, one overall low risk of bias, n=363): Standardised mean difference in ADL scores between I and C: 0.54 (95% CI 0.11 to 0.96), p=0.01 (favouring I) QOL (4 RCTs, 2 had high risk of bias, n=471): Standardised mean difference in QOL scores between I and C: -0.1 (95% CI -0.54 to 0.33), p=0.65. Time periods not stated.	Studies assessed for risk of bias in seven domains. The authors judged studies with more than one 'high risk' domain to be at high risk of bias. This SRMA included heterogeneous interventions. Comparators included other interventions and usual care, but these were not analysed separately. Various definitions of frailty were used. The ADL score was higher in the I group, which was reported in the text as an improvement in the I group compared with C. For most of the included ADL measures a higher score is worse, but no further details were provided on how they were combined to produce this finding.	A statistically significant improvement in ADL scores was reported for frail elderly people taking part in exercise interventions alone or in combination with other interventions compared with control groups. There was no significant difference between intervention and control groups in the change in QOL scores. The clinical significance of the change in ADL scores is not clear. This SRMA was reasonably well conducted but the study subjects, interventions and comparators were heterogeneous, which is likely to have affected the findings. It was not

										clear how the MA result had been calculated from the different ADL scores used.
Community dwelling frail elderly, settings not stated.	Interventions to prevent adverse outcomes in frail elderly. This row includes a physical intervention.	Van der Elst et al, 2019. Search to 17 June, 2016. Papers published in English, French, German or Dutch.	SRMA. To investigate the effect of an intervention on adverse outcomes in frail older adults.	Community-dwelling (settings not stated). Age ≥60 years. Frail. Country of individual studies not stated.	Any. One RCT with relevant outcomes included physical activity, defined as bodily movement produced by skeletal muscles that requires energy expenditure. Other RCTs included case management (nine). information provision (three), and psychosocial interventions (one).	Care as usual.	Accidental falls. Time periods not stated.	Accidental falls, physical intervention (1 RCT, n=83): IRR 0.43 (95% CI 0.33 to 0.57), p value not stated. Results from other interventions shown in separate tables.	Studies were assessed for risk of bias in seven domains: quality assessed as low (meeting two or fewer criteria), medium (meeting three or four criteria) or high (meeting more than four criteria). The physical activity RCT was medium quality. MA was carried out where interventions were provided in more than one study. No further details were provided on the individual interventions of each type, which may have been heterogeneous. Subjects were defined as having been diagnosed as frail; various definitions of frailty were used.	One small RCT of a physical intervention for frail elderly people found a significant reduction in accidental falls compared with a control group. The study was considered of medium quality and there were no further details about the interventions which mean that the implications of this finding are difficult to assess from this SRMA.
Community dwelling prefrail or mildly frail elderly, settings not stated.	Exercise interventions ('health promotion').	Frost et al, 2017. Search Jan 1990–May 2016. Papers published in English.	SRMA. To synthesise RCTs evaluating home and community-based health promotion interventions for older people with mild/pre-frailty.	Community-dwelling. Mean age ≥65 years. Mild frailty identified through a validated frailty scale which contained an intermediate classification between frail and robust.	Home- or community-based health promotion interventions. Relevant outcomes were only reported in studies of exercise interventions. Exercise interventions included various combinations of	Included: usual care, health education, other types of exercise interventions.	Self-reported functioning (ADL measures, including FSQ, OARSI, LLFDI function subscale). Time periods varied.	ADL (3 RCTs, n=211). Standardised mean difference in ADL scores between I and C: 0.19 (95% CI -0.57 to 0.95), p=0.62. All studies reporting ADL were of exercise interventions.	Studies were assessed for risk of bias in seven domains. Of the three studies included in the MA, two had low risk of bias in at least five domains and the third had high or unknown risk of bias in all domains. Most studies were small (n<100) and likely to be underpowered. The SR	No statistically significant difference in ADL scores was reported between prefrail or mildly frail elderly people receiving exercise interventions and control groups. This SRMA appears to have been reasonably well conducted but of the three studies included in the MA

				Various countries. Studies with relevant outcomes: USA (two), Germany (one).	power, strength, flexibility and balance training, Wii-fit, seated exercise.				defined prefrailty/ mild frailty. The interventions were heterogeneous, including both single and multiple physical activity components. Comparators included other interventions and usual care, but these were not analysed separately.	one was of poor quality and all appeared underpowered. Interventions and comparators were heterogeneous. These factors are likely to have affected the findings.
Community-dwelling physically frail elderly. Settings not stated, included nursing home.	Non-pharmacological interventions to treat physical frailty and sarcopenia. This row includes an exercise intervention.	Lozano-Montoya et al, 2017. Search to Oct 2015. Search was for SRs. Primary comparative studies included in the identified SRs, of the interventions and population of interest, were included in this SR. Papers published in English, Italian, Portuguese, or Spanish.	SR. To critically appraise the evidence from SRs of the primary studies on nonphar-macological interventions to treat physical frailty and sarcopenia.	Mean age >65 years. Community-dwelling (settings not stated, included nursing home). Frail according to Fried's criteria. Various countries. Study of exercise intervention carried out in Spain.	One RCT with relevant outcomes included an exercise programme (resistance, balance, and gait training) in a nonagenarian nursing home population. One other RCT included a combined nutritional, physiotherapy, physical training, and psychological support intervention.	Passive stretches.	ADL. 12 weeks (one RCT).	ADL: exercise programme lasting 12 weeks (1 RCT, n=24, 'serious' risk of bias): Less ADL deterioration in the intervention than the control group, p=0.001 (actual results not reported).	This review was carried out by searching for SRs, then identifying the individual studies included in the SRs and taking data from the studies. This appears likely to have missed some relevant original studies. Primary studies were assessed for risk of bias in seven domains and graded low, medium or high risk. The authors reported whether they considered each outcome finding to have a 'serious' risk of bias. Limited details are provided in the paper regarding the findings in relation to each outcome and their significance. MA was not feasible because of the heterogeneity of the interventions.	One very small study of an exercise intervention with very elderly people in a nursing home reported significantly less deterioration in ADL scores in intervention compared with control subjects, but further details were not provided in this SR. There were also limitations in the way this SR was conducted which together with the individual study limitations are likely to have affected the results.

5.2 Community dwelling elderly (own home): self-directed exercise with motivational interviewing										
Population type	**Intervention type**	**Study author, year of publication. Years of study (RCTs). Search timescale, language restrictions (SRs).**	**Study type and aim**	**Population, including setting and country**	**Intervention**	**Control**	**Outcomes, including time points (outcomes relevant to PICO only)**	**Results (Intervention (I) vs Control (C) (including for subgroups relevant to PICO)**	**Brief comment re key quality issues**	**Conclusions**
Community dwelling elderly requiring walking aids or home help, living in own home.	Physical activity with or without motivational interviewing.	Tuvemo Johnson et al, 2020. Study recruited Oct 2012 to May 2015.	RCT. To examine the 12-month effects of the home-based Otago Exercise Program with or without the support of motivational interviewing.	Community dwelling (own home). Age ≥75 years. Able to walk independently indoors. Required walking aid or home help. Mean age of participants 83.2 years. 70% women. Sweden.	PA: manual-based physical activity programme (balance and strength exercises three times per week) carried out independently with seven visits and three phone calls from a physiotherapist over one year. Up to three walks per week recommended in addition. MI: as above, home visits included motivational interviewing (MI) by physiotherapists trained in MI techniques. Both groups also received a booklet on safety.	Control: booklet on safety.	Falls (self-reported in exercise and falls diary). ITT analysis: including all those randomised. Per Protocol analysis: including only those reporting that they completed at least 202 sessions of PA or walking per year. 12-month follow-up.	<u>ITT analysis</u> PA n=61, MI n=58, C n=56. Fall rate per person in 12 months: PA 1.1, MI 1.4, C 0.6. p=0.37. Injuries due to falls, rate per person in 12 months: PA 0.5, MI 0.6, C 0.3. p=0.36. <u>Per protocol analysis</u> PA n=29, MI n=31, C n=53. Fall rate per person in 12 months: PA 1.0, MI 1.1, C 0.7. p=0.28. Injuries due to falls, rate per person in 12 months: PA 0.6, MI 0.6, C 0.3. p=0.36.	Randomisation procedure appeared adequate. No significant differences were reported between groups at baseline. Assessors were blinded to group. 175 subjects were randomised. Sample size was based on a measure of physical function rather than falls. Analyses were reported as both ITT (including all those randomised, using the last value carried forward for imputation) and Per Protocol (including only those who completed at least 202 sessions of PA or walking per year). Frequency of exercise and falls depended on self-report and exercise was unsupervised.	No statistically significant differences in number of falls or injuries due to falls were reported between groups of elderly people undertaking self-directed physical activity with or without motivational interviewing and a usual care control group. This was a small RCT and may have been underpowered for falls, but appears to have been reasonably well conducted.

5.3 Community dwelling adults with stroke (setting not stated): physical activity intervention										
Population type	**Intervention type**	**Study author, year of publication. Years of study (RCTs). Search timescale, language restrictions (SRs).**	**Study type and aim**	**Population, including setting and country**	**Intervention**	**Control**	**Outcomes, including time points (outcomes relevant to PICO only)**	**Results (Intervention (I) vs Control (C) (including for subgroups relevant to PICO)**	**Brief comment re key quality issues**	**Conclusions**
Community-dwelling adults with recent stroke (setting not stated).	Individualised physical activity programme.	Askim et al, 2018. Study took place between Oct 2011 Jan 2016.	RCT. To evaluate the efficacy and safety of an 18-month follow-up program of individualised regular coaching on physical activity and exercise.	Aged ≥18 years. Community-dwelling (setting not stated). Recently discharged from hospital or inpatient rehab following confirmed first-ever or recurrent stroke. Modified Rankin Scale* score <5. No serious comorbidities. Mean age 72 years. 61% male. Norway.	In addition to standard care: Monthly individualized coaching by a physiotherapist for 18 months, with individual assessment and physical activity schedule each month. Option to participate in groups, individual physio or home training. Recommended 150 mins exercise per week. Exercise diary kept by patient. 60-64% complied with 150 minutes per week according to exercise diaries.	Standard care (usually 45 minutes weekly physio per week, for the first three months for mild/ moderate stroke, up to six months for the most severe strokes).	ADL (Barthel). Modified Rankin Scale* Vascular events. Hospital admissions because of vascular events. 18-month follow-up. *measures degree of disability or dependence in daily activities for people who have suffered a stroke. Range from 0 = no symptoms, 5 = severe disability, bedridden, incontinent	I n=186, C n=194. ADL: mean (SE) at baseline and 18-month follow-up, between group difference (BGD): Barthel Index: # I 96.4 (0.05), 90.2 (0.18) C 96.1 (0.066), 90.2 (0.16) BGD* −0.41 (95% CI −4.96 to 4.14), p=0.860. Modified Rankin Scale: # I 1.45 (0.056), 1.28 (0.117) C 1.44 (0.079), 1.33 (0.11) BGD* −0.03 (95% CI −0.30 to 0.25), p=0.860 *Adjusted for age, sex, stroke severity and baseline measures. Any vascular event (number (%)):	Randomisation procedure appeared adequate. There were no significant baseline differences reported between groups. Power calculations estimated that a sample size of 340 would be required, 380 were recruited and follow-up data at 18 months were available for 315 (83%) subjects. Assessors were blinded to group. Analyses were reported to be ITT with defined approaches to imputing missing values. Baseline ADL and modified Rankin scale (mRS) scores suggested little loss of function or disability at the start of the intervention, and both groups had a slight decline in ADL and improvement in mRS over the 18-month period.	There were no statistically significant differences in measures of ADL, disability and dependence, vascular events or hospital admissions due to vascular events at 18 months between stroke patients taking part in an individualised physical activity programme with regular coaching in addition to standard care, compared with usual after-stroke care. This appears to have been a well-conducted RCT. However generalisability to the UK is unclear as the usual care group appeared to have received more physiotherapy than would be usual for similar patients in the UK.

							and requiring constant nursing care.	I 17 (9.1%), C 28 (14.4%), p=0.110. Hospital admissions because of vascular events (number): I 17, C 28, p=0.110. # lower score better		

5.4 Community dwelling elderly with dementia (own home or nursing home): exercise or physical activity interventions										
Population type	**Intervention type**	**Study author, year of publication. Years of study (RCTs). Search timescale, language restrictions (SRs).**	**Study type and aim**	**Population, including setting and country**	**Intervention**	**Control**	**Outcomes, including time points (outcomes relevant to PICO only)**	**Results (Intervention (I) vs Control (C) (including for subgroups relevant to PICO)**	**Brief comment re key quality issues**	**Conclusions**
Community-dwelling (in own home) elderly people with dementia.	Physical activity programme.	Roitto et al, 2018. Dates of study not stated.	RCT. To explore how exercise modifies the risk of falling in community-dwelling people with Alzheimer's disease and neuropsychiatric symptoms.	Aged ≥65 years. Living in own home with spouse. Diagnosed with Alzheimer's and have neuropsychiatric symptoms. Signs of frailty, at least one of: one or more falls in the past year, a decreased walking speed, unintentional weight loss. Mean age 78 years. Finland.	Physiotherapy: supervised, twice weekly home-based or group-based exercise comprising strength, balance, endurance, and multitask training, for one year.	Usual care.	Falls (fall diary kept by spouse). One year follow-up.	I n=120, C n=59. Fall rate per person-year over 1 year: I 1.48 (95% CI 1.26 to 1.73) C 2.87 (95% CI 2.43 to 3.35) p<0.001	Randomisation procedure was not described. No significant differences were reported between intervention and control groups at baseline. Falls were recorded by the subject's spouse. This paper reports a secondary analysis from a RCT comparing home-based and group-based exercise with control. The numbers originally undertaking home-based or group-based exercise were not stated. The intervention group in this study combines results for the two exercise programmes. Of the total originally recruited,	Elderly people with dementia taking part in an exercise programme (either home-based or group-based) had statistically significantly fewer falls at one year than those receiving usual care. Results from two different exercise programmes (home-based and group-based) were combined. This paper included limited details about methodology so it is difficult to judge how reliable these findings are likely to be.

									31 (15%) (split between I and C not stated) appear not to have been included in this analysis because the spouse did not complete a questionnaire about neuropsychiatric symptoms.	
Elderly people with dementia in nursing homes.	Physical activity programme.	Toots et al, 2018. Dates of study not stated.	Cluster RCT. To investigate the effects of a high-intensity functional exercise programme on fall rate in people with dementia living in nursing homes.	Aged ≥65 years. Nursing home resident. Dementia diagnosis. Need assistance with at least one personal ADL. Able to stand from chair with assistance from no more than one person. MMSE score ≥10. (maximum score 30, higher score better) Mean age of subjects 85.1 years. Sweden.	Physiotherapist-led group exercise programme five times per fortnight for four months. Strength, balance and mobility exercises.	Group activities led by Occupational Therapists.	Falls (from patient records). Fall incidence rate (IR). Falls resulting in moderate or serious injury. Moderate = head injuries, vertebral, wrist or ankle fractures. Serious = major fractures, such as hip or other femoral fractures. Follow-up 12 months after end of activity (16 months in total).	I n=85, C n=87. Number (%) with at least one fall, total falls: I 57 (66%), 232. C 61 (69%), 241 Fall incidence rate: I 3.0, C 3.2. Fall IRR I vs C 0.9 (95% CI 0.5 to 1.6), p=0.782. Falls resulting in moderate or serious injury (number, %): I 5 (6%), C 14 (16%). OR 0.31 (95% CI 0.10 to 0.94), p=0.039.	The randomisation procedure appeared adequate. Groups of 3-8 living near to each other were cluster randomised to avoid contamination. Power calculations estimated 135 would be required to detect differences in fall rates, but it was not clear if this allowed for the cluster design. 186 were randomised and 176 included in analyses, excluding 10 who died before the end of the intervention period. Significant numbers appear to have died before the end of the 12-month follow-up period but it was not clear how missing data were dealt with. There were no differences at baseline apart from antidepressant use, which was adjusted for in the analysis. Analysis was at individual level and does not appear to have adjusted for the cluster design. Assessors were blinded to intervention.	The rate of falls at 12-month follow-up was not significantly different in elderly nursing home residents with dementia undertaking an exercise programme compared with a control group. However, there were significantly fewer falls that resulted in moderate or serious injury in the intervention compared with the control group. This appeared to be a moderately well-conducted study although some details were not included in this paper and the analysis did not adjust for the cluster design which may have overestimated the effects.

5.5 Community dwelling elderly with a history of falls (various settings or not stated): exercise or physical activity interventions										
Population type	**Intervention type**	**Study author, year of publication. Years of study (RCTs). Search timescale, language restrictions (SRs).**	**Study type and aim**	**Population, including setting and country**	**Intervention**	**Control**	**Outcomes, including time points (outcomes relevant to PICO only)**	**Results (Intervention (I) vs Control (C) (including for subgroups relevant to PICO)**	**Brief comment re key quality issues**	**Conclusions**
Community-dwelling elderly with history of falls (setting not stated).	Group or home-based physical therapy sessions, followed by a home exercise programme; advice on home safety; referral for medication review.	Matchar et al, 2017. The study took place between Dec 2012, and May 2015.	RCT. To evaluate the effectiveness of a multifactorial, tailored programme of physical therapy to reduce the occurrence of falls among a heterogeneous group of high-risk elderly Singaporeans recently discharged from the ED following a fall.	Aged ≥65 years. Community-dwelling (setting not stated). Seen in ED for fall or fall-related injury. Expected to recover weight bearing of the lower extremity within one month. Average age of subjects 77.4-78.2 years. Nearly half had two or more major comorbidities. Singapore	Group or home-based sessions by trained physical therapist (including strength, mobility, balance, endurance). Those with better baseline physical performance had group sessions. Group: twice weekly for three months. Home-based: three times weekly for three months or until improved enough to attend group sessions. After three months encouraged to continue with exercise at home. Physiotherapists also gave advice on home safety, and referred	Usual care (including educational materials on falls prevention).	Falls (recorded in fall calendars returned monthly). Injurious falls (a fall for which the participant sought medical attention or restricted their daily activities for at least 48 hours). Follow-up at 9 months (after 3 months of physical activity sessions and 6 months maintenance).	I n=177, C n=177 Falls (number, (%)): I 54 (30.5%) C 67 (37.8%) RR 0.72 (95% CI 0.46 to 1.12), p=0.146. Injurious falls (number, (%)): I 25 (14.1%) C 40 (22.6%) RR 0.56 (95% CI 0.32 to 0.98), p=0.041.	Randomisation procedure appears adequate. There were no significant differences reported between groups in baseline demographic, socioeconomic or risk factors. Proposed total sample size was 300, but this was increased to 330 due to subjects having fewer falls than expected. 350 were randomised and around 10% appear to have been lost to follow-up, although this was inconsistently reported. Assessors were blinded to group. Falls and injuries were self-reported, recorded in falls diaries which were reviewed monthly.	There was no significant difference in the incidence of falls in elderly people with a history of falls up to nine months after starting a physical activity programme, compared with controls receiving usual care. The intervention subjects did have a significantly lower incidence of falls resulting in injury. The study population appears to have been quite heterogeneous, some with significant levels of comorbidities and restriction of physical capabilities. This appears to have been a moderately well-conducted study.

					polypharmacy patients for medication review.					
Community-dwelling elderly with history of falls (setting not stated).	Group or home-based physical therapy sessions, followed by a home exercise programme; advice on home safety; referral for medication review. (as Matchar 2017).	Matchar et al, 2019.	RCT, cost-effectiveness analysis. To perform a cost-effectiveness analysis of a multifactorial, tailored intervention to reduce falls among a heterogeneous group of high risk elderly people.	As Matchar 2017	As Matchar 2017	As Matchar 2017	Intervention costs (Singapore dollars, S$). Health system costs (Singapore dollars, S$). Cost-effectiveness (cost per QALY in S$).	Costs per participant (mean, (SD)) Intervention cost: S$ 964.6 (471.1) Health system costs including intervention: I S$ 3718.5 (8469.0) C S$ 3356.4 (9558.6) p=0.706. Difference in cost (C lower): S$ 362. ICER: S$ 120, 667 per QALY.	As Matchar 2017. This study had found that the intervention group had a reduction in injurious falls but not in overall numbers of falls, and the authors also reported that it was more effective in individuals who were less severely ill at baseline. Health care utilisation costs were derived from participants' bills from the ED, inpatient and outpatient facilities affiliated with the two participating hospitals where subjects had originally attended the ED. QALYs were calculated by converting responses to the EQ-5D to a utility score (EQ-5D scores were not reported). Other costs such as primary care, social care or personal costs were not included.	A physical activity intervention for older people who had fallen was not found to be cost-effective, based on the Singaporean benchmark for cost-effectiveness which was reported in this paper to be S$70,000 per QALY (equivalent to approximately £40,000 at current conversion rates). It is likely that there were additional costs which were not included in the analysis. The ICER was S$ 120, 667 which is equivalent to approximately £68,700. It is difficult to say how applicable this study is to the UK, given differences in populations, healthcare systems and costs between Singapore and the UK.
Community-dwelling elderly with history of falls (living in house or flat).	Physical activity carried out independently, supervised by nursing assistants	Fahlström et al, 2018. The study was carried out between 2007 and 2009.	RCT. To determine whether nursing assistants can prevent	Aged ≥65 years. Community-dwelling (house or flat, not sheltered housing).	Participating staff (nursing assistants (NAs), Occupational Therapists (OTs) and Physiotherapists	PT and OT assessment. Controls recorded falls and activity in	Falls (self-reported). 12-month follow-up. Hospital healthcare	Risk of falls (12 months): I n=31, C n=31. RR I vs C 1.10 (95% CI 0.58 to 2.07), p = 0.77.	Randomisation procedure appears to have been adequate. Groups were reported to be similar at baseline. Sample size calculations estimated that 170 participants were	This study did not find any difference in the risk of falls at 12 months or in hospital healthcare consumption at 5 months between elderly people with a

	on home visits.		falls by supervising community-living elderly individuals with a history of falling to perform individually designed home exercise programmes.	Had at least one fall during the last 12 months. Mean age of participants was 81-82 years. Over half were taking at least five medications. 80-82% had fallen in the previous year. Sweden.	(PTs) were trained but carried out study interventions alongside their usual duties. PT made an initial visit to assess and design an individual home exercise programme (balance, muscle strength and walking ability). NAs made eight home visits over five months to encourage the activities. OTs made an initial visit to assess the home environment. Subjects recorded falls and activity in a calendar.	a calendar.	consumption (registry data) QOL (SF-36 subscales) 5-month follow-up	Hospital health care consumption (5 months) I n=60, C n=56 No significant differences (numbers of events not reported): Hospital healthcare visits, p=0.98; Hospital episodes, p=0.45; In-hospital days, p=0.67. QOL (SF-36 subscales) (5 months): I n=49, C n=44. Bodily pain decreased significantly in I compared with C, p=0.003 No significant intervention effect at 5 months for the remaining seven out of eight SF-36 subscales: Physical function, p=0.50 Role physical, p=0.40 General health, p=0.55 Vitality, p=0.15 Social functioning, p>0.99 Role emotional, p=0.19 Mental health, p=0.46.	needed in each group. The finally recruited study with 76 I and 72 C was significantly underpowered. Dropout rates were reported to be 21-22% and variable numbers were included in the analyses. Baseline assessments were blinded but follow-up assessments at 5 months were not.	history of falls who were given a home exercise programme, with nursing assistant support, and the control group. This was a small underpowered study and there were a number of problems with the methodology and reporting of the data which mean that the results cannot be regarded as reliable.
Community-dwelling elderly with history of falls and/or increased risk of falls. Setting not stated.	Group exercise sessions and home exercise programme.	Siegrist et al, 2016. Recruitment took place between July 2009 and March 2010.	RCT. To investigate whether an exercise-based fall prevention programme in the German	Aged ≥65 years. Community-dwelling (setting not stated). Increased fall risk: one or more falls in the past 12 months, or low physical function or balance	Staff attended a falls training workshop. Participants had 16 weekly group exercise sessions by trained instructor (1 hour/week) (strength, power,	Staff attended falls training workshop. Usual care.	Falls. Fallers (>1 fall per year or ≥1 injurious fall). Fall-related injuries. Self-completed	I n=222, C n=156. Falls, number (rate per person) at 12 months: I 291 (1.3) C 367 (2.4) IRR: 0.54 (95%CI 0.35 to 0.84), p=0.007. IRR adjusted for baseline differences: 0.68 (95% CI 0.42 to	The randomisation procedure described appeared adequate; randomisation was by practice. Sample size calculations estimated that 40 clusters (382 individuals) would be needed. A total of 378 in 33 practices were recruited (I n=222, C	Elderly people with a history falls who took part in 16 weekly exercise sessions followed by an independent home exercise programme were reported to have significantly fewer falls and fall-related

			primary care setting can significantly reduce the number of falls per individual in community-dwelling older people at high risk of falls.	deficits. Mean age of participants 78 years. Germany	balance and gait training, behavioural aspects) and a manual-based home exercise programme.		fall calendar returned monthly. Follow-up at 12 months.	1.22), p value not reported. Fallers, number (%): I 73 (32.8%) C 70 (44.9%) OR: 0.52 (95% CI 0.29 to 0.91), p=0.021. (no adjusted OR reported) Fall–related injuries, number (%): I 63 (28.4%) C 59 (37.8%) IRR: 0.66 (95% CI 0.42 to 0.94), p=0.033. IRR adjusted for baseline group differences: 0.79 (95%CI 0.49 to 1.33), p value not reported.	n=156). It was not clear why the randomisation process resulted in about 50% fewer subjects in C and this was not mentioned in the paper. No significant group differences were reported on most baseline measures. The C group had higher/worse scores for several measures of physical function, dizziness and use of walking aids. Loss to follow-up was I 38 (17.1%), C 40 (24.6%). Analysis appears to have been ITT. Falls outcomes were self-reported in a monthly diary. Analyses appear to have been adjusted to account for clustering effects. Most analyses were unadjusted for baseline group differences.	injuries at 1 year than controls. However the intervention group had better physical function at baseline and when findings were adjusted for baseline differences, the differences in falls and injuries no longer appeared to be significant. This appears to have been a moderately well-conducted study, but there may have been problems with the randomisation process which resulted in an I group which was 50% larger than the C group, and in which subjects had better physical function. Staff in the C group received training in falls prevention which may have led to contamination.

6. Medication review alone

6.1 Community-dwelling elderly (settings not stated): medication review										
Population type	**Intervention type**	**Study author, year of publication. Years of study (RCTs). Search timescale, language restrictions (SRs).**	**Study type and aim**	**Population, including setting and country**	**Intervention**	**Control**	**Outcomes, including time points (outcomes relevant to PICO only)**	**Results (Intervention (I) vs Control (C) (including for subgroups relevant to PICO)**	**Brief comment re key quality issues**	**Conclusions**
Community-dwelling (at home) people receiving home care.	Medication review and recommendations on changes.	Toivo et al, 2019. Recruited Sept-Dec 2015.	Cluster RCT. To assess the impact of a care coordination intervention on medication risks identified in drug regimens of older home care clients.	Aged >65 years. Receiving regular home care. Using ≥one prescription medicine. Mean age 82.8 years. 70% female. 81% living alone. Finland.	Multiprofessional approach: Nurse screened for drug-related problems, conducted baseline assessment and compiled medication lists; Information reviewed by pharmacist; Triage meetings with physician, nurse and pharmacist where actions agreed; Further review by pharmacist with home visit if needed; Recommendations on medication changes agreed by pharmacist and physician; Decisions made by patient's own physician.	Standard home care (home visits by nurses providing help with daily activities and medicine use).	Number of medications in use. Number of patients using harmful medications (antipsychotic and psychotropic). ITT analysis: all patients with 12-month follow-up data. Per protocol analysis: only I group subjects in whom recommended changes were implemented. 12-month outcomes.	<u>ITT analysis</u> I n=65, C n=64. Mean number of medications in use at baseline and 12 months, and adjusted mean change over 12 months (AMC) *. I 13.5, 14.1 AMC 0.77 (95% CI 0.05 to 1.48), p=0.04. C 12.7, 13.0 AMC 0.52, (95% CI -0.37 to 1.41), p=0.25. Significance of difference in change between groups: p=0.59 Number of patients using harmful medications at baseline and 12 months; OR I 56, 57 OR 1.15 (95% CI 0.63 to 2.10), p=0.66. C 51, 51	Cluster randomised by home care service area; randomisation procedure not described. Control group were significantly older and were assessed as having greater need for regular help but had better performance on the sit-to-stand test; there were no other significant baseline differences between groups. This was an open (non-blinded) study. 191 were randomised (I n=104, C n=87), 59 (31.4%) were lost to follow-up, not significantly different between groups. 129 participants with baseline and 12 months follow-up data available were included in ITT analysis. Recommendations for medication changes were not implemented by patients' own	Elderly people in receipt of home care who underwent a medication review involving a pharmacist, physician and nurse resulting in recommendations on medication changes, had no difference in the number of medications they were using at 12-month follow-up compared with a control group. There was also no difference between groups in the number of medications used which were defined as harmful. Both groups had a small increase over time in the number of medications used, which in the I group was statistically significant.

								OR 1.00 (95% CI 0.63 to 1.60), p=1.00. Significance of difference in change between groups: p=0.73 <u>Per protocol analysis</u> I n=29, C n=64 Mean number of medications in use at baseline and 12 months, and AMC*. I 14.0, 13.3 AMC -0.02 (95% CI -1.24 to 1.20), p=0.97. C 12.7, 13.0 AMC 0.38 (95% CI -0.59 to 1.36), p=0.44. Significance of difference in change between groups: p=0.46. *AMC: adjusted for functional ability and use of antiepileptic medications.	physicians in 50% of patients who had recommendations made. The authors also conducted a per protocol analysis including only those I group subjects in whom the recommended medication changes were implemented. The validity of this approach in assessing the effectiveness of their intervention is questionable.	This study had a number of methodological flaws including large loss to follow-up and lack of blinding and was probably underpowered. The reliability of the findings is unclear.
Community-dwelling older people with polypharmacy recently discharged from hospital to home health.	Medication review based on pharmacogenetic testing.	Elliott et al, 2017. Study took place between Feb 2015 and Feb 2016.	RCT. To assess the clinical impact of pharmacogenetic profiling on home health polypharmacy patients.	Aged ≥50 years. Referred to home health agency on discharge from hospital. Taking or initiating treatment with one of fifty-five single ingredient or six medication combinations with potential for significant	Buccal samples were taken for pharmacogenetic testing. A clinical decision support tool (CDST) was used to identify potential drug/drug or drug/gene interactions. Findings verified by a clinical pharmacist. Recommendations made to physicians.	Screened for potential drug/drug interactions. Recommendations made to physicians. Medication changes decided by physicians.	Re-hospitalisations. ED visits. Outcomes at 30 and 60 days after hospital discharge.	I n-57, C n=53. Number of rehospitalisations, mean (range). At 30 days I 0.25 (0-3) C 0.38 (0-2) RR 0.65 (95% CI 0.32 to 1.28), p=0.21. At 60 days I 0.33 (0-3) C 0.70 (0-3) RR 0.48 (95% CI 0.27 to 0.82), p=0.007	Randomisation procedures appeared adequate. The I group had more women, an older age profile and higher rates of eye and cerebrovascular disease than the C group but there were no significant differences in symptom scores between groups. Analyses were not adjusted for differences. No blinding was reported. 110 enrolled, I n-57, C n=53. Five C subjects	Elderly people with polypharmacy who were discharged from hospital to a home health service and underwent pharmacogenetic testing, with recommendations for changes in medication if indicated, had significantly fewer hospital admissions and ED visits 60 days after initial discharge than patients who had

				drug-gene-based interactions. Mean age 75.6 years. 61.8% female. Average 11.5 drugs per person. USA.	Medication changes decided by physicians.			Number of ED visits, mean (range) At 30 days I 0.25 (0-2) C 0.40 (0-2) RR 0.62 (95% CI 0.31 to 1.21), p=0.16 At 60 days I 0.39 (0-2) C 0.66 (0-4)) RR 0.58 (95% CI 0.34 to 0.99), p=0.045 Recommendations made to clinicians (I group only): Change/Major 35.1% Consider/Moderate 21.1% Monitor/Minor 31.5% No Change/None 12.3%	were lost to follow-up and six died (21%); seven I were lost to follow-up and one died (14%). Outcome analyses included all randomised patients. The authors reported that the majority of all recommendations made to clinicians were followed (96 of 124, 77%) but it was not stated whether this differed between groups. The average time to change therapy was 3 weeks after discharge. The authors considered that the large number of deaths in the C group were probably not related to the intervention.	recommendations for changes in medication based on information about drug/drug interactions only. This was a small study with some baseline between-group differences. Overall about three-quarters of the recommended medication changes were implemented by physicians but it was not clear whether this differed between groups, and the number of recommendations was only reported for the I group. It is therefore difficult to judge what components of the intervention contributed to the outcomes.
Community-dwelling older people with polypharmacy (setting not stated).	Clinical medication review by community pharmacists.	Verdoorn et al, 2019. Study took place between Apr 2016 and Aug 2017.	RCT. To investigate the effect of a patient-centred clinical medication review focused on personal goals on health-related quality of life and on number of	Aged ≥70 years. Using ≥seven long-term medications. Community-dwelling, setting not stated. No hospital admission in previous months. Median age of participants 78-80 years. Recruited through community pharmacies	Clinical medication review: Interview by pharmacist, covering health problems, preferences, medication, health goals; Identification of potential drug-related problems; Care plan developed by pharmacist and GP;	Usual care.	QOL: EQ-5D-5L EQ-5D VAS Number of long-term medications.	3 months: I n=282, C n=283. 6 months: I n=266, C n=261. EQ-5D-5L Effect size at 3 months, I vs C: −0.0011 (95% CI −0.012 to 0.010), p=0.85 Effect size at 6 months, I vs C: −0.0022 (95% CI −0.024 to 0.020; p=0.85 EQ-VAS	Randomisation was done independently by a researcher but the procedure was not clearly described. Study participants were not blinded but questionnaires were completed by an independent researcher. Sample size calculations estimated that 630 participants were needed. 629 were randomised, I n=315, C n=314. Dropout rates were similar in both groups: at 3 months n=565 (90%) and at 6 months n=527 (84%). All	Patients taking multiple medications who received a clinical medication review by a community pharmacist which was focused on personal goals, had a significantly greater improvement in health-related QOL measured by a Visual Analogue Scale than the control group. There was no significant difference in a health-related QOL questionnaire asking

			health problems.	where pharmacists were accredited to perform clinical medication reviews (CMR). Netherlands	Care plan agreed with patient; Follow-up over 3 months by pharmacist.			Effect size at 3 months, I vs C: +1.7 (95% CI 0.47 to 2.9), p=0.006. Effect size at 6 months +3.4 (95% CI 0.94 to 5.8), p=0.006 Total number of long-term medications, I vs C At 6 months −0.32 (no further details provided).	patients in the intervention group received the intended treatment. Patients were randomised within pharmacies so there may have been contamination. There appears to have been incomplete reporting of some outcomes, for example there was limited information about the long-term medication use finding, and supplementary tables appear to show significant differences in healthcare use but no statistical analysis was provided. The authors argued that EQ-5D-VAS score (where a statistically significant difference was found) was a more valid measure of QOL in this group of patients than EQ-5D-5L (on which the study had originally been powered, but where there was no significant difference). They also presented comparisons of reported symptoms at baseline and 6 months which did not show any significant differences between the groups.	about mobility, self-care, usual activities, pain/discomfort and anxiety/ depression. The intervention group were also reported to have fewer long-term medications per month than the control group. This was a fairly large study with relatively low loss to follow-up. However there were a number of problems with the reporting of this study which mean that the findings should be treated with caution.

6.2 Community-dwelling elderly who have fallen (any setting): medication review										
Population type	**Intervention type**	**Study author, year of publication. Years of study (RCTs). Search timescale, language restrictions (SRs).**	**Study type and aim**	**Population, including setting and country**	**Intervention**	**Control**	**Outcomes, including time points (outcomes relevant to PICO only)**	**Results (Intervention (I) vs Control (C) (including for subgroups relevant to PICO)**	**Brief comment re key quality issues**	**Conclusions**
Elderly community-dwelling (setting not stated) fallers.	Medication review with withdrawal of fall-risk-increasing drugs where possible.	Boyé et al, 2016. Dates of study not stated.	RCT. To investigate the effect of withdrawal of fall-risk-increasing-drugs (FRIDs) versus 'care as usual' on reducing falls in community-dwelling older fallers.	Aged ≥65 years. Community-dwelling (setting not stated). ED visit because of a fall. Use one or more FRIDs. Mean age 76 years. 62% female. Mean 6 drugs at baseline. Mean 4 FRIDs at baseline. Finland.	Fall-related assessment at research clinic including medical history and medication use. FRIDs discontinued or reduced where possible. It was not clear who the assessment was carried out by. Patient kept falls calendar (returned every three months) for reporting falls and related GP consultations and ED attendances.	Not stated.	Falls. Recurrent falls during the follow-up period. Fall-related ED attendances. Fall-related GP consultations. All outcomes self-reported based on falls calendar. 12-month follow-up.	n in each analysis not stated. Numbers experiencing a fall I 115 (37%), C 91 (34%) p=0.33 Numbers experiencing a recurrent fall I 50 (16%), C 38 (14%) p=0.45 Number of fall-related GP consultations I 36 (12%), C 46 (17%) p=0.07 Number of fall-related ED visits I 16 (5%), C 21 (8%) p=0.22 I group only: No. taking FRIDs: 308 Withdrawal not attempted: 122 (40%) Withdrawal failed: 66 (21%) Withdrawal successful: 120 (39%)	Randomisation procedure was not described. There were reported to be no significant baseline differences between groups. Blinding was not reported. Sample size estimate was 620, total recruited n= 612 (I n=319, C n=293). Analyses were ITT. 32 participants withdrew from the study or died (I 11, 3.5%), C 21 7%). Numbers included in each outcome measure appear to vary. The outcomes were self-reported in fall calendars returned every three months. FRIDs were predefined, in three categories: cardiovascular, psychotropic, and other.	Elderly people who had fallen and had a medication review with withdrawal of fall-risk-increasing drugs where possible had no significant difference in the number of falls or in GP consultations or ED visits due to a fall over the following 12 months compared with a control group. FRIDs were withdrawn in 39% of the I group patients who were taking them. Just over one-third of participants in both groups reported falling in the 12-month follow-up period. Falls were self-reported and may have been incomplete as fall calendars were only returned every three months. This was a relatively large study but some details were lacking or unclear in this paper which mean that it is

										hard to judge how reliable the findings are.

6.3 Elderly in long term care: medication review										
Population type	**Intervention type**	**Study author, year of publication. Years of study (RCTs). Search timescale, language restrictions (SRs).**	**Study type and aim**	**Population, including setting and country**	**Intervention**	**Control**	**Outcomes, including time points (outcomes relevant to PICO only)**	**Results (Intervention (I) vs Control (C) (including for subgroups relevant to PICO)**	**Brief comment re key quality issues**	**Conclusions**
Older people in long term care.	Interventions for preventing delirium. This row includes a medication review intervention.	Woodhouse et al, 2019. Search to 27 February 2019. No language restrictions stated.	SR (narrative review). To assess the effectiveness of interventions for preventing delirium in older people in institutional long-term care settings.	Residents of long-term care facilities (permanent residence providing accommodation together with personal or nursing care). Mean age ≥65 years. Studies with relevant outcomes: one USA, one UK.	One US-based RCT included computerised medication review with a software programme used across 25 care homes, which identified medications that may contribute to delirium and falls risk and prompted pharmacists to carry out a medication review and institute a monitoring plan. One other RCT included an educational package for care home staff.	Standard care, or placebo for pharmacological interventions.	Hospital admissions. Falls. 12 months.	Hospital admissions (one RCT, medication review and adjustment), mean 12-month follow-up, 7599 participant-months: HR 0.89 (95% CI 0.72 to 1.10). Falls (one RCT, medication review and adjustment), mean 12-month follow-up, 2275 participant-months: RR 1.03 (95% CI 0.92 to 1.15). No p values were reported. Results of the educational intervention shown in separate table.	MA was not possible due to heterogeneity of interventions and the findings reported were from single studies. Studies were assessed for risk of bias in seven domains. The study of medication reviews had low risk of bias in two domains and high risk in two (remainder unclear). The hospital admissions data was based on postcodes, which may have included individuals resident in the same postcode as the care home but not in the care home, so was considered not precise. The review included trials that used a validated method of delirium diagnosis.	Computerised medication review was not found to have a significant effect on falls or hospital admissions for older people in long term care, based on a large study in care homes in the USA. This study appeared to be of poor quality and it is also unclear how applicable the findings would be to care homes in the UK which may not have computerised prescribing systems, although it may be possible to take a similar approach using GP prescribing systems. This appeared to be a well-conducted Cochrane SR but MA was not possible and the findings are

										based on single studies.
Elderly people with polypharmacy in residential aged care facilities.	Medication review and deprescribing.	Potter et al, 2016. Study dates not stated.	RCT. To determine whether deprescribing would reduce the total number of medicines taken by frail older people living in residential aged care facilities.	Age ≥65 years. Living in a residential aged care facility. Taking regular medication. Mean age 84 years. 52% female. Mean 7.4 (I) – 7.9 (C) target medicines for deprescribing (those considered potentially inappropriate). Western Australia	Individual medication review involving: Review of medicines prescribed and administered; Patient interview and examination by GP, baseline assessments by nurse; Deprescribing targets identified from list of potentially inappropriate medicines; Individual medicine withdrawal plans.	Medication review and baseline assessments.	Mean change in number of unique regular medicines. QOLAD (Quality of Life in Alzheimer's Dementia) EQ-5D VAS Numbers falling. GP attendances. Hospital admissions. 12-month follow-up.	<u>Mean (SD) change in number of medicines per person</u>: I n=45, C n=48. At 6 months I -2.3 (3.1), C +0.2 (2.5) Estimated difference between I and C 2.5, (95% CI 1.3 to 3.8), p<0.001. At 12 months: I -1.9 (4.1), C +0.1 (3.5) Estimated difference between I and C 2.0 (0.9), (95%CI 0.08 to 3.8), p = 0.04. <u>QOLAD</u> (higher score better) Mean (SD) change in score at 12 months: I n=22, C n=15 I -1.0 (4.3), C -1.0 (4.7) p=0.91. <u>EQ-5D VAS</u> (higher score better) Mean (SD) change in score at 12 months I n=20, C n=12 I -11 (17), C 7 (15), p=0.35 <u>Falls and healthcare use at 12 months</u> I n=45, C n=48. Number (%) having at least one fall I 25 (56%), C 31 (65%), p=0.40	Randomisation procedure appeared adequate. Planned sample size was 250, 95 were recruited (I n=47, C n=48). 18 lost to follow-up within 12 months (16 died, 2 withdrew). Individuals were randomised across four residential facilities. Groups were similar at baseline apart from significantly lower mean systolic BP, more patients with gastro-oesophageal reflux disease and fewer with chronic kidney disease in the control group. Analyses were reported to be ITT but it was not clear how missing data were dealt with. Assessor for some outcomes (including QOL) was blinded, other study participants were not. Control subjects also underwent medication reviews and baseline assessment which may have led to contamination.	Clinician-led individual medication review with planned medicine withdrawal significantly reduced the number of medicines being taken by elderly people with polypharmacy and multimorbidity living in residential aged care facilities at six- and 12-month follow-up. No significant differences were found in QOL or health service use outcomes. This was a small RCT which was underpowered for the outcomes apart from medication use. The clinical significance of the changes in medication use are not clear and a larger study would be needed to explore these findings and other outcomes further.

								GP attendance, number (%) I 10 (22%), C 5 (10%), p=0.16 Hospital admission, number (%) I 23 (51%), C 24 (50%), p=0.99		

7. Behavioural or psychosocial intervention alone

7.1 Community dwelling frail or pre-frail elderly (any setting or not stated): behavioural or psychosocial intervention										
Population type	**Intervention type**	**Study author, year of publication. Years of study (RCTs). Search timescale, language restrictions (SRs).**	**Study type and aim**	**Population, including setting and country**	**Intervention**	**Control**	**Outcomes, including time points (outcomes relevant to PICO only)**	**Results (Intervention (I) vs Control (C) (including for subgroups relevant to PICO)**	**Brief comment re key quality issues**	**Conclusions**
Community-dwelling frail or pre-frail elderly (including extra care housing, excluding care homes).	Behaviour change intervention focusing on mobility, nutrition, psychological well-being and socialising.	Walters et al, 2018. The study took place between 16 Dec 2015 and 14 Nov 2016.	RCT. To evaluate the feasibility and acceptability of the HomeHealth intervention for delivery in the NHS and for a full-scale RCT.	Aged ≥65 years. Community dwelling (including extra care housing, excluding care homes). 'Mildly frail' on the Rockwood Clinical Frailty Scale. Life expectancy >6 months. 55% frail, 43% prefrail, One not frail. England.	Tailored behaviour change intervention by trained non-specialist support workers. Focused on mobility, nutrition, psychological well-being and socialising. Approaches included goal-setting, action-planning and problem-solving, reviewing progress, providing feedback, encouraging self-monitoring. Planned as six (range three to 12) sessions over six months.	Usual care.	ADL (modified Barthel index) Falls. Frailty (characteristics measured by Fried scale, ie. weakness, slowness, exhaustion, weight loss, low physical activity). QOL (EQ-5D-5L) QALYs Costs. Outcomes at 6 months.	I n=25, C =23 Modified Barthel Index (higher score better), Effect Size I vs C 1.684, p=0.004 Falls OR of fall vs no fall, I vs C 0.619, p= 0.522 Number of frailty characteristics at 6 months RR I vs C 1.008 (95% CI 0.67 to 1.54), p = 0.968 EQ-5D-5L (baseline and 6 months, mean (SD)): I 0.68 (0.19), 0.73 (0.16) C 0.71 (0.19), 0.70 (0.21) Adjusted QALYs at 6 months (95% CI) I 0.362 (0.349 to 0.374) C 0.347 (0.334 to 0.360) Average cost of HomeHealth service per participant: £307	Randomisation procedure appeared adequate (block randomisation by GP practice). 51 were randomised, I 26, C 25. Three were lost to follow-up. Most baseline variables were reported to be similar in the two groups but no statistical comparisons of baseline measures were reported. Assessor was blinded to group. This was a feasibility study, so not powered to detect differences in outcomes.	The ADL score improved in frail or pre-frail elderly people receiving a behavioural intervention and fell in the control group at 6 months; the difference was statistically significant. The intervention cost an estimated £307 per participant and estimated cost of use of other services was markedly higher in the control group than intervention subjects, but this was skewed by a small number of high cost interventions unrelated to the study intervention. There were no other significant differences between groups but the study was not powered to detect them, as it was a feasibility RCT. It appears to

								Total cost of community and secondary care service use per participant at 6 months (mean, SE)*: I £1,650, C £2,575. *authors noted that service costs were skewed by a small number of high cost interventions in the C group unrelated to the aims of this intervention.		have been well-conducted.
Community dwelling frail elderly, settings not stated.	Interventions to prevent adverse outcomes in frail elderly. This row includes a psychosocial intervention.	Van der Elst et al, 2019. Search to 17 June, 2016. Papers published in English, French, German or Dutch.	SRMA. To investigate the effect of an intervention on adverse outcomes in frail older adults.	Community-dwelling (settings not stated). Age ≥60 years. Frail. Country of individual studies not stated.	One RCT included a psychosocial intervention (defined as treatment of psychological (eg anxiety) or social (eg financial) problems) Other RCTs included case management, information provision and physical interventions.	Care as usual.	Accidental falls. Time periods not stated; vary between studies.	Accidental falls, psychosocial intervention (1 RCT, n=359): IRR 0.86 (95%CI 0.65 to 1.13), p value not stated. Results of other interventions shown in separate tables.	Studies were assessed for risk of bias in seven domains: quality assessed as low (meeting two or fewer criteria), medium (meeting three or four criteria) or high (meeting more than four criteria). The psychosocial intervention RCT was high quality. MA was carried out where interventions were provided in more than one study. No further details were provided on the individual interventions of each type, which may have been heterogeneous. Subjects were defined as having been diagnosed as frail; various definitions of frailty were used.	No statistically significant differences in the risk of accidental falls were found in a single RCT of a psychosocial intervention with frail elderly people compared with a control group. There were no further details about the intervention in this study which mean that the implications of this finding are difficult to assess. This appears to have been a well-conducted SRMA. Most studies were assessed as being of medium or high quality. However the interventions may have been heterogeneous and a range of frailty definitions were used, which may

										mean the subjects were also heterogeneous, which may have affected the results where MA was undertaken (not for this intervention).
Community-dwelling frail or pre-frail elderly, any setting.	Interventions focusing on prevention of frailty progression. This row includes a problem-solving intervention.	Apostolo et al, 2018. Search dates Jan 2001 to Nov 2015. Studies in English, Portuguese, Spanish, Italian and Dutch.	SR. To identify the effectiveness of interventions to prevent progression of pre-frailty and frailty in older adults.	Aged ≥65 years. Pre-frail or frail. Community-dwelling. Intervention in any setting. Countries of included studies were Taiwan, Sweden, Australia, Mexico, Belgium.	One RCT included a problem-solving therapy intervention. Other interventions included a group exercise programme + nutritional advice, case management approaches, a nurse home visit, assessment, plan, and alert button, and an OT-delivered programme.	Usual care, alternative therapeutic interventions or no intervention.	Frailty (various measures). Post-intervention (3 months).	Frailty status. Problem-solving therapy (1 RCT, n=115, moderate quality): Prefrail/ frail at baseline: I 84%, 16%: C 90%, 10% No significant difference between I and C in change in frailty status at 3 months (post-intervention) (no further details provided). Results of other interventions shown in separate tables.	Methodological quality of the studies was assessed against 10 criteria; included studies met ≥five criteria. All studies used a recognised scale or index (eg Fried) to define pre-frailty and frailty. Findings and their statistical significance were not reported for all measures in all groups. It was not clear whether this was due to missing original data or incomplete reporting in the SR.	No improvements in frailty post-intervention were found in frail or pre-frail older people receiving a problem-solving therapy intervention compared with a control group. Little detail was provided about the intervention. This appeared to be a reasonably well-conducted SR and the included RCTs appear to have been of moderate or high quality. All studies used defined criteria for assessing frailty. The interventions and study populations were heterogeneous and the SR only reported results of individual studies with no attempt to combine study findings. Reporting of some outcomes appeared to be incomplete but it was not clear if this was due to limited information in the original study.

8. Exercise/physical activity and nutrition interventions

8.1 Community dwelling frail or pre-frail elderly (any setting or not stated): exercise or physical activity and/or nutrition interventions										
Population type	**Intervention type**	**Study author, year of publication. Years of study (RCTs). Search timescale, language restrictions (SRs).**	**Study type and aim**	**Population, including setting and country**	**Intervention**	**Control**	**Outcomes, including time points (outcomes relevant to PICO only)**	**Results (Intervention (I) vs Control (C) (including for subgroups relevant to PICO)**	**Brief comment re key quality issues**	**Conclusions**
Community-dwelling frail or pre-frail elderly, setting not stated.	'Primary care' interventions to treat, delay or reverse physical frailty. This row includes physical exercise and/or nutritional interventions.	Macdonald et al, 2020. Search May 1996 - June 2019. Papers published in English.	SRMA. To assess the effectiveness of primary care interventions for physical frailty among community-dwelling adults	Community-dwelling (setting not stated). Age ≥60 years. In 10/12 studies included in MAs, subjects were defined as prefrail or frail. Countries not stated.	Relevant interventions Included physical exercise programmes, nutritional supplementation and nutritional education. At least some of the exercise programmes appear to have been group or supervised programmes, but this was not clear. Other interventions included CGA.	Control (no intervention or placebo).	Frailty (using Fried criteria or adaptations of Fried criteria). RR: risk ratio of change in frailty status (frail or not frail), or frailty prevalence, for I vs C. MA included the results from the immediate post-intervention time point (time periods of interventions varied, max duration 12 months).	Change in frailty status: exercise and nutrition supplements (2 RCTs, n=157): RR 0.62 (95%CI 0.48 to 0.79), p=0.0002. Change in frailty status: nutrition supplements alone (2 RCTs, n=153): RR 0.91 (95%CI 0.63 to 1.33), p=063. Change in prevalence of frailty: exercise and nutrition education (4 RCTs, n=390): RR 0.69 (95%CI 0.58 to 0.82), p=0.0001. Change in prevalence of frailty: exercise alone (4 RCTs, n=596): RR 0.63 (95%CI 0.47 to 0.84), p=0.002. Results of CGA interventions shown in separate table.	Studies were assessed for risk of bias in seven domains. All studies included in MA had at least four domains assessed as at low risk of bias suggesting they were of medium or high quality. All studies included in MA were RCTs. MA was carried out where intervention and outcome measure type were similar. All studies used the Fried frailty criteria or an adaptation of these. The study descriptions of frailty status of their eligible populations were reported but the frailty status of subjects included in the MAs was not clear.	Frail or pre-frail older people receiving exercise interventions, exercise and nutrition supplements or exercise and nutrition education were reported to have a statistically significantly greater improvement in frailty compared with control groups. No improvement was found in those receiving nutritional supplements alone. This appeared to be a reasonably well-conducted SRMA and the RCTs included in the MA were of medium or high quality. Similar criteria for assessing frailty were used in all studies, but subjects may have been heterogeneous as frailty status at recruitment was not

										reported. Limited detail was provided on the interventions but those within each type of intervention were also reported to be heterogeneous. These factors are likely to have affected the findings.
Community-dwelling frail or pre-frail elderly, any setting.	Interventions focusing on prevention of frailty progression. This row includes an exercise and nutrition intervention.	Apostolo et al, 2018. Search dates Jan 2001 to Nov 2015. Studies in English, Portuguese, Spanish, Italian and Dutch.	SR. To identify the effectiveness of interventions to prevent progression of pre-frailty and frailty in older adults.	Aged ≥65 years. Pre-frail or frail. Community-dwelling. Intervention in any setting. Countries of included studies were Taiwan, Sweden, Australia, Mexico, Belgium.	Relevant interventions included a group exercise programme + nutritional advice. Other interventions included problem-solving therapy, case management approaches, nurse home visit, assessment, plan, and alert button, and an OT-delivered programme.	Usual care, alternative therapeutic interventions or no intervention.	Frailty (various measures). ADL. Length of follow-up varied between studies.	Frailty status. Group exercise and nutrition advice (1 RCT, n=117, moderate quality): Prefrail/ frail at baseline: I 84%, 16%; C 90%, 10% Improvement in frailty at 3 months (post-intervention) 45% greater in I than C, p=0.008 (no further details provided). Results of other interventions shown in separate tables.	Methodological quality of the studies was assessed against 10 criteria; included studies met ≥five criteria. All studies used a recognised scale or index (eg Fried) to define pre-frailty and frailty. Findings and their statistical significance were not reported for all frailty measures in all groups. It was not clear whether this was due to missing original data or incomplete reporting in the SR.	Statistically significant improvements in frailty post-intervention were found in one RCT of an exercise and nutrition intervention with frail or pre-frail elderly people compared with a control group. This was a relatively small RCT and limited details were included in the SR. The clinical significance of the change in frailty scores is not clear. This appeared to be a reasonably well-conducted SR and the included RCTs appear to have been of moderate or high quality. All studies used defined criteria for assessing frailty. Reporting of some outcomes appeared to be incomplete but it was not clear if this was due to limited information in the original study.

8.2 Community dwelling frail or prefrail elderly (excluding nursing home): self-directed exercise or physical activity with nutrition supplements										
Population type	**Intervention type**	**Study author, year of publication. Years of study (RCTs). Search timescale, language restrictions (SRs).**	**Study type and aim**	**Population, including setting and country**	**Intervention**	**Control**	**Outcomes, including time points (outcomes relevant to PICO only)**	**Results (Intervention (I) vs Control (C) (including for subgroups relevant to PICO)**	**Brief comment re key quality issues**	**Conclusions**
Community-dwelling frail or prefrail elderly. Setting not stated, but nursing home excluded.	Exercise and/or nutrition interventions.	Hsieh et al, 2019. Study carried out between Oct 2015 and June 2017.	RCT. To assess the effects of individualised home-based exercise and nutrition interventions on frailty management for the pre-frail or frail older adults.	≥65 years. Community-dwelling (excluding nursing home). Frail or prefrail without severe illnesses or cognitive impairment. Mean age of participants 71.6 years. 39.8% women. 86.1–93.5% were prefrail. Taiwan.	Comprehensive assessment. Exercise: personalised programme, including strength, flexibility, balance, and endurance training, performed independently. Nutrition: customised dishware setting out food groups; daily supplements of skim milk and nuts. Monthly visit or phone call with project staff for three months, followed by self-maintenance period of three months.	Usual care.	Frailty score (Fried). QOL (mental component): SF12-MCS. Outcomes at six months.	Exercise n=79, Nutrition n=83, Exercise + nutrition n=77, Control n=80. Difference in score change between I and C groups at 6 months. Frailty score *, Exercise: -0.23 (95% CI -0.41 to -0.05), p=0.012. Nutrition: -0.28 (95% CI -0.46 to -0.11), p=0.002 Exercise + nutrition: -0.34 (95% CI -0.52 to -0.16), p< 0.001. *Lower score better; negative score difference indicates greater decrease in I than C group. SF-12 MCS #. Exercise: 1.58 (95% CI -0.07 to 3.23), p value NS. Nutrition: 2.12 (95% CI 0.49 to 3.75), p=0.011. Exercise + nutrition: 1.05 (95% CI -0.61 to 2.72), p value NS.	Details of the randomisation procedure were not provided. There were no statistically significant differences at baseline between groups in most variables, except for lower body strength and flexibility, and prevalence of diabetes. Sample size estimate was 320 across four groups and 319 were randomised, there was 78% follow-up at 6 months. Analysis was ITT with missing values being imputed from the last observation. Assessors were blinded to group but study personnel and subjects were not. A standard frailty score (Fried) was used. Compliance with interventions was assessed using food and exercise diaries and by project staff.	The improvement in frailty scores at six months was found to be statistically significantly better in the groups of frail or pre-frail elderly people receiving self-directed exercise alone, the nutrition intervention alone, and a combined intervention compared with the control group. The clinical significance of the change in frailty scores is not clear. The improvement in the SF12-MCS score was statistically significantly better only in the nutrition group. This was a reasonably well-conducted RCT which the authors considered was adequately powered to detect outcomes of interest. However follow-up was relatively short.

								#Higher score better, positive score difference indicates greater increase in I than C group.		As the study was based in Taiwan it is not clear how applicable the content of the nutritional intervention would be to the UK.

9. Exercise/ physical activity and cognitive intervention

9.1 Community dwelling prefrail older people (setting not stated): combined exercise and cognitive intervention										
Population type	**Intervention type**	**Study author, year of publication. Years of study (RCTs). Search timescale, language restrictions (SRs).**	**Study type and aim**	**Population, including setting and country**	**Intervention**	**Control**	**Outcomes, including time points (outcomes relevant to PICO only)**	**Results (Intervention (I) vs Control (C) (including for subgroups relevant to PICO)**	**Brief comment re key quality issues**	**Conclusions**
Community dwelling prefrail older persons, setting not stated.	Exercise, cognitive training and board games.	Yu et al, 2020. Study recruited Nov 2017 to Sept 2018.	RCT. To examine the effects of a multicomponent frailty prevention program in community - dwelling older persons with prefrailty.	Community-dwelling (setting not stated). Age ≥50 years. Prefrail based on FRAIL scale score. Mean age of the participants 62.2 years. 88.2% were women. Hong Kong.	60 minutes of group exercise, 30 minutes of computer-assisted cognitive training and 30 minutes of board games, twice a week for 12 weeks.	Not stated.	Frailty (FRAIL scale score): Measures fatigue, resistance, ambulation, illnesses, and loss of weight. 12-week follow-up.	I n=66, C n=61 Change in FRAIL score at 12 weeks, mean (SD) *: I -1.3 (0.6), C +0.3 (0.7), p<0.001. *Lower score = less frail.	Randomisation procedure appeared adequate. 134 were randomised, 127 (95%) completed follow-up. Sample size calculation was not reported. Analysis only included those with follow-up data. There were reported to be no significant differences in baseline measures between the intervention and control groups. Assessors were blinded to allocation.	A reduction in FRAIL score was reported in the intervention group of pre-frail older people who received a combined exercise, cognitive training and board game intervention, while the control group had a small increase in FRAIL score. The difference between groups was reported to be statistically significant. The clinical significance of the change in frailty scores is not clear and it is not possible to distinguish the contribution of the different components of the intervention. This was a small RCT but appears to have been reasonably well-conducted.

10. Exercise/physical activity, nutrition and cognitive/ psychological support intervention

10.1 Community dwelling frail elderly (setting not stated): exercise or physical activity, nutrition supplement and psychological support interventions										
Population type	**Intervention type**	**Study author, year of publication. Years of study (RCTs). Search timescale, language restrictions (SRs).**	**Study type and aim**	**Population, including setting and country**	**Intervention**	**Control**	**Outcomes, including time points (outcomes relevant to PICO only)**	**Results (Intervention (I) vs Control (C) (including for subgroups relevant to PICO)**	**Brief comment re key quality issues**	**Conclusions**
Community-dwelling physically frail elderly. Settings not stated, included nursing home.	Non-pharmacological interventions to treat physical frailty and sarcopenia. This row includes a combined nutritional, physiotherapy, physical training, and psychological support intervention.	Lozano-Montoya et al, 2017. Search to Oct 2015. Search was for SRs. Primary comparative studies included in the identified SRs, of the interventions and population of interest, were included in this SR. Papers published in English, Italian, Portuguese, or Spanish.	SR. To critically appraise the evidence from SRs of the primary studies on nonphar-macological interventions to treat physical frailty and sarcopenia.	Mean age >65 years. Community-dwelling (settings not stated, included nursing home). Frail according to Fried's criteria. Various countries. Studies with relevant outcomes carried out in Australia (multidisciplinary intervention), Spain (physical activity intervention).	One RCT with relevant outcomes included a combined nutritional, physiotherapy, physical training, and psychological support. One other RCT included an exercise programme in a nonagenarian nursing home population.	Usual care. .	ADL. Falls. 12 months (one RCT).	Falls: combined intervention lasting 12 months, (1 RCT reported in 3 papers, n=216, 'serious' risk of bias): I vs C IRR 1.12 (95% CI 0.78 to 1.63, p=0.53). ADL (Barthel Index): combined intervention lasting 12 months, (1 RCT reported in 3 papers, n=216, 'serious' risk of bias): 0.67 points higher in control group (95% CI -4.23 to 5.56, p=0.79). Results of the exercise intervention shown in separate table.	This review was carried out by searching for SRs, then identifying the individual studies included in the SRs and taking data from the studies. This appears likely to have missed some relevant original studies. Primary studies were assessed for risk of bias in seven domains and graded low, medium or high risk. The authors reported whether they considered each outcome finding to have a 'serious' risk of bias. Limited details are provided in the paper regarding the findings in relation to each outcome and their significance. MA was not feasible because of the	Subjects receiving an individually tailored combined physical training, nutritional and psychological intervention were not reported to have any significant differences in measures of ADL or falls compared with those receiving usual care. This finding was based on one RCT which this review's authors assessed as having a serious risk of bias. There were also limitations in the way this SR was conducted which together with the individual study limitations are likely to have affected the results.

									heterogeneity of the interventions.	

10.2 Community dwelling frail or pre-frail elderly (setting not stated): physical activity advice, nutrition advice +/- nutritional supplement and cognitive interventions										
Population type	**Intervention type**	**Study author, year of publication. Years of study (RCTs). Search timescale, language restrictions (SRs).**	**Study type and aim**	**Population, including setting and country**	**Intervention**	**Control**	**Outcomes, including time points (outcomes relevant to PICO only)**	**Results (Intervention (I) vs Control (C) (including for subgroups relevant to PICO)**	**Brief comment re key quality issues**	**Conclusions**
Community-dwelling frail or prefrail elderly, setting not stated.	Physical activity and nutrition advice and cognitive training, with or without nutritional supplement.	Guerville et al, 2019. Study carried out between 2008 and 2011.	RCT. To assess the associations of long-term lifestyle multidomain intervention (MI) and omega-3 supplementation with frailty level evolution and frailty incidence. This paper reports analysis of data from the same study as De Souto Barreto et al (2018), but a different definition of	≥70 years. Community-dwelling (setting not stated) At least one of: Spontaneous memory complaints; Dependency in one or more IADLs; Gait speed slower than 0.8 m/s. Subjects with diagnosed dementia or dependency in any basic ADL were excluded. Mean age 75 years. 63-66% female. 42% pre-frail (frailty score 1-2), 3% frail (frailty score ≥3). France and Monaco.	Multidomain intervention (MIv): nutrition advice, physical activity advice, and cognitive training, in small group sessions (twelve per month for two months, then one per month up to three years); three preventive consultations. Nutritional supplement: daily omega-3 polyunsaturated fatty acids. The three intervention groups were: MIv plus placebo; Omega-3; MIv plus omega-3.	Usual care with placebo.	Frailty; five dimensions each assessed with defined scales: Unintentional weight loss >4.5 kg in previous year; Self-reported exhaustion; Low self-reported physical activity in the past two weeks; Slow gait; Poor handgrip strength. Total frailty score ranged from 0 to 5, higher score indicating	Change in frailty score at three years compared with control group (n=392), HR of time-group interaction in regression analysis: MIv + omega-3 (n=393): HR 0.95 (95% CI 0.87 to 1.03), p=0.27. MIv + placebo (n=405): HR 0. 95 (95% CI 0.87 to 1.02), p=0.26. Omega-3 alone (n=398): HR 0.92 (95% CI 0.85 to 1.004), p=0.20. Incidence of frailty in those who were non-frail at baseline compared with control group (n=1394; n in each group not stated): MIv + omega-3 HR 0.61 (95% CI 0.37 to 0.99), p=0.13.	Randomisation procedure appeared adequate. There was no significant difference in baseline characteristics reported between groups. Frailty data were available on 71% of the 1588 recruited subjects at 3 years. Analysis was reported to be ITT, but it was not stated how missing data were handled. Assessors were blinded to group. Study subjects and personnel were blinded to omega-3 or placebo allocation. This was a secondary analysis of a RCT designed to evaluate the effect of the interventions on a composite cognitive score. The subgroup analysis excluding subjects who were frail at 12 months did not	No differences between intervention and control groups were found in changes in frailty scores or incidence of frailty at three years compared with baseline measures, for frail or pre-frail elderly people who received a multidomain intervention (group-based physical activity advice, nutrition advice and cognitive training) together with omega-3 supplements. For those who had been non-frail at 12 months there was a statistically significantly lower incidence of frailty at three years in those who received the group intervention with omega-3

			frailty is used.				greater frailty. Frailty defined as score of ≥3. Outcomes at three years.	MIv + placebo HR 0.71 (95% CI 0.44 to 1.14), p=0.22. Omega-3 alone HR 0.82 (95% CI 0.52 to 1.29), p=0.39. Incidence of frailty in those who were non-frail at 12 months (n=1172; n in each group not stated): MIv + omega-3 HR 0.44 (95% CI 0.22 to 0.82), p=0.03. MIv + placebo HR 0.59 (95% CI 0.32 to 1.05), p=0.11. Omega-3 alone HR 0.69 (95% CI 0.62 to 1.22), p=0.20.	appear to have been pre-planned. It was based on the authors' assumption that those who became frail in the first 12 months probably had predisposing factors which were unlikely to be influenced by the intervention.	supplements compared with the control group. The clinical significance of changes in frailty scores is not clear. No significant differences were found in incidence of frailty in any other groups. This was a secondary analysis of a large study with long-term follow-up which appears to have been well-conducted. However the analysis of changes in frailty scores compared with 12-month scores does not appear to have been pre-planned. and these findings should be treated with caution. The multiple tests and outcome measures included in this paper and de Souto Barreto et al (2018) from the same study (which were not pre-planned) makes the results less reliable as some may appear significant due to chance.
Community-dwelling frail or prefrail elderly, setting not stated.	Physical activity and nutrition advice and cognitive training.	De Souto Barreto et al, 2018. Study dates not stated in this paper.	RCT. To investigate whether a long-term multidomain lifestyle	≥70 years. Community-dwelling (setting not stated) At least one of: Spontaneous memory complaints;	Multidomain intervention (MIv): nutrition advice with or without omega-3 supplement, physical	Usual care, with Omega-3 supplement or placebo.	Frailty Index (FI) based on 32-item scale. FI = sum of deficits divided by 32.	<u>Frailty index (FI)</u> Between-group adjusted* mean difference (negative values indicate improvement). I n=816, C n=821	Randomisation procedure appeared adequate. There was no significant difference in baseline characteristics between groups. Assessors were blinded to group.	A nutrition and physical activity advice and cognitive training intervention (with or without omega-3 supplements) with frail or pre-frail

		Reported by Guerville et al as between 2008 and 2011.	intervention was associated with the severity and incidence of frailty in older adults. This paper reports analysis of data from the same study as Guerville et al, 2019, but a different definition of frailty is used.	Dependency in one or more IADLs; Gait speed slower than 0.8 m/s. Subjects with diagnosed dementia or dependency in any basic ADL were excluded. Mean age 75 years. 75% women. Frailty prevalence (Frailty Index ≥0.25): C 19.8%, I 22.7%. France and Monaco.	activity advice, and cognitive training, in small group sessions (12 per month for two months, then one per month up to three years). Three clinical consultations (at baseline and at 1- and 2-year follow-up) were performed by a physician to manage cardiovascular risk factors.		Frailty incidence in those without frailty at baseline (frailty defined as FI ≥0.25, sensitivity analysis FI ≥0.30). Persistent frailty incidence (FI ≥0.25 at 2 consecutive data points). Reversal of frailty in subjects with baseline frailty (FI <0.25 during follow-up in those with FI ≥0.25 at baseline). Outcomes up to three years.	6 months: -0.01 (95% CI -0.01 to 0.000, p=.072); 1 year: -0.00 (95% CI -0.01 to 0.00), p=0.41; 2 years: -0.00 (95% CI -0.01 to 0.00), p=0.17; 3 years: -0.01 (95% CI -0.02 to -0.00), p=0.026. β for time-by-treatment interaction # -0.001 (95% CI -0.002 to 0.000), p=0.098. Sensitivity analysis including only those attending ≥75% of multidomain sessions (n = 1240): β for time-by-treatment interaction # -0.001 (95% CI -0.003 to 0.000), p=0.062. <u>Frailty incidence</u> (in those without frailty at baseline) <u>FI≥0.25</u> n = 1146, numbers in I and C groups not stated. I 103 vs C 138; HR (I vs C) 0.72 (95% CI 0.55 to 0.93), p=0.01. <u>FI ≥0.30</u> n = 1313, numbers in I and C groups not stated. I 86 vs C 88; HR (I vs C) 0.91 (95% CI 0.67 to 1.22), p=0.53. <u>Persistent frailty</u> n=1042, numbers in I and C groups not stated.	837 subjects received the multidomain intervention as defined in this paper and 842 did not (n=1679). Frailty data were available for 816 I and 821 C subjects (n=1637, 97.5% of the total). The rationale for the FI threshold of 0.25 as the definition of frailty was not explained, and while the frailty incidence analysis using this threshold found a statistically significant difference between groups, the sensitivity analysis using a FI threshold of 0.3 did not. This was a secondary analysis of a RCT designed to evaluate the effect of the interventions on a composite cognitive score. Two of the original intervention groups were combined to make the intervention group used in this analysis, and one of the original intervention groups (the omega-3 group) was combined with the placebo control group to make the controls used in this analysis.	elderly people over three years did not have a statistically significant effect on Frailty Index (FI) score over time compared with controls, based on mixed-effect linear regression. However at the three-year time point the intervention group did have a significantly lower FI score compared with controls. The incidence of frailty and of persistent frailty were both significantly lower in the intervention group at 3 years when a FI threshold of 0.25 was used, but when the threshold was increased to 0.3 the difference in frailty incidence was no longer significant. There was no significant difference between groups in reversal of frailty in those who had been frail at baseline. This was a secondary analysis of large study with long-term follow-up which appears to have been well-conducted. However the intervention and control groups used in this analysis were created from

								I 27 vs C 48 HR (I vs C) 0.53 (95% CI 0.33 to 0.85), p=0.008. <u>Reversal of frailty</u> n=311, numbers in I and HR (I vs C) 1.08 (95% CI 0.82 to 1.42), p= 0.60. *adjusted for baseline FI score # β coefficient based on mixed effects linear regression.		combinations of groups in the original study which had not been planned. These findings should therefore be treated with caution. The clinical significance of the changes in FI score and the thresholds used are not clear. The multiple tests and outcome measures included in this paper and Guerville et al (2019) from the same study (which were not pre-planned) makes the results less reliable as some may appear significant due to chance.

11. Exercise/ physical activity, nutrition, cognitive and medication review intervention

11.1 Community dwelling frail or pre-frail elderly (setting not stated): exercise or physical activity, nutrition supplement, cognitive and medication review intervention										
Population type	**Intervention type**	**Study author, year of publication. Years of study (RCTs). Search timescale, language restrictions (SRs).**	**Study type and aim**	**Population, including setting and country**	**Intervention**	**Control**	**Outcomes, including time points (outcomes relevant to PICO only)**	**Results (Intervention (I) vs Control (C) (including for subgroups relevant to PICO)**	**Brief comment re key quality issues**	**Conclusions**
Community-dwelling frail and pre-frail elderly, setting not stated.	Physical activity programme, nutritional advice, social skills training and medication review.	Romera-Liebana et al, 2018. Recruited Jan 2013 - Jan 2015.	RCT. To evaluate whether a multifactorial intervention programme could modify physical and cognitive frailty parameters in elderly individuals.	>65 years. Community-dwelling. Timed get-up-and-go Test (TGUGT) 10-30 seconds. No severe cognitive impairment. Mean age of participants 77.3 years. 75% female. 47% living alone. 25% pre-frail and 75% frail (Fried criteria). Spain.	Multifactorial with 4 elements: Aerobics group exercise programme conducted by physiotherapists, 60 minutes twice a week for 6 weeks; Hyperproteic nutritional shake daily for 6 weeks; Memory workshops, 90 minutes twice a week for 6 weeks (written, oral, corporal, and musical exercises) conducted by speech therapists; Medication review 'following STOPP criteria'.	Usual care.	Number of drugs per day. 3-month and 18-month follow-up. A number of measures of physical and cognitive function were also reported but no measures of ADL, QOL or resource use.	3 months: I n=173, C n=174 18 months, I n=148, C n=119. Mean (SD) number of drugs per day (baseline, 3 months, 18 months) I: 7.7 (3.2), 6.9 (3.2), 7.5 (3.4) C: 6.6 (3.8), 7.2 (4.0), 7.5 (4.1) Difference between groups in decrease in mean number of prescriptions at 3 months and 18 months (negative favours intervention)*: 3 months: -1.39 (95% CI -1.69 to -1.10) 18 months: -1.09 (95% CI -1.71 to -0.47). *adjusted for age, gender, marital status, educational status, income, cognitive score, TGUGT.	Randomisation procedure was not described. No significant differences reported in baseline variables apart from significantly more medications in the intervention group (p=0.004). 352 were recruited (176 in each group), 3-month follow-up included 347 (99%), 18-month follow-up included 267 (76%). Baseline and outcome measurements were blinded to group assignment. Frailty, falls and ADL were assessed at baseline but outcome measures included individual measures of functional and cognitive performance only. There were no details about the medication review, except that it followed STOPP criteria (a tool which identifies potentially inappropriate uses of medications in older people).	Frail and pre-frail elderly people who took part in a six-week multifactorial intervention, including medication review, had a significant improvement in the number of drugs they were taking compared with the control group at 18 months. The intervention group were taking significantly more drugs at baseline. The intervention also involved physical activity, nutrition supplements and memory workshops, but no other outcome measures relevant to this review were reported. This RCT appears to have been moderately well conducted but there

										were limited details about the medication review intervention and it Is not possible to judge what the effect of the combined intervention was or which components contributed to the outcomes. There was limited explanation in the paper of how the results were analysed, making it difficult to interpret the findings. The clinical and cost implications of the change in drug use are not clear.

12. Exercise/ physical activity, nutrition, social skills training and medication review intervention

12.1 Community dwelling frail or pre-frail elderly (setting not stated): exercise or physical activity, nutrition education, social skills training and medication review intervention										
Population type	**Intervention type**	**Study author, year of publication. Years of study (RCTs). Search timescale, language restrictions (SRs).**	**Study type and aim**	**Population, including setting and country**	**Intervention**	**Control**	**Outcomes, including time points (outcomes relevant to PICO only)**	**Results (Intervention (I) vs Control (C) (including for subgroups relevant to PICO)**	**Brief comment re key quality issues**	**Conclusions**
Community-dwelling frail and pre-frail elderly, setting not stated.	Physical activity programme, nutritional advice, social skills training and medication review.	Van Lieshout et al, 2018. Study took place between 2011 and Nov 2014.	RCT. To evaluate the effectiveness of the SPRY-program on daily functioning among (pre) frail community-dwelling persons that are 65 years and over.	Age ≥65 years. Living independently in the community (setting not stated). Groningen Frailty Indicator (GFI) score of ≥1 (i.e. prefrail (score 1-3) or frail (score ≥4)). No cognitive impairment. Mean age of participants 74 years. 55% female. 167 (59.5%) participants were pre-frail and 114 (40.6%) were frail. Netherlands.	SPRY programme, 4 elements: Individual medication review and optimisation for those on ≥four drugs; Physical training: two hourly sessions weekly for 12 weeks, run by a physical therapist; Social skills training: weekly group sessions for five weeks; Nutritional education, three group sessions.	Waiting list control.	ADL (Katz). QOL: SF-12 PCS SF-12 MCS Frailty (Groningen Frailty Index, GFI) Healthcare consumption (self-reported). 12-month follow-up.	I n=143, C n=147. ADL: Katz score: No. (%) reporting one or more disabilities at baseline and 12 months: I 18 (12.9%), 35 (25.3%); C 28 (19.7%), 40 (28.2%); OR 0.96 (95%CI 0.39 to 2.35), p=0.92 SF-12 PCS, estimated mean score at 12 months*: I 45.5 (95% CI 42.83 to 48.08) C 45.1 (95% CI 42.74 to 47.52) p=0.61 SF-12 MCS, estimated mean score at 12 months*: I 48.0 (95% CI 45.45 to 50.53) C 47.4 (95% CI 45.42 to 49.35) p=0.17	Randomisation procedure appears to have been adequate. There were no significant differences at baseline apart from income (higher in control group). The authors estimated that a sample size of at least 148 per group was needed. They recruited 290 participants (I n=143, C n=147), with follow-up data on 207 (29.6% loss to follow-up). Analysis was ITT. It was not reported whether assessors were blinded to group. Healthcare consumption was self-reported retrospectively and may have been subject to recall bias. The p value for the change in frailty score was reported as >1, presumably in error.	No statistically significant differences in measures of ADL, QOL, frailty or healthcare consumption were found at up to 12 months follow-up between elderly frail or pre-frail patients taking part in a multicomponent physical activity, nutrition education, social skills training and medication review intervention, compared with a control group having usual care. The original intervention was for a maximum of 12 weeks. This study had a number of methodological problems and may have been underpowered. The p value for the change in frailty score was reported

								Frailty (GFI), estimated mean score at 12 months*: I 3.9 (95% CI 2.53 to 5.30) C 3.9 (95% CI 2.88 to 4.84) p=1.36. (note: as reported in the paper) Difference in healthcare consumption, I vs C at 12 months*: Hospital admission: OR 1.33 (95% CI 0.53 to 3.58), p=0.54 Doctor's visit beyond regular hours: OR 1.36 (95% CI 0.52 to 3.52) p=0.52 Nursing home admission: OR 1.25 (95% CI 0.59 to 2.65), p= 0.57 * adjusted for age, gender, marital status, education, income, disability at T0, level of frailty at T0. Medication review was carried out in 83 (59.8%) of the intervention group, of whom 32 (38.1%) stopped using one or more drugs.		as >1, presumably in error.

13. Exercise/ physical activity, nutrition, medication review and social circumstances review intervention

13.1 Community dwelling pre-frail elderly (non-institutionalised): self-directed exercise, nutrition education, medication review and social circumstances review intervention										
Population type	**Intervention type**	**Study author, year of publication. Years of study (RCTs). Search timescale, language restrictions (SRs).**	**Study type and aim**	**Population, including setting and country**	**Intervention**	**Control**	**Outcomes, including time points (outcomes relevant to PICO only)**	**Results (Intervention (I) vs Control (C) (including for subgroups relevant to PICO)**	**Brief comment re key quality issues**	**Conclusions**
Community-dwelling prefrail elderly. Setting not stated but were non-institutionalised.	Physical activity instruction, nutritional advice, medication review, review of personal and social circumstances.	Gene Huguet et al, 2018 The study took place between June 2016 and July 2017.	RCT. To evaluate a multifactorial intervention, to prevent frailty in community-dwelling elderly patients with incipient frailty.	Aged ≥80 years. Non-institutionalised. Pre-frail (met one or two Fried criteria). Excluded dementia, palliative care, frail. Mean age of subjects 84.5 years. 64.5% female. Spain.	Multicomponent: Medication review in polypharmacy patients (≥five drugs); Nutritional advice: group session, advising on Mediterranean diet; Physical exercise: instruction in exercises and recommendations for home-performance; nine sessions over six months; Review of personal and environmental conditions and social support, by social worker, and evaluation of need for home telecare.	Usual care.	ADL score (Barthel). IADL (Lawton). Progression to frailty (three or more Fried criteria). Reversion from frailty. 12-month follow-up.	I n=85, C n=88 ADL *, mean (SD) at baseline and 12 months: I 94.9 (5.4), 96.2 (5.1); C 95.2 (6.4), 94.1 (7.9); Intervention difference 2.37 (95% CI 1.14 to 3.61), p<0.001. IADL *, mean (SD) at baseline and 12 months: I 6.5 (1.6), 6.4 (1.7); C 6.4 (1.6), 6.0 (2.0); Intervention difference 0.26 (95% CI -0.01 to 0.53), p=0.062. * higher score better Progression to frailty during the follow-up period, number (%): I 7 (8.2%), C 21 (23.9%); RR 2.9 (95%CI 1.45 to 8.69). Reversion from frailty to robust during the follow-up period, number (%):	Randomisation procedure appeared adequate. There were no significant differences between the groups in baseline characteristics. 200 were recruited (100 in each group); follow-up was completed by 173; 13.5% loss to follow-up. It was not stated whether assessors were blinded to group. EQ-5D was also reported but results have not been included here because they were inconsistently reported in the tables and text; table results reported greater improvement in the control group while text results reported greater improvement in the intervention group. There were limited details about some aspects of the intervention, for example the physical activity component appeared to be primarily instruction	At 12-month follow-up prefrail elderly people receiving a multicomponent intervention lasting up to six months including medication review, nutritional advice, physical exercise instruction and review of social circumstances had improved ADL scores while in the control group ADL scores had deteriorated; the difference between groups was statistically significant. IADL scores had deteriorated in both groups, but the difference was non-significant. Significantly more in the control group had progressed to frailty and significantly more in the intervention group had reversed from frailty to robust.

								I 12 (14.1%), C 1 (1.1%), p<0.001.	for independent activity at home rather than instructor-led sessions, but it was not clear. Some subjects were stated to have had telecare installed following the personal circumstances review, but there were no further details.	This was a small RCT which appears to have been only moderately well conducted. Some results were inconsistently reported and there were limited details about some of the interventions. The findings should therefore be treated with caution.

14. Interventions including telemonitoring

14.1 Community dwelling adults with heart failure (setting not stated): telemonitoring or telephone support										
Population type	**Intervention type**	**Study author, year of publication. Years of study (RCTs). Search timescale, language restrictions (SRs).**	**Study type and aim**	**Population, including setting and country**	**Intervention**	**Control**	**Outcomes, including time points (outcomes relevant to PICO only)**	**Results (Intervention (I) vs Control (C) (including for subgroups relevant to PICO)**	**Brief comment re key quality issues**	**Conclusions**
Community-dwelling adults with a diagnosis of heart failure. Setting not stated but nursing home excluded.	Telemonitoring or telephone support.	Inglis et al, 2015. Search to Jan 2015. No language restrictions stated.	SRMA. To review randomised controlled trials (RCTs) of structured telephone support or non-invasive home telemonitoring compared to standard practice for people with heart failure.	Adults (any age) with a diagnosis of heart failure. Community-dwelling (excluding nursing home). Countries: 17 studies were in the USA, remainder were in Germany, Italy, UK, Netherlands, Poland, Austria, Australia, Argentina, Brazil, Canada, India, Iran, Finland, Sweden.	Either: structured telephone support (delivered using simple telephone technology); or telemonitoring (digital/broadband/satellite/ wireless/blue-tooth transmission of physiological and other non-invasive data). In either case interventions are scheduled, initiated by a health professional, delivered as the only aftercare intervention.	Usual care.	All-cause hospitalisation. Chronic heart failure (CHF)-related hospitalisation. Time periods not stated.	All-cause hospitalisation: structured telephone support vs usual care (16 RCTs, n=7216, very low quality evidence): I vs C RR 0.95 (95%CI 0.90 to 1.00), p=0.05. All-cause hospitalisation: non-invasive telemonitoring vs usual care (13 RCTs, n=3332, very low quality evidence): I vs C RR 0.95 (95%CI 0.89 to 1.01), p=0.11. CHF-related hospitalisation: structured telephone support vs usual care (16 RCTs, n=7030, moderate quality evidence): I vs C RR 0.85 (95%CI 0.77 to 0.93), p=0. (as reported in paper). CHF-related hospitalisation: non-invasive	This was a well-conducted Cochrane review. Risk of bias in the included studies was assessed in line with Cochrane methodology. Overall the quality of evidence was assessed as between very low and moderate for different outcomes. MA for different outcomes included between 2000 to over 7000 subjects.	This SRMA found that both structured telephone support and non-invasive telemonitoring resulted in fewer heart-failure-related hospital admissions in patients with chronic heart failure compared with usual care. The evidence for these outcomes was considered to be of moderate quality. There was no significant difference in all-cause hospital admissions with non-invasive telemonitoring and for structured telephone support the difference was borderline significant; this evidence was considered to be of very low quality. A large number of studies from various countries were

								telemonitoring vs usual care (8 RCTs, n=2148, moderate quality evidence): I vs C RR 0.71 (95%CI 0.60 to 0.83), p<0.0001.		included and the interventions were heterogeneous. Risk of bias in the included studies means that estimated effects reported may not be accurate.
Elderly people with heart failure.	Telemonitoring and telephonic support.	Pedone et al, 2015. Dates of study not stated.	RCT. To evaluate the effect of an innovative model integrating telemonitoring of vital parameters and telephone support on 6-month survival and hospital admissions of elderly adults with heart failure.	Age ≥65 years. Diagnosis of heart failure. Discharged from hospital or attending outpatients. Setting not stated. Mean age 80 years. Italy.	Telemonitoring system linked to blood pressure, pulse and oximetry measurements. Geriatrician reviewed readings daily and contacted patients if necessary. System displayed an alert when a measurement was outside a predefined range. Patients had telephone access to geriatrician if needed with fast-track access to appointments or ambulatory visits.	Usual care. Patients had telephone access to geriatrician if needed.	Hospital admissions (any cause). 180-day follow-up.	I n=47, C n=43. Hospital admissions within 180 days (number, incidence rate (IR)), incidence rate ratio (IRR): I 8, IR 39/100 person-years (95% CI 20 to 77) C 20, IR 129/100 person-years (95% CI 84 to 200). IRR 0.30 (95% CI 0.12–0.67), p value not reported. Probability of remaining free of admission at 180 days: Kaplan-Meier estimate, log rank p=0.04.	There was limited information about the randomisation procedure. Baseline ADL and IADL were significantly worse in the C group; there were no other significant differences between groups. Number randomised were I n=50, C n=46, with I n=47, C n=43 at follow-up. 62% of scheduled measurements were completed and 64% of participants completed at least half of the scheduled measurements. It is not clear whether outcomes were adjusted for baseline differences between groups.	Elderly people with heart failure who had been recently discharged from hospital or seen in outpatients, who were randomised to a telephonic monitoring system with telephone access to a geriatrician, had significantly fewer hospital admissions due to any cause over the following 6 months than those receiving usual care. This was a small RCT. There were a number of problems with the methodology and reporting which are likely to reduce the reliability of the results.

14.2 Community dwelling adults with heart failure: multicomponent intervention including telemonitoring										
Population type	**Intervention type**	**Study author, year of publication. Years of study (RCTs). Search timescale, language restrictions (SRs).**	**Study type and aim**	**Population, including setting and country**	**Intervention**	**Control**	**Outcomes, including time points (outcomes relevant to PICO only)**	**Results (Intervention (I) vs Control (C) (including for subgroups relevant to PICO)**	**Brief comment re key quality issues**	**Conclusions**
Adults with heart failure.	Care recommendations by multidisciplinary team; telemonitoring; screening and management of depression.	Bekelman et al, 2015. Subjects were enrolled between May 2009 and June 2011.	RCT. To determine the effectiveness of a collaborative care patient-centred disease management intervention to improve the health status of patients with heart failure.	Patient at one of four Veterans Administration (VA) medical centres; Diagnosis of heart failure; Kansas City Cardiomyopathy Questionnaire (KCCQ) score <60 (indicating significant HF symptoms, limited functional status, poor QOL). Mean age 68 years. 98.8% male. USA.	Collaborative care provided by a team: nurse, primary care physician, cardiologist, and psychiatrist; Reviewed health record and Patient Health Questionnaire 9 (PHQ-9) data; Recommended care changes; Weekly reviews of telemonitoring data and PHQ9. Patient's physician decided on implementing recommendations Depression care for those with PHQ-9 score ≥10 including one-to-one counselling and self-management training. Telemonitoring including symptom monitoring and	Usual care (variable; may have included telemonitoring).	Hospitalisation. Data obtained from VA records. 12-month follow-up.	I n=187, C n=197. Hospitalisation at 1 year: I 29.4%, C 29.9% p=0.87). (further details not reported).	Randomisation procedure appears adequate. Planned sample size was 600, 392 recruited. Eight dropped out after randomisation; I n=187, C n=197. Loss to follow-up was 14% at 12 months. There were no statistically significant differences between groups at baseline. Clinical measures (eg the KCCQ) at baseline, three and six months were blinded, at 12 months were not. 75% of the collaborative care team recommendations were reported to have been followed by physicians.	Patients with limited functional status due to heart failure who received a multicomponent intervention including care recommendations by a multidisciplinary team, telemonitoring and screening and management of depression had the same rate of hospitalisations at 1 year as those receiving usual care from a VA provider. This appeared to be a reasonably well-conducted RCT although limited details were provided about the findings relevant to this review. It is not clear how generalisable the findings would be to the NHS.

					medication reminders.					

15. Information, social prescribing

15.1 Community dwelling frail elderly (settings not stated): information provision										
Population type	**Intervention type**	**Study author, year of publication. Years of study (RCTs). Search timescale, language restrictions (SRs).**	**Study type and aim**	**Population, including setting and country**	**Intervention**	**Control**	**Outcomes, including time points (outcomes relevant to PICO only)**	**Results (Intervention (I) vs Control (C) (including for subgroups relevant to PICO)**	**Brief comment re key quality issues**	**Conclusions**
Community dwelling frail elderly, settings not stated.	Interventions to prevent adverse outcomes in frail elderly. This row includes information provision interventions.	Van der Elst et al, 2019. Search to 17 June, 2016. Papers published in English, French, German or Dutch.	SRMA. To investigate the effect of an intervention on adverse outcomes in frail older adults.	Community-dwelling (settings not stated). Age ≥60 years. Frail. Country of individual studies not stated.	Three RCTs included information provision, defined as an emphasis on self-care and preventive approaches as well as information for community-wide dissemination and use. Other RCTs included case management, physical interventions and psychosocial interventions.	Care as usual.	Institutionalisation. Time periods not stated; vary between studies.	Institutionalisation: information provision interventions (3 RCTs, n=968): OR 1.53 (95% CI 0.64 to 3.65), p=0.34. Results of other interventions shown in separate tables.	Studies were assessed for risk of bias in seven domains: quality assessed as low (meeting two or fewer criteria), medium (meeting three or four criteria) or high (meeting more than four criteria). Information provision MA included 1 low, 1 medium, 1 high quality studies. MA was carried out where interventions were provided in more than one study. No further details were provided on the individual interventions of each type, which may have been heterogeneous. Subjects were defined as having been diagnosed as frail; various definitions of frailty were used.	No statistically significant differences were found in institutionalisation for frail older people receiving information interventions, compared with usual care. This was based on MA of three RCTs but there were no further details about the interventions in these studies. This appears to have been a well-conducted SRMA. Most studies were assessed as being of medium or high quality and the MAs included between around 1000-2000 subjects. However the interventions may have been heterogeneous and a range of frailty definitions were

										used, which may mean the subjects were also heterogeneous, which may have affected the results.

15.2 Community dwelling frail or prefrail elderly (setting not stated): social prescribing										
Population type	**Intervention type**	**Study author, year of publication. Years of study (RCTs). Search timescale, language restrictions (SRs).**	**Study type and aim**	**Population, including setting and country**	**Intervention**	**Control**	**Outcomes, including time points (outcomes relevant to PICO only)**	**Results (Intervention (I) vs Control (C) (including for subgroups relevant to PICO)**	**Brief comment re key quality issues**	**Conclusions**
Community dwelling frail or pre-frail elderly, setting not stated.	Social prescribing.	Smith et al, 2019. Search to 1 July 2019. Papers published in English. No eligible papers were identified.	SR. To determine the current evidence on the effectiveness of social prescribing programmes to delay or reduce frailty in frail older adults living in the community.	Community-dwelling (setting not stated). Age ≥65 years. Frail or prefrail (any criteria). Countries not specified.	Social prescribing, community referral, referral schemes, wellbeing programmes or interventions where a non-health link worker was the intervention provider	Not stated.	Included: validated measure of frailty, HRQoL, health resource use.	No eligible papers identified. No restrictions were set on study type.	The preliminary stages of the SR appeared to be well-conducted.	No eligible studies were identified on the effectiveness of social prescribing to delay or prevent frailty. The principal reason for excluding studies was stated to be that they did not report measures of frailty.

16. Specific condition/ risk management

16.1 Community dwelling people with SMI: compulsory community treatment										
Population type	**Intervention type**	**Study author, year of publication. Years of study (RCTs). Search timescale, language restrictions (SRs).**	**Study type and aim**	**Population, including setting and country**	**Intervention**	**Control**	**Outcomes, including time points (outcomes relevant to PICO only)**	**Results (Intervention (I) vs Control (C) (including for subgroups relevant to PICO)**	**Brief comment re key quality issues**	**Conclusions**
People with serious mental illness living in the community.	Compulsory community treatment.	Kisely et al, 2017. Search to June 3, 2016. No language restrictions stated.	SRMA. To examine the effectiveness of compulsory community treatment (CCT) for people with severe mental illness (SMI).	Adults with SMI (mainly schizophrenia and schizophrenia-like disorders, bipolar disorder or depression with psychotic features). Community-dwelling, recently discharged from hospital. Countries: USA (two RCTs), UK (one RCT).	CCT. In the included studies this was court-ordered involuntary outpatient commitment (OPC) (two US studies), or clinician-ordered compulsory treatment orders (CTO) (one UK study).	Voluntary care. In the included studies this included voluntary treatment with comprehensive discharge plan, and supervised discharge.	Hospital readmission. Hospital bed days. LQOLI (Lehman QOL scale) (higher score better). Time periods up to 12 months.	Hospital readmission within 11 to 12 months (3 RCTs, n=749, low to medium quality evidence): CCT vs voluntary care, RR 0.98, (95%CI 0.83 to 1.17), p=0.83. Hospital bed days within 12 months (2 RCTs, n=597, low to medium quality evidence): CCT vs voluntary care, Mean difference -3.35 (95%CI -15.14 to 8.44), p=0.58. LQOLI (time period not stated) (2 RCTs, n=406, low quality evidence): CCT vs voluntary care, mean difference -0.22 (95%CI -0.95 to 0.5), p=0.55.	This was a well-conducted Cochrane review. Risk of bias in the included studies was assessed in line with Cochrane methodology. Two were considered to provide low-quality evidence and one (Burns et al 2013, the UK study) moderate-quality evidence. Two studies were of court-ordered CCT in the USA and the third was of clinician-ordered CCT in the UK. Findings from the different approaches to CCT and voluntary care were pooled. However there are likely to have been significant differences in the approaches used and the context within which the interventions took place.	This SRMA did not find any significant differences in hospital admissions or bed days or in QOL in people with SMI subject to compulsory community treatment compared with those under voluntary treatment. One study was UK-based and included clinician-ordered compulsory treatment orders. Two included court-ordered CCT in the USA which may have limited applicability in the UK. The SRMA was well-conducted but the included studies were of low to medium quality only.

16.2 Community dwelling people with SMI: cardiometabolic risk management										
Population type	**Intervention type**	**Study author, year of publication. Years of study (RCTs). Search timescale, language restrictions (SRs).**	**Study type and aim**	**Population, including setting and country**	**Intervention**	**Control**	**Outcomes, including time points (outcomes relevant to PICO only)**	**Results (Intervention (I) vs Control (C) (including for subgroups relevant to PICO)**	**Brief comment re key quality issues**	**Conclusions**
Community-dwelling patients with serious mental illness (SMI) and cardiometabolic risk factors.	Managing cardiometabolic risk factors through dedicated clinic and staff at community mental health centre.	Druss et al, 2017. Study dates not stated.	RCT. To compare quality and outcomes of care between an integrated behavioural health home and usual care. (Note: The behavioural health home was a cardiometabolic risk management clinic based at a community mental health centre).	Patients with SMI and cardiometabolic risk factors attending community mental health centre. SMI (schizophrenia, schizoaffective disorder, bipolar disorder, major depression, obsessive-compulsive disorder or posttraumatic stress disorder, with or without comorbid substance use) without cognitive impairment. At least one of: blood pressure ≥130/85mmHg; glucose level ≥100mg/dL; serum cholesterol >240mg/dL; LDL >160 mg/dL.	Behavioural health home: Clinic based at community mental health (CMH) centre with nurse care manager, and nurse practitioner with prescribing authority, overseen by medical director. Patient health education for lifestyle factors. Weekly review of patients whose cardiometabolic measurements were not within normal range. Attendance by clinic staff at CMH meetings and sharing of records.	Provided with a summary of their laboratory tests and encouraged to make an appointment with a community medical provider.	HRQOL SF-36 MCS SF-36 PCS Service use (based on charts from all medical and behavioural health facilities where subjects reported receiving care). p values for group-by-time effects over 12 months. Follow-up at six and 12 months.	I = 224, C = 223. SF-36 MCS* (mean, (SD)) at baseline, 6 months, 12 months: I 29.9 (13.5), 33.3 (14.8), 38.0, (14.3) C 29.3 (13.9), 35.4 (14.7), 36.3 (15.2). p=0.029 SF-36 PCS* (mean, (SD)) at baseline, 6 months, 12 months: I 40.5 (11.9), 42.4 (11.7), 42.9 (12.2); C 41.0 (12.4), 41.8 (12.0), 42.5 (12.4); p=0.036 Use of recommended # preventive services (mean, (SD)) at baseline, 12 months: I 36% (20), 56% (20) C 36% (20), 33% (20) P<0.001 <u>Healthcare provider visits</u> (mean over the previous 6 months, (SD) at baseline, 12 months: Primary care provider I 0.93 (1.7), 1.73 (1.8) C 0.65 (1.2), 0.86 (1.2)	Randomisation procedure was not described. There were reported to be no significant baseline differences between groups. Follow-up at 12 months was 77.2% for interviews, 100% for chart review data, and 81.3% for laboratory data. It was not clear whether assessments were blinded (where this was applicable). Analyses were ITT. It is not clear how complete the service use outcomes measures would be as these depended on self-report. Outcomes relating to quality of care and clinical measures such as blood pressure and HbA1c were also recorded. The authors reported that quality of diabetes and hypertension care and medication was significantly better in the intervention group. However most clinical	Patients with SMI and cardiometabolic risk factors attending a community mental health centre who had access to a dedicated clinic and staff to help manage their risk factors had statistically significantly greater improvements in measures of health-related QOL, and increases in use of primary care providers and preventive services, at 12 months compared with similar patients who did not have access to such a clinic. There were no differences between the groups in use of other healthcare services and the authors also reported no differences in most clinical outcomes or quality of care. The study took place in a single service in the USA and it is not

				USA.				p<0.001 Mental health provider I 2.13 (4.3), 1.08 (1.7) C 2.18 (4.3), 2.18 (6.0) p=0.148 Specialty provider visits I 0.27 (1.3), 0.49 (1.4) C 0.17 (0.7), 0.56 (1.4) p=0.423 Emergency department visits I 0.87 (1.5), 0.97 (2.2) C 0.71 (1.7), 0.70 (1.5) p=0.472 Hospitalisation I 0.27 (0.7), 0.29 (1.1) C 0.32 (0.9), 0.24 (0.7) p=0.283 *higher score better # recommended by USPSTF (US Preventive Services Task Force)	outcomes did not show a differential improvement between groups.	clear how applicable this model would be to the UK, although it appeared to take a case management approach and it is likely some elements would be transferable. The study had some methodological problems which limit the reliability of the findings.

16.3 Clinically stable community-dwelling COPD patients: specialist respiratory nurse supporting primary care

Population type	Intervention type	Study author, year of publication. Years of study (RCTs). Search timescale, language restrictions (SRs).	Study type and aim	Population, including setting and country	Intervention	Control	Outcomes, including time points (outcomes relevant to PICO only)	Results (Intervention (I) vs Control (C) (including for subgroups relevant to PICO)	Brief comment re key quality issues	Conclusions
Clinically stable community-dwelling COPD	Care supported by specialist	Hernandez et al, 2015. Original study	RCT. To explore the effectivenes	Clinically stable community-dwelling COPD patients with a history of at	Comprehensive assessment (severity of respiratory	Usual care without support from	Baseline and 12 months:	I n = 59, C n = 55. <u>At 12 months:</u>	Randomisation procedure appeared adequate. I and C groups were similar on most measures at	Patients with clinically stable COPD and a recent history of hospital admissions who had

patients with a history of recent hospital admissions.	respiratory nurse.	recruitment took place between Apr-Dec 2005 and intervention was for 12 months. This paper also reports follow-up 6 years after end of intervention.	s of a community-based Integrated Care service in preventing hospitalisations and emergency department visits in stable frail COPD patients.	least two hospital admissions owing to severe respiratory exacerbations during two consecutive years. Mean age 73-75 years. 15% female. Average of 6 comorbidities. Spain.	disease, co-morbid conditions, social support needs); 2-hour education session, with patient information materials; Joint visit to patient's home by primary care team and specialist nurse; Ongoing access to specialist nurse for primary care team when required. Intervention lasted 12 months.	specialist nurses.	Analysis of medical records; Self-administered questionnaire including IADL (Lawton scale), HRQOL (St George's Respiratory Questionnaire, SGRQ). 6-year follow-up: review of medical records.	IADL (range 0–8, higher score better), mean (SD): I 6.3 (0.8), C 6.2 (0.9), p=0.26 SGRQ (range 0-100, higher score worse): I 43 (20), C 49 (22) p=0.13 Hospital admissions owing to COPD exacerbations*, I vs C: OR 2.17 (95% CI 0.60 to 7.87), p=0.237 Emergency room admissions owing to COPD exacerbations*, I vs C: OR 0.33 (95% CI 0.13 to 0.84), p=0.020 *Adjusted for baseline differences in vaccinations. Actual number or rate of admissions not shown. <u>Hospital admissions at 6 years:</u> no significant differences between groups (data not shown).	baseline, except that the I group were significantly more likely to have had influenza and pneumococcal vaccination. 155 were included at baseline (I n=71, C n=84) and 114 (I n=59, C n=54) were included in the 12-month analyses (26% loss to follow-up). IADL and HRQOL measures were based on self-administered questionnaires so were not blinded at follow-up. 12-month outcomes were shown but there was no comparison by group of changes between baseline and 12 months. The authors also reported that mortality was significantly lower in the I group at 12 months but there was no mortality difference at 6 years.	input from a specialist respiratory nurse supporting the primary care team over one year had significantly fewer ED admissions but no difference in hospital admissions compared with a usual care control group. There were no differences in measures of ADL or HRQOL at 12 months. There was no difference in hospital admissions six years later. This was a small RCT with a number of methodological problems which mean that the findings cannot be regarded as very reliable.

17. Staff education intervention

17.1 Elderly in long term care: education for care home staff										
Population type	**Intervention type**	**Study author, year of publication. Years of study (RCTs). Search timescale, language restrictions (SRs).**	**Study type and aim**	**Population, including setting and country**	**Intervention**	**Control**	**Outcomes, including time points (outcomes relevant to PICO only)**	**Results (Intervention (I) vs Control (C) (including for subgroups relevant to PICO)**	**Brief comment re key quality issues**	**Conclusions**
Older people in long term care.	Interventions for preventing delirium. This row includes an educational intervention for care home staff.	Woodhouse et al, 2019. Search to 27 February 2019. No language restrictions stated.	SR (narrative review). To assess the effectiveness of interventions for preventing delirium in older people in institutional long-term care settings.	Residents of long-term care facilities (permanent residence providing accommodation together with personal or nursing care). Mean age ≥65 years. Studies with relevant outcomes: one USA, one UK.	Any interventions designed to prevent delirium in long-term care settings. One UK-based RCT included a multicomponent educational package for care home staff: three interactive educational sessions plus monthly facilitated staff working groups, delivered across 14 care homes. Another RCT included computerised medication review and medication adjustment.	Standard care, or placebo for pharmacological interventions.	Hospital admissions. 10 months after randomisation.	Hospital admissions (one RCT, staff educational intervention, 10-month follow-up, n=494): RR 0.67 (95% CI 0.57 to 0.79). No p values were reported. Results for medication review shown in separate table.	MA was not possible due to heterogeneity of interventions and the findings reported were from single studies. Studies were assessed for risk of bias in seven domains. The study of staff education had low risk in five domains. The hospital admissions data was based on postcodes, which may have included individuals resident in the same postcode as the care home but not in the care home, so was considered not precise. The review included trials that used a validated method of delirium diagnosis.	An educational intervention for care home staff in the UK which aimed to prevent delirium in care home residents was found to probably reduce hospital admissions at 10-month follow-up, although the measure of hospital admissions used was not precise. The study was considered of good quality (low risks of bias in five out of seven domains). This appeared to be a well-conducted Cochrane SR but MA was not possible and the findings are based on single studies.

18. Podiatry intervention

18.1 Care home residents with a history of falls: podiatry intervention										
Population type	**Intervention type**	**Study author, year of publication. Years of study (RCTs). Search timescale, language restrictions (SRs).**	**Study type and aim**	**Population, including setting and country**	**Intervention**	**Control**	**Outcomes, including time points (outcomes relevant to PICO only)**	**Results (Intervention (I) vs Control (C) (including for subgroups relevant to PICO)**	**Brief comment re key quality issues**	**Conclusions**
Elderly care home residents with a history of falls.	Multicomponent podiatry intervention.	Wylie et al, 2017. Recruitment Jan 2014 – June 2014.	RCT. To assess the feasibility of a trial of a podiatry intervention to reduce care home falls, and the potential direction and magnitude of the effect of the intervention in terms of number of falls in care home residents.	Aged >65 years. Permanently living in a care home for older people. One or more falls in the previous year. A foot problem within the scope of practice of a UK trained podiatrist (all subjects were currently using podiatry services). Able to provide informed consent. Mean age 86 years. 81% female. Scotland.	Provision of foot orthoses moulded for the user; Assessment of footwear and provision of suitable replacement when indicated; A course of foot and ankle exercises to be performed independently three times per week. Core podiatry. Training for care home staff. Three-month intervention.	Core podiatry (routine nail and callus maintenance).	Falls. EQ-5D. ADL (Barthel Index). Outcomes at T1: baseline T2: end of intervention (3 months) T3: 3 months after end of intervention T4: 6 months after end of intervention. Standardised effect size (SES) derived from difference in means between I and C; positive value favours intervention. It was not stated what	I n=23, C n=20. Falls: mean (range) falls per participant during the specified time period; SES I vs C. T1 to T2: I 0.64 (0–3), C 1.18 (0–6). SES 0.4 (95% CI -0.2 to 1.0), p=0.08. T2 to T3: I 0.99 (0–5), C 1.05 (0–3). SES 0.0 (95% CI -0.5 to 0.6), p=0.18. T3 to T4: I 0.77 (0–7), C 0.83 (0–6). SES 0.0 (95% CI -0.5 to 0.6), p=0.47. Mean EQ-5D score, SES, I vs C: T2: 0.6 (95% CI 0.0 to 1.3). T4: 0 (95% CI -0.6 to 0.6). Mean Barthel Index, SES, I vs C: T2: 0.0 (95% CI -0.5 to 0.6).	Randomisation procedure appeared adequate. 43 were randomised, loss to follow-up 13% (I) and 30% (C). Baseline characteristics were similar except that more of the C group were male, fewer had had a previous stroke and more were registered blind than the I group (significance of differences not stated). Outcome assessments were blinded. This was a small pilot RCT and was not powered to detect differences in outcome measures. There were no significant differences in outcomes up to 6 months after the end of the intervention. The intervention group had fewer falls immediately after the intervention but this was not statistically significant and there were no differences on longer-term follow-up.	A multicomponent podiatry intervention for elderly care home residents with a history of falls did not result in a significant difference in the number of falls or in measures of QOL or ADL up to 6 months after the end of the intervention, compared with usual podiatry care. While the intervention group had fewer falls immediately after the intervention this was not statistically significant and the difference was not maintained on longer-term follow-up. This was a small pilot RCT and was not powered to detect differences in outcomes.

							standardisation was used.	T4: 0.2 (95% CI -0.4 to 0.8).		

19. Systematic reviews with two or more interventions of different types reported separately

Findings for each type of intervention are also shown in the relevant tables above.

19.1 Community-dwelling elderly: SRs with two or more interventions of different types reported separately

Population type	Intervention type	Study author, year of publication. Years of study (RCTs). Search timescale, language restrictions (SRs).	Study type and aim	Population, including setting and country	Intervention	Control	Outcomes, including time points (outcomes relevant to PICO only)	Results (Intervention (I) vs Control (C) (including for subgroups relevant to PICO)	Brief comment re key quality issues	Conclusions
Community-dwelling frail or pre-frail elderly, setting not stated.	'Primary care' interventions to treat, delay or reverse physical frailty.	Macdonald et al, 2020. Search May 1996 - June 2019. Papers published in English.	SRMA. To assess the effectiveness of primary care interventions for physical frailty among community-dwelling adults	Community-dwelling (setting not stated). Age ≥60 years. In 10/12 studies included in MAs, subjects were defined as prefrail or frail. Countries not stated.	Interventions with relevant outcomes included physical exercise programmes, nutritional supplementation, nutritional education, CGA. CGA was not defined but examples given included multiprofessional team involvement and care tailored to individual needs. It did not include case management approaches.	Control (no intervention or placebo).	Frailty (using Fried criteria or adaptations); change in frailty status or frailty prevalence. MA included the results from the immediate post-intervention time point (time periods of interventions varied, max duration 12 months).	Change in frailty status: exercise and nutrition supplements (2 RCTs, n=157): RR 0.62 (95%CI 0.48 to 0.79), p=0.0002. Change in frailty status: nutrition supplements alone (2 RCTs, n=153): RR 0.91 (95%CI 0.63 to 1.33), p=063. Change in prevalence of frailty: exercise and nutrition education (4 RCTs, n=390): RR 0.69 (95%CI 0.58 to 0.82), p=0.0001. Change in prevalence of frailty: exercise alone (4 RCTs, n=596): RR 0.63 (95%CI 0.47 to 0.84), p=0.002. Change in prevalence of frailty: CGA (3 RCTs, n=786, 2 high, 1 medium quality):	Studies were assessed for risk of bias in seven domains. All studies included in MA had at least four domains assessed as at low risk of bias suggesting they were of medium or high quality. All studies included in MA were RCTs. MA was carried out where intervention and outcome measure type were similar. All studies used the Fried frailty criteria or an adaptation of these. The study descriptions of frailty status of their eligible populations were reported but the frailty status of subjects included in the MAs was not clear.	Frail or pre-frail older people receiving exercise interventions, exercise and nutrition supplements, exercise and nutrition education or CGA were reported to have a statistically significantly greater improvement in frailty compared with control groups. No improvement was found in those receiving nutritional supplements alone. This appeared to be a reasonably well-conducted SRMA and the RCTs included in the MA were of medium or high quality. Similar criteria for assessing frailty were used in all studies, but subjects may have

								RR 0.77 (95%CI 0.64 to 0.93), p=0.006.		been heterogeneous as frailty status at recruitment was not reported. Limited detail was provided on the interventions but those within each type of intervention were also reported to be heterogeneous. These factors are likely to have affected the findings.
Older people in long term care.	Interventions for preventing delirium.	Woodhouse et al, 2019. Search to 27 February 2019. No language restrictions stated.	SR (narrative review). To assess the effectiveness of interventions for preventing delirium in older people in institutional long-term care settings.	Residents of long-term care facilities (permanent residence providing accommodation together with personal or nursing care). Mean age ≥65 years. Studies with relevant outcomes: one USA, one UK.	Any interventions designed to prevent delirium in long-term care settings. Interventions with relevant outcomes included computerised medication review and medication adjustment, and an educational package for care home staff.	Standard care, or placebo for pharmacological interventions.	Hospital admissions. Falls. Time periods varied, max 12 months.	Hospital admissions (one RCT, staff educational intervention, 10-month follow-up, n=494): RR 0.67(95% CI 0.57 to 0.79). Hospital admissions (one RCT, medication review and adjustment), mean 12-month follow-up, 7599 participant-months: HR 0.89 (95% CI 0.72 to 1.10). Falls (one RCT, medication review and adjustment), mean 12-month follow-up, 2275 participant-months: RR 1.03 (95% CI 0.92 to 1.15). No p values were reported.	MA was not possible due to heterogeneity of interventions and the findings reported are from two single studies. Studies were assessed for risk of bias in seven domains. Of the two studies with relevant outcomes, the study of staff education had low risk in five domains, while the study of medication reviews had low risk in two domains and high risk in two (remainder unclear). The hospital admissions data was based on postcodes, which may have included individuals resident in the same postcode as the care home but not in the care home, so was considered not precise. The review included trials that used a validated method of delirium diagnosis.	Computerised medication review was not found to have a significant effect on falls or hospital admissions, based on a large study in care homes in the USA. This study appeared to be of poor quality and it is also unclear how applicable the findings would be to care homes in the UK which may not have computerised prescribing systems, although it may be possible to take a similar approach using GP prescribing systems. An educational intervention for care home staff in the UK was found to probably reduce hospital admissions, although the measure of hospital admissions used was not precise. This appeared to be a well-conducted Cochrane SR but MA was not possible

										and the findings are based on single studies.
Community dwelling frail elderly, settings not stated.	Interventions to prevent adverse outcomes in frail elderly.	Van der Elst et al, 2019. Search to 17 June, 2016. Papers published in English, French, German or Dutch.	SRMA. To investigate the effect of an intervention on adverse outcomes in frail older adults.	Community-dwelling (settings not stated). Age ≥60 years. Frail. Country of individual studies not stated.	Any. Interventions in included studies with relevant outcomes were case management (CM) (nine), information provision (three), physical (one), and psychosocial (one). Definitions: CM: a collaborative process of assessment, planning, facilitation, care coordination, evaluation, and advocacy for options and services to meet an individual's and family's comprehensive health needs through communication and available resources to promote quality, cost-effective outcomes. Info provision: an emphasis on self-care and preventive approaches as well as information for community-wide	Care as usual.	Institutionalisation, Hospitalisation, Accidental falls. Time periods not stated; vary between studies.	Institutionalisation: information provision interventions (3 RCTs, n=968): OR 1.53 (95% CI 0.64 to 3.65), p=0.34. Institutionalisation: CM interventions (6 RCTs, n=2226): OR 0.92 (95% CI 0.63 to 1.32), p=0.64. Hospitalisation: CM interventions (5 RCTs, n=2059): OR 1.13 (95% CI 0.95 to 1.35), p=0.18. Accidental falls: CM interventions (1 RCT, n=237): IRR 1.12 (95%CI 0.78 to 1.63), p value not stated Accidental falls, psychosocial intervention (1 RCT, n=359): IRR 0.86 (95%CI 0.65 to 1.13), p value not stated. Accidental falls, physical intervention (1 RCT, n=83): IRR 0.43 (95% CI 0.33 to 0.57), p value not stated.	Studies were assessed for risk of bias in seven domains: quality assessed as low (meeting two or fewer criteria), medium (meeting three or four criteria) or high (meeting more than four criteria). Information provision MA included 1 low, 1 medium, 1 high quality studies; CM MA included 4 medium, 1 high quality studies, the physical activity RCT was medium quality and the psychosocial intervention RCT was high quality. MA was carried out where interventions were provided in more than one study. No further details were provided on the individual interventions of each type, which may have been heterogeneous. Subjects were defined as having been diagnosed as frail; various definitions of frailty were used.	No statistically significant differences were found in hospitalisation or institutionalisation for frail older people receiving CM, or in institutionalisation for frail older people receiving information interventions, compared with usual care. One small RCT of a physical intervention found a significant reduction in accidental falls. No reduction in accidental falls was found in a single RCT of a CM approach, or a single RCT of a psychosocial intervention. There were no further details about the interventions in these studies. This appears to have been a well-conducted SRMA. Most studies were assessed as being of medium or high quality and the MAs included between around 1000-2000 subjects. However the interventions may have been heterogeneous and a range of frailty definitions were

					dissemination and use. Psychosocial: treatment of psychological (eg anxiety) or social (eg financial) problems. Physical: bodily movement produced by skeletal muscles that requires energy expenditure.					used, which may mean the subjects were also heterogeneous, which may have affected the results.
Community-dwelling frail or pre-frail elderly, any setting.	Interventions focusing on prevention of frailty progression.	Apostolo et al, 2018. Search dates Jan 2001 to Nov 2015. Studies in English, Portuguese, Spanish, Italian and Dutch.	SR. To identify the effectiveness of interventions to prevent progression of pre-frailty and frailty in older adults.	Aged ≥65 years. Pre-frail or frail. Community-dwelling. Intervention in any setting. Countries of included studies were Taiwan, Sweden, Australia, Mexico, Belgium.	Interventions in included studies with relevant outcomes were: Group exercise programme + nutritional advice; Problem-solving therapy. Multiprofessional assessment and CM, rehab and other interventions as needed. Multidisciplinary intervention, assessment and CM, including PA/ nutrition/medication review. Nurse home visit, assessment, plan, (no CM), alert button.	Usual care, alternative therapeutic interventions or no intervention.	Frailty (various measures). ADL. Length of follow-up varied between studies.	Frailty status. Group exercise and nutrition advice (1 RCT, n=117, moderate quality): Prefrail/ frail at baseline: I 84%, 16%; C 90%, 10% Improvement in frailty at 3 months (post-intervention) 45% greater in I than C, p=0.008 (no further details provided). Problem-solving therapy (1 RCT, n=115, moderate quality): Prefrail/ frail at baseline: I 84%, 16%: C 90%, 10% No significant difference between I and C in change in frailty status at 3 months (post-intervention).	Methodological quality of the studies was assessed against 10 criteria; included studies met ≥five criteria. All studies used a recognised scale or index (eg Fried) to define pre-frailty and frailty. Findings and their statistical significance were not reported for all measures in all groups. It was not clear whether this was due to missing original data or incomplete reporting in the SR. Findings have been included from RCTs where relevant outcomes (eg a frailty measure) were reported in the SR, with sufficient details to provide some clarity about what the interventions involved and some details of numerical findings and their significance.	Improvements in frailty post-intervention or at follow-up were found in one RCT of an exercise and nutrition intervention; one RCT of a multidisciplinary intervention involving assessment and CM, with various interventions such as PA, nutrition or medication review; and one RCT of an intervention involving a nurse home visit, assessment and care plan with provision of an alert button. Improvements in ADL were found in one RCT of an OT intervention. A problem-solving intervention and a multidisciplinary

					OT-delivered programme involving assessment, plan, delivery of interventions (eg assistive devices, skills training).			Multiprofessional assessment and CM +/- rehab (1 RCT, n=161, moderate quality): Non-frail/ pre-frail/ frail at baseline: I 5%, 26%, 69% C 0%, 24%, 76% Frailty status improved/ maintained/ decreased 12 months post-discharge: I 12%, 74%, 14% C 22%, 68%, 9%. No significant difference between groups. Multidisciplinary intervention, assessment and CM, including PA/ nutrition/ medication review (1 RCT, n=241, good quality): Frailty prevalence: Baseline: I 100%, C 100% 12 months: I 62%, C 77% p=0.02. Assessment and plan at nurse home visit, alert button (1 RCT, n=89, good quality): Frailty prevalence: Baseline: I 46.7%, C 45.5% 9 months: I 23.3%, C 58.3% p<0.05. OT intervention (1 RCT, n=168, moderate quality): Basic ADL (mean (SD)) at baseline, and change after 8-10 week intervention:	This SR included a number of RCTs which had also been included in one of the SRMAs in this review. Studies which were included in one of the SRMAs have not been included here, unless Apostolo et al reported different outcomes from those reported in the SRMA.	intervention with assessment, CM and rehab if required did not find any differences in frailty outcomes. This appeared to be a reasonably well-conducted SR and the included RCTs appear to have been of moderate or high quality. All studies used defined criteria for assessing frailty. The interventions and study populations were heterogeneous and the SR only reported results of individual studies with no attempt to combine study findings. Reporting of some outcomes appeared to be incomplete but it was not clear if this was due to limited information in the original study.

								I 66 (25), +3.6 C 69 (23), -3.1 p=0.013.		
Community-dwelling physically frail elderly. Settings not stated, included nursing home.	Non-pharmacological interventions to treat physical frailty and sarcopenia.	Lozano-Montoya et al, 2017. Search to Oct 2015. Search was for SRs. Primary comparative studies included in the identified SRs, of the interventions and population of interest, were included in this SR. Papers published in English, Italian, Portuguese, or Spanish.	SR. To critically appraise the evidence from SRs of the primary studies on nonphar-macological interventions to treat physical frailty and sarcopenia.	Mean age >65 years. Community-dwelling (settings not stated, included nursing home). Frail according to Fried's criteria. Various countries. Studies with relevant outcomes carried out in Australia (multidisciplinary intervention), Spain (physical activity intervention).	Interventions in included studies with relevant outcomes were: Combined nutritional, physiotherapy, physical training, and psychological support. Exercise programme (resistance, balance, and gait training). Nonagenarian nursing home population.	Usual care. Passive stretches.	ADL. Falls. 12 weeks (one RCT). 12 months (one RCT).	Falls: combined intervention lasting 12 months, (1 RCT reported in 3 papers, n=216, 'serious' risk of bias): I vs C IRR 1.12 (95% CI 0.78 to 1.63, p=0.53). ADL (Barthel Index): combined intervention lasting 12 months, (1 RCT reported in 3 papers, n=216, 'serious' risk of bias): 0.67 points higher in control group (95% CI -4.23 to 5.56, p=0.79). ADL: exercise programme lasting 12 weeks (1 RCT, n=24, 'serious' risk of bias): Less ADL deterioration in the intervention than the control group, p=0.001 (actual results not reported).	This review was carried out by searching for SRs, then identifying the individual studies included in the SRs and taking data from the studies. This appears likely to have missed some relevant original studies. Primary studies were assessed for risk of bias in seven domains and graded low, medium or high risk. The authors reported whether they considered each outcome finding to have a 'serious' risk of bias. Limited details are provided in the paper regarding the findings in relation to each outcome and their significance. MA was not feasible because of the heterogeneity of the interventions.	Subjects receiving an individually tailored combined physical training, nutritional and psychological intervention were not reported to have any significant differences in measures of ADL or falls compared with those receiving usual care. This finding was based on one RCT which this review's authors assessed as having a serious risk of bias. One very small study of an exercise intervention with very elderly people in a nursing home reported significantly less deterioration in ADL scores in intervention compared with control subjects, but further details were not provided in this SR. There were also limitations in the way this SR was conducted which together with the individual study limitations are likely to have affected the results.

20. Abbreviations

ACP: Advance care planning;	FI: Frailty Index;	NEADL: Nottingham Extended Activities of Daily Living;
ADCS-ADL: Alzheimer's Disease Co-operative Study Activities of Daily Living Inventory;	FRID: Fall-risk-increasing drug;	OARSI: Older American Resources and Services Instrument;
ADL: Activities of Daily Living;	FSQ: Functional Status Questionnaire;	OPC: Outpatient commitment
AEE: Adjusted Effect Estimate;	GARS: Groningen Activity Restriction Scale;	OR: Odds ratio;
AGU: Ambulatory Geriatric Unit;	GFI: Groningen Frailty Index;	OT: Occupational Therapy;
AMC: Adjusted mean change;	GWI: Groningen Wellbeing Indicator;	PA: Physical activity;
BI: Barthel Index;	HR: Hazard Ratio;	PaTH: Patient trajectory for home-dwelling elders;
C: Control;	HRQOL: Health-related quality of life;	PT: Physiotherapy;
CCT: Compulsory community treatment;	HUI3: Health Utilities Index Mark 3;	PWI-ID: Personal Well-Being Index-Intellectual Disability;
CDST: Clinical decision support tool;	I: Intervention;	QALY: Quality-adjusted life-year;
CES: Center for Epidemiologic Studies;	IADL: Instrumental Activities of Daily Living;	QOL: Quality of Life;
CGA: Comprehensive Geriatric Assessment;	ICER: Incremental cost-effectiveness ratio;	QOLAD: Quality of Life in Alzheimer's Dementia;
CGU: Community geriatrics unit;	ICM: Intensive case management;	RCT: Randomised controlled trial;
CHF: Chronic heart failure;	INTERMED-E-SA: INTERMED for the Elderly Self-Assessment;	RR: Risk ratio;
CI: Confidence Interval;	IRR: Incidence rate ratio	SD: Standard deviation;
CM: Case management;	ITT: Intention-to-treat;	SE: Standard error;
CMH: Community mental health;	KCCQ: Kansas City Cardiomyopathy Questionnaire;	SMAS: Self-management ability scale;
COPM: Canadian Occupational Performance Measure;	LLFDI: Later Life Function and Disability Index;	SMI: Serious mental illness;
COPD: Chronic obstructive pulmonary disease;	LQOLI: Lehman's Quality of Life Interview;	SOF: Study of Osteoporotic Fractures;
CPR: Cardiopulmonary resuscitation;	LQOLP: Lancashire Quality of Life Profile;	SR: Systematic review;
CTO: Compulsory treatment order;	MA: Meta-analysis;	
DiD: Difference-in-difference;	MDT: Multi-disciplinary team;	SRMA: Systematic Review and Meta-analysis;
DQOL: Dementia Quality of Life;	MGT: Mobile Geriatric Team;	TGUGT: Timed up-and-go test;
EASI: Everyday abilities scale for India;	MI: Motivational interviewing;	TFI: Tilburg frailty Indicator;
ED: Emergency Department;	MMSE: Mini-Mental State Examination;	USPSTF: US Preventive Services Task Force;
ER: Emergency Room;	mRS: modified Rankin Scale;	VA: Veterans Administration;
ES: Effect Size;	NA: Nursing assistant;	VAS: Visual analogue scale;

21. Overview of key measures reported in included studies

Measure name	Brief description
Barthel Index: Activities of Daily Living (ADL)	10 items: feeding, bathing, grooming, dressing, bowels, bladder, toilet use, transfers, mobility (level), stairs.
COPM: Canadian Occupational Performance Measure	Ability to perform in 5 areas identified as the most important by the patient: eg may include personal care, functional mobility, transportation, finances, work, household management, recreation, socialisation.
EQ-5D (EuroQOL)	Health-related QOL: 5 items: mobility, self-care, usual activities, pain/ discomfort, anxiety/ depression
FRAIL score	Fatigue, does the patient fatigue easily? Resistance, eg able to climb stairs Ambulation, eg able to walk one block Illnesses, eg more than 5 comorbidities Loss of Weight, eg>5% in last 6 months.
Fried Frailty criteria (cardiovascular health study)	Unintentional weight loss (>4.5kg or >5% in past year) Self-reported exhaustion Weakness (grip strength) Slow walking speed Low physical activity
FSQ: Functional Status Questionnaire	ADL measure: 5 sections covering: physical function in ADL, psychological function, role function, social function, a variety of performance measures
GARS: Groningen Activity Restriction Scale	ADL measure: 18 items covering ADL and IADL including: dressing, mobility, washing, toilet use, feeding, food preparation, foot care, household activities, laundry, shopping.
GFI: Groningen Frailty Index	15 items covering mobility, vision, nutrition, co-morbidity, cognition, psychosocial, physical fitness.
Intermed-E-SA	A measure of complexity of care needs. Covers history, current state and vulnerability/ prognosis in 4 domains: Biological, psychological, social and health system.
IADL: Instrumental Activities of Daily Living (eg Lawton)	Use of telephone, shopping, food preparation, housekeeping, laundry, transportation, responsibility for own medications, handling finances.
Katz basic ADL	Bathing, dressing, toileting, transferring, continence, feeding.
LQOLP: Lancashire QOL profile	58 items covering Living situation, Leisure & social participation, Health, Finances, Family relations, Safety, Positive esteem, Negative esteem, Fulfillment.
LQOLI: Lehman QOL interview	Interview covering subjective items (eg satisfaction with life in general, living situation, family, social relations, leisure, work, safety, health) and objective (eg activities, social and family contacts, budget, income, work).
LLFDI: Later Life Function and Disability Index	ADL measure: Degree of difficulty with 32 ADLs eg opening a jar, putting on trousers or a coat, walking indoors or outdoors, stairs, opening a heavy door, washing up, carrying something.
MMSE: Mini mental state examination	Covers orientation, naming objects, attention and calculation, recall, ability to follow simple commands, ability to write a simple sentence, ability to copy a shape.
mRS: modified Rankin Scale:	Disability or dependence in daily activities in neurological conditions: 0 No symptoms; 1 No significant disability despite symptoms; 2 Slight disability; 3 Moderate disability; requiring some help; 4 Moderately severe disability; unable to walk without assistance, unable to attend to own bodily needs without assistance; 5 Severe disability; requiring constant nursing care and attention; 6 Dead
NEADL: Nottingham Extended ADL	22 items of instrumental ADL covering mobility, kitchen, domestic tasks, leisure activities

OARSI: Older American Resources and Services instrument	Covers five dimensions of functioning: Social Resources, Economic Resources, Mental Health, Physical Health, and ability to carry out Activities of Daily Living; and the extent, intensity of utilisation, and perceived need for each of 24 non-overlapping generic services.
QOLAD: Quality of Life in Alzheimer's Dementia	Interview: how do you feel about 13 areas: Physical health, Energy, Mood, Living situation, Memory, Family, Marriage, Friends, Self as a whole, Ability to do chores around the house, Ability to do things for fun, Money, Life as a whole.
Rockwood clinical frailty scale	Nine grades (with definitions based on abilities, activities, degree of dependence): very fit, well, managing well, vulnerable, mildly frail, moderately frail, severely frail, very severely frail, terminally ill.
SF-36	HRQOL measure: 36 items in eight subscales: physical functioning, bodily pain, role limitations due to physical health problems, role limitations due to personal or emotional problems, general mental health, social functioning, energy/fatigue or vitality, and general health perceptions.
SF-36 MCS: SF-36 Mental Component Summary Score SF-36 PCS: SF-36 Physical Component Summary Score	Aggregations of the SF 36 subscales using different weightings for each scale to calculate contributions of physical and mental health components to the HRQOL score.
SF-12	12-item subset of SF-36.
SMAS: Self-management ability scale	30-item scale covering initiative, social behaviour, variety of activities, self-efficacy, positive frame of mind.
SOF: Study of Osteoporotic Fractures frailty criteria.	3 items: Weight loss ≥ 5% over 3 years; Inability to do 5 chair stands; 'Do you feel full of energy?' (yes/no).
TFI: Tilburg frailty indicator	25-item scale. Covers: Determinants of frailty (eg demographic, chronic illness, recent major life events) Physical (eg health, weight loss, hearing, vision, walking, Psychological (eg memory, feeling down, anxiety) Social (eg living circumstances, social support)
W-BQ12	Well-being scale: A 12-item questionnaire covering three components: negative well-being, positive well-being, energy. These component scores can be combined to give an overall general well-being score.
SGRQ: St George's Respiratory Questionnaire	A 50-item questionnaire developed to measure health status (quality of life) in patients with diseases of airways obstruction. Scores are calculated for three domains: Symptoms, Activity and Impacts (Psycho-social) as well as a total score.

9 Literature Search Terms

Population	Adults aged 18 years or over living in the community (at home, supported accommodation, care home, temporary accommodation, homeless) UK and international studies
Indication	'Complex' health needs/case complexity with or without social care needs (not strictly defined) [e.g. frailty, multimorbidity]
Intervention	Anticipatory care intervention comprising primary and/or community healthcare with or without social care [alternative terms for anticipatory care include: integrated case management, population health management, proactive case management, case management, proactive care, multidisciplinary, preventative care, proactive care, care coordination] [anticipatory care interventions could include: needs assessment, comprehensive geriatric assessment, social prescribing, falls prevention/assessment, housing/home fire safe and well visits, comprehensive falls support, strength and balance, nutrition, weight management, MSK pain management, mental health interventions, care coordinator, community mental health teams, structured medication review (SMR), personalised care plan and care planning, patient activation (PAM), lifestyle]
Comparator	Usual care i.e. no anticipatory care plan, no risk stratification, no planned primary or community health care support or social care support
Outcomes	Quality of life outcomes including measures where there is a clear rationale that improvements in the measure would lead to improvement in QOL, such as activities of daily living and falls (list discussed/agreed with SPH QA lead, and not including, for example, 6-minute walk distance) Resource utilisation e.g. admission to hospital, emergency care, OP appointments, GP visits, prescriptions
Inclusion criteria	
Study designs	Systematic reviews of randomised controlled trials (RCTs) and RCTs (including quasi-randomised and cluster-randomised) [Only written publications in the public domain that are readily retrievable through formal searches for peer-reviewed literature]
Date and language	Studies published in English in the last five years
Exclusion criteria	
Study designs	Non-randomised comparator studies, cohort studies, case series, grey literature, case reports (n=1), commentaries, letters, conference abstracts, posters, narrative reviews, studies with no outcomes relating to quality of life or health care utilisation. Where there is systematic review evidence available, the latest appropriate systematic review for each particular population/intervention pair is included, together with relevant RCTs published after the search date of that systematic review.

10 Search Strategy

We searched Medline, Embase and the Cochrane Library limiting the search to papers published in England from 1st January 2015 to 12th March 2020.

Medline search:

1 exp Adult/ (7084618)

2 Aged/ (3024430)

3 "Aged, 80 and over"/ (893118)

4 Frail Elderly/ (11062)

5 Homeless Persons/ (7523)

6 Homebound Persons/ (612)

7 (((old* or vulnerable) adj2 (adult* or people or men or women or males or females or population*)) or "old age").ti,ab. (196473)

8 elder*.ti,ab. (251624)

9 (age* over 18 years or age* over 18 yrs or (18 years adj2 over)).ti,ab. (3497)

10 (middle year* or late* year*).ti,ab. (2878)

11 middle age.ti,ab. (7601)

12 advanced age.ti,ab. (15837)

13 septuagenarian*.ti,ab. (365)

14 octogenarian*.ti,ab. (3110)

15 nonagenarian*.ti,ab. (1348)

16 homeless*.ti,ab. (10238)

17 homebound*.ti,ab. (933)

18 (frail adj3 (adult* or people or elderly or person* or women or men or males or females or population)).ti,ab. (6180)

19 or/1-18 (7211874)

20 Independent Living/ (5387)

21 Assisted Living Facilities/ (1342)

22 Homes for the Aged/ (13688)

23 Housing for the Elderly/ (1603)

24 Halfway Houses/ (1056)

25 (community dwelling or community-dwelling).ti,ab. (22465)

26 (support* adj7 (accommodation or hous* or living or at home)).ti,ab. (9427)

27 ((shelter* or warden*) adj7 (accommodation or hous* or living)).ti,ab. (1195)

28 ((temporary or short term or short-term) adj7 (hostel* or accommodation or hous*)).ti,ab. (546)

29 (care home* or residential care* or residential home*).ti,ab. (7408)

30 living at home.ti,ab. (2587)

31 ((living adj5 home) or (living adj5 independent*)).ti,ab. (10474)

32 (home dwelling or home-dwelling).ti,ab. (571)

33 or/20-32 (66035)

34 Comorbidity/ (104934)

35 Multimorbidity/ (749)

36 Multiple Chronic Conditions/ (401)

37 Frailty/ (2183)

38 Polypharmacy/ (4742)

39 complex care.ti,ab. (1230)
40 complex patient*.ti,ab. (3129)
41 complex need*.ti,ab. (1534)
42 (complex* adj2 (care or patient* or need* or healthcare or health care)).ti,ab. (22664)
43 multiple chronic.ti,ab. (2064)
44 (multiple longterm or multiple long-term).ti,ab. (176)
45 frail*.ti,ab. (20600)
46 (multimorbid* or multi-morbid* or multicomorbid* or multi-comorbid*).ti,ab. (4986)
47 (comorbid* or co-morbid*).ti,ab. (171145)
48 (polypharm* or poly-pharm*).ti,ab. (7981)
49 (social adj9 (isolat* or vulnerab*)).ti,ab. (12277)
50 (lonely or loneliness).ti,ab. (6800)
51 (mental health adj9 (concern* or issue* or problem* or difficult* or deterior* or poor)).ti,ab. (28453)
52 ((medication or medicine*) adj9 (problem* or concern* or difficult* or issue*)).ti,ab. (28066)
53 (case* adj9 complex*).ti,ab. (29428)
54 or/34-53 (382095)
55 Needs Assessment/ (29747)
56 Case Management/ (9999)
57 Preventive Medicine/ (11636)
58 Medication Therapy Management/ (2023)
59 Community Mental Health Services/ (18387)
60 Healthy Lifestyle/ (1680)
61 Diet, Healthy/ (3351)
62 Health Promotion/ (72401)
63 Population Health Management/ (53)
64 Exercise/ or Resistance Training/ (112585)
65 Pain Management/ (32908)
66 "Diet, Food, and Nutrition"/ (2)
67 Nutritional Status/ (43528)
68 ((anticipat* or proactive or pro-active or coordinated or co-ordinated or multidisciplinary or multi-disciplinary or integrated or integration or preventive or preventative) adj8 (care or (case adj5 manag*))).ti,ab. (51866)
69 care plan*.ti,ab. (14394)
70 (structured medication review* or SMR*).ti,ab. (8337)
71 (weight mangement or healthy weight).ti,ab. (2732)
72 (strength adj4 (train* or exerci* or develop*)).ti,ab. (12354)
73 (balance adj4 (train* or exerci* or develop*)).ti,ab. (6251)
74 Geriatric Assessment/ (26838)
75 Frailty/pc or Accidental Falls/pc (8937)
76 (comprehensive geriatric assessment or CGA).ti,ab. (5346)
77 (fall* adj8 (assess* or prevent* or support*)).ti,ab. (13438)
78 comprehensive falls support.ti,ab. (0)
79 social prescribing.mp. (120)
80 ((adult mental health or community mental health) adj4 (team* or service*)).ti,ab. (2103)
81 community psychiatric nurs*.ti,ab. (397)

82 Home Care Services/ (33065)

83 (patient activation or PAM).ti,ab. (7832)

84 (Mak* every contact count or MECC).ti,ab. (581)

85 (safe adj2 well visit*).ti,ab. (0)

86 (safe and well visit*).ti,ab. (3)

87 (nutrition or (health* adj4 (eating or diet*))).ti,ab. (172393)

88 hydration.mp. (35159)

89 or/55-88 (657895)

90 19 and 33 and 54 and 89 (3062)

91 limit 90 to (yr="2010 -Current" and (comparative study or "systematic review" or ("reviews (best balance of sensitivity and specificity)" or "therapy (best balance of sensitivity and specificity)" or "economics (best balance of sensitivity and specificity)"))) (695)

92 limit 91 to english language (666)

93 limit 92 to clinical trial protocol (5)

94 92 not 93 (661)

95 (systematic review protocol or study protocol).ti. (10942)

96 94 not 95 (631)

97 (protocol adj15 (trial* or review* or study)).ti. (21955)

98 96 not 97 (611)

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