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Effectiveness of community-based multidisciplinary integrated care for older people: a protocol for a systematic review

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ABSTRACT

Introduction The increasing number of older adults with multiple complex care needs has placed increased pressure on healthcare systems internationally to reorientate healthcare delivery. For many older adults, their first point of contact with the health service is with their general practitioner (GP) and GP participation with integrated care models is the foundation of a population-based approach. A knowledge gap remains in relation to the effectiveness of GP participation in community-based integrated health and social care approaches for older adults. This systematic review aims to examine the effectiveness of multidisciplinary-integrated care for community-dwelling older adults with GP participation.

Methods and analysis This systematic review will include randomised controlled trials (RCTs), quasi and cluster RCTs focusing on integrated care interventions for community-dwelling older adults by multidisciplinary teams including health and social care professionals and GPs. The databases PUBMED, EMBASE, CINAHL, Central Register of Controlled Trials in the Cochrane Library and MEDLINE will be searched. The primary outcome measure will be functional status. Secondary outcomes will include: primary healthcare utilisation, secondary healthcare utilisation, participant satisfaction with care, health-related quality of life, nursing home admission and mortality. The methodological quality of the studies will be assessed using the Cochrane Risk of Bias Tool V.2. The elements of care integration will be mapped in the individual studies using the Rainbow Model of Integrated Care taxonomy. A meta-analysis will be completed, depending on the uniformity of the data. Grading of Recommendations, Assessment, Development and Evaluation will be used to assess the certainty of evidence.

Ethics and dissemination Formal ethical approval is not required as all data included are anonymous secondary data. Scientific outputs will be presented at relevant conferences and in collaboration with our public and patient involvement stakeholder panel of older adults at the Ageing Research Centre at the University of Limerick.

PROSPERO registration number CRD42022309744.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ This review will be conducted in line with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses standardised reporting guidelines.
⇒ A comprehensive search across five databases covering biomedical, nursing and allied health peer-reviewed literature will be carried out.
⇒ This review will only include trials with a randomised design to ensure scientific rigour when examining intervention effects.
⇒ This systematic review will articulate the level and nature of care integration using the Rainbow Model of Integrated Care taxonomy.
⇒ The Cochrane Risk of Bias Tool and the Grading of Recommendations, Assessment, Development and Evaluation Tool will be used to assess the quality and certainty of the evidence generated.

INTRODUCTION

Globally, it is estimated that the number of older people aged ≥60 years is expected to double from 962 million in 2017 to 2.1 billion by 2050.[1] As people age, they experience a decline in their intrinsic capacity and an increase in the incidence of multimorbidity, leading to considerable, multidisciplinary care needs.[2] The complex profile of this cohort makes it challenging to coordinate and integrate care, resulting in an increased risk of adverse health outcomes,[3–5] greater use of primary care,[6] emergency and acute healthcare services and overall higher healthcare costs.[7]

Internationally, health and social care organisations recognise the need for systems to move from acute, episodic care to longitudinal, coordinated and integrated care models, reflecting the growth in multimorbidity and complexity of care needs among older adults. This shift in health service delivery is also acknowledged by the WHO, who advocates for an integrated care approach to a person-centred comprehensive assessment of health and social care needs for older people.[8] One of the conceptual challenges when examining integrated care is the

lack of a universal concept and use of other terms such as patient-centred care or coordinated care interchangeably.[9] Coordinated care is broadly considered as teamwork across a range of different healthcare professionals, while patient-centred care focuses on involving patients in their own care.[10] While these concepts are included as components of integrated care, integrated care is considered an overarching multidimensional concept that also encompasses cross-boundary engagement and collaboration across different healthcare organisations.[10] To reflect this complexity, the WHO defines integrated care as 'services that are managed and delivered so that people receive a continuum of health promotion, disease prevention, diagnosis, treatment, disease-management, rehabilitation and palliative care services, coordinated across the different levels and sites of care within and beyond the health sector, and according to their needs throughout the life course' (World Health Organization[11] p.2). This definition is aligned with the Rainbow Model of Integrated Care (RMIC), a taxonomy consisting of 21 key features from an end-user, professional, management and policy-maker perspective to describe the underlying features of integrated care.[12] The key features of the RMIC are organised into eight main dimensions, which are contained in three categories: scope (person focused or population based), type (clinical, professional, organisational and system) and enablers (functional or normative) of an integrated primary care service model.[12] The RMIC provides a mechanism to describe key features of care integration across a range of populations.[13 14]

Integrated care programmes for community dwelling older adults often includes a comprehensive geriatric assessment (CGA) to increase the understanding of an older person's care needs and preferences. CGA is defined as a 'multidimensional interdisciplinary diagnostic process focused on determining a frail elderly person's medical, psychological and functional capability in order to develop a coordinated and integrated plan for treatment and long-term follow-up',[15] and thus includes a person-centred coordinated plan of care for the older person leading to individualised interventions, specific to patient needs. A Cochrane review of 21 randomised controlled trials (RCTs) by Briggs *et al*[16] demonstrates the positive effect of expert-led CGA on community dwelling frail older people, reducing the likelihood of death (risk ratio (RR) of 0.88 (95% CI 0.76 to 1.02) and unplanned hospital admission RR of 0.83 (95% CI 0.70 to 0.99). Briggs *et al* excluded 13 studies from the review because specialist geriatric expertise, defined as a healthcare professional including a geriatrician, specialist nurse or therapist with gerontological expertise, was not involved in the CGA team. However, for many older adults, their first point of contact with the health service is through their general practitioner (GP) in primary care.[17] Primary care teams involve multiple healthcare professionals including GPs, nurses, physiotherapists, occupational therapists, social workers, home support providers, administrators, speech and language therapists, dieticians, pharmacists, community welfare officers, chiropodists and psychologists.[18] These teams have specialist knowledge of the areas they serve and the patients they care for. The Irish healthcare system along with many international health systems is developing community healthcare networks, with GPs as the foundation of this multidisciplinary team (MDT) care in the primary care setting, in order to meet the changing complex medical needs of service users.[19 20] The effectiveness of GP participation in multidisciplinary integrated care on older people's health outcomes shows conflicting results in the literature.

An RCT by Béland *et al* found that community-based health and social care professional MDT integrated care with GP participation reduced the risk of hospital inpatient stays by 50% among community-dwelling older people.[21] Another controlled trial found that integrated care interventions for older people in the primary care setting reduced hospital utilisation, GP visits, with an improvement in physical functioning,[22] despite the lack of specialist geriatric expertise. Two cluster RCTs examining the effectiveness of a primary care integrated care approach on older people with complex care needs found that the GP-led screening and integrated multidisciplinary assessment and treatment did not have any significant effect on disability at 6, 12 or 24 months' follow-up,[23] Quality of Life (QoL), activities of daily living (ADLs), care satisfaction or cost-effectiveness at 12-month follow-up.[24]

A gap in the literature remains with respect to synthesis of the evidence on GP participation in multidisciplinary integrated care for older people residing in the community. This systematic review seeks to synthesise interventions for this cohort of older adults who have complex medical conditions resulting in a range of health and social care needs requiring MDT input. With increased efforts being placed on the transfer of care from acute to community settings and hospital avoidance strategies, determining the effectiveness of early detection and intervention for frail community-dwelling older people is essential. Furthermore, despite the increasing popularity of implementing integrated care models for community-dwelling older people, the level of integration across studies is varied.

Objectives

The objectives of this systematic review are to:

1. To examine the effectiveness of multidisciplinary integrated care for community-dwelling older adults with GP participation.
2. To apply the RMIC taxonomy of integrated care to describe the level of care integration in each individual study.

METHODS AND ANALYSIS

Study design

This systematic review will include RCTs, cluster RCTs and quasi-RCTs. We have used the Cochrane Collaboration definition of quasi-RCTs where 'the method of allocation is known but is not considered strictly random' and includes 'methods of assignment include alternation, date of birth and medical record number'.[25] This protocol for systematic review will be completed according to the

Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Protocols (PRISMA-P) standardised reporting guidelines.[26] A template of the PRISMA-P checklist is provided in online supplemental file 1. The subsequent systematic review will be conducted in line with the PRIMSA standardised reporting guidelines.[27] The protocol is also registered on PROSPERO: CRD42022309744.

Search strategy

A comprehensive search will be completed by CH in the following databases: PUBMED, EMBASE, CINAHL, Central Register of Controlled Trials in the Cochrane Library and MEDLINE. The reference lists of selected studies to be included will also be hand searched. The search will include the Medical Subject Headings as described in online supplemental file 2. Included studies will be selected based on the population, intervention, control and outcome as described in online supplemental file 3.

Eligibility criteria

Trials will be included that meet the following eligibility criteria:

Population: studies will be selected if they include community-dwelling adults≥65 years.

Intervention: the review will focus on assessment and/or interventions carried out in the community by MDTs with GP participation and comprise±nursingand one or more Health and Social Care Professional (HSCP) members. Specifically, studies will be included only if the following criterion is met:

The MDT includes at least one of the following HSCPs: clinical pharmacist, dietician, medical social worker, occupational therapist, psychologist, physiotherapist and speech and language therapist.

Comparison: comparison interventions will include usual care or other interventions.

Health outcomes

The primary outcome will be functional status. Functional decline will be defined as the loss in an individual's ability to perform ADLs safely and independently.[28] Multiple validated tools such as the Barthel Index (BI)[29] and the Groningen Activity Restriction Scale will be used to assess functional status.[30] Secondary outcomes will include primary healthcare use (GP, public health nurse, health & social care professional use, formal homecare support) and secondary healthcare utilisation (outpatient department services, Emergency Department (ED) presentation and unplanned hospital admission), participant satisfaction with care, health-related QoL, mortality and nursing home admission. Patient reported adverse outcomes will also be recorded (eg, falls).

The taxonomy of 21 key features of integrated care by Valentijn *et al12* developed to classify the broad understanding of integrated care will be employed. This will facilitate the description of diverse integrated care approaches for each included study to help translate research findings into policy and practice (online supplemental file 4).

Exclusion criteria

Studies will be excluded if the population includes adults <65 years, those living in nursing homes, if the MDT does not include the GP and at least one HSCP member or if the multidisciplinary intervention was not completed in the community setting. Studies will also be excluded where integrated care is initiated among older adults who are discharged from the acute inpatient setting[31] or from the ED as these studies have been previously synthesised.[32]

Study selection

Study selection will be completed using a two-step process. In step 1, studies will be downloaded to Endnote, and titles and abstracts will be screened by two independent authors (CH and RG). Step 2 will involve two independent reviewers (CH and RG) screening full-text studies according to the inclusion criteria will be downloaded to Rayyan software,[33] which will be outlined in a PRISMA flow diagram. Any inconsistencies in the inclusion process will be resolved via consensus or third author consultation (ACG).

Data collection and extraction

Data will be extracted and compiled into a data extraction form (online supplemental file 5) by one reviewer (CH). The data extraction form will be piloted on a sample of studies. The form will include data regarding the study design, objectives, results, population, intervention (including models of service delivery such as MDT or interdisciplinary care), control, outcomes and follow-up. All extraction forms will be compiled into a Microsoft Excel sheet and will be reviewed by another independent author (ACG). Any discrepancies that cannot be agreed on will be reviewed by a third author (RG). If any study includes missing or incomplete reports, an attempt will be made to contact the author, and this will be recorded in the data extraction form.

Quality assessment

Critical appraisal of each study included will be independently completed by two authors (CH and MM) using the Cochrane Risk of Bias (ROB) Tool (V.2) for RCT's or the ROB Tool (V.2) for cluster RCTs.[34] The studies will be assessed for ROB focusing on aspects of randomisation, deviation from intended interventions, missing data, measurement of outcomes and reporting. An extra domain from bias arising from the timing of identification or recruitment will be assessed in cluster RCTs. Low risk will be categorised as 'the study is judged to be at low ROB for all domains for this result'; some concerns will be categorised as 'the study is judged to raise some concerns in at least one domain for this result, but not to be at high ROB for any domain'; and high risk will be categorised as 'the study is judged to be at high ROB in at least one domain for this result or the study is judged

to have some concerns for multiple domains in a way that substantially lowers confidence in the result'.[34]

The certainty of evidence will be assessed using Grading of Recommendations, Assessment, Development and Evaluation (GRADE).[35] The GRADE approach will be used to rate the quality of the evidence for each main outcome. It will assess study limitations, indirectness of evidence, inconsistency of results, imprecision and publication bias. The evidence will be graded as high, moderate, low or very low quality. If a disagreement between reviewers arises, both reviewers (CH and MM) will come to a consensus, and a third reviewer (RG) will be consulted if necessary.

Data synthesis

A meta-analysis will be completed for clinically and statistically homogenous data using Stata V.17. The measurement of effect will be calculated for dichotomous outcomes (eg, rates of hospitalisation) using RRs and 95% confidence intervals (CIs). Continuous outcomes (eg, BI, Patient Satisfaction Questionnaire Short Form) will be analysed using mean differences or standardised mean differences (where different outcomes are used to measure the same construct), standard deviation (SD) and 95% CIs. Where the mean or SD is not available, the median will be used as a proxy for the mean and a multiple of 0.25 the range or 0.75 times the IQR will be used as a proxy for the SD.[36] Heterogeneity will be analysed across trials using an I^2 statistic which will be considered statically significant at $p<0.05$. The I^2 value of 30%–60% will be considered as moderate heterogeneity, 50%–90% as substantial heterogeneity and 75%–100% as considerable heterogeneity.[37] For the purposes of this review, an I^2 of greater than 50% will be considered substantial and a random effects model will be reported to account for variability across studies. If I^2 is ≤50% a fixed effects model will be employed.[38]

A sensitivity analysis will be conducted to explore the impact of ROB within the included studies, by analysing the effect of the methodological and clinical characteristics on outcomes (specialist geriatric training by GP, composition of HSCP team, duration of intervention). In order to incorporate bias assessments in the analysis, we will provide a detailed description of ROB by individual domains, we will display a summary of ROB across studies and we will display all ROB judgements on forest plots. If a study is rated as high ROB in some categories, a sensitivity analysis may be completed to exclude this study from the overall analysis. Cluster randomised trials will be assessed to ensure adequate analysis was carried out to consider the effects of clusters. A subgroup analysis will be completed to explore potential sources of heterogeneity if required. A subgroup analysis will be completed stratifying the composition of the HSCP team, from, GP with physiotherapist, duration of the intervention or the location where the intervention is carried out, for example, in the home compared with in a community centre. The subgroups analyses will be presented with a test for interaction. Authors will be contacted in the event that data are not available.

Public and patient involvement (PPI)

There are growing imperatives for PPI in health research to enhance the design and implementation of healthcare.[39] This proposal was presented to members of the PPI stakeholder panel of older adults at the Ageing Research Centre at the University of Limerick (UL). The purpose of this was to invite their feedback, comments and insights, to inform the approach to the research question and outcomes of interest. Panel members felt strongly about how functional decline strongly influences a person's confidence and QoL. The panel agreed with the outcomes proposed and also noted that patient reported adverse outcomes should be recorded as personal safety is important and adverse outcomes can significantly negatively impact QoL. The same approach will be used for the main systematic review where the draft findings will be presented to members and feedback invited on key discussion points of the review and potential considerations for follow-on intervention studies. The PPI panel will also be consulted on the lay dissemination formats of the review.

DISCUSSION

This review will systematically search and synthesise primary empirical research examining and reporting on the effectiveness of multidisciplinary integrated care with GP participation on the care of community dwelling older adults. Older adults are at risk of poor health outcomes specifically functional decline during hospital admission, which results in prolonged hospital stay, increased nursing home admission and an increase in social care costs.[40] Hospital avoidance strategies are essential to identify this at-risk cohort prior to experiencing adverse events. Delivery of integrated care to older people is considered a complex intervention,[2] subsequently this review will identify components of integrated care strategies including HSCP team members and intervention elements. The elements of integrated care outlined in the RMIC by Valentijn *et al*[41] will be used as a reference standard to outline the elements of integrated care used in each study. This will facilitate future recommendations to be made regarding such integrated care approaches for older people living in the community. This review will be relevant to both clinicians and policy-makers and will enable evidence-based recommendations to be made regarding current and future integrated care strategies for community-dwelling older people. It is predicted that the range of outcomes across trials will be varied which may limit our ability to pool data across studies. Functional decline was chosen as the primary outcome in our study as lower ability in completion of ADLs is negatively correlated with QoL in older adults.[42]

By synthesising the evidence regarding integrated care for community-dwelling older people, there is a potential

to reduce the risk of unplanned hospital admission as is the case for CGA for community-dwelling older people.[16] A reduction in hospitalisation may lead to reduced risk of functional decline[3] and ultimately maintain older adults QoL.[42]

Ethics and dissemination

Formal ethical approval is not required for this review as all data included are anonymous secondary data.

The review will abide by the PRISMA standardised reporting guidelines will be published in a peer-reviewed journal and disseminated through discussion in the Ageing Research Centre at UL. Scientific outputs will be disseminated in the form of presentations at relevant older persons and primary care conferences. Lay dissemination will take place in collaboration with the PPI stakeholder panel of older adults at the Ageing Research Centre at the University of Limerick.

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Contributors CH and RG were major contributors in writing this systematic review protocol. CH, RG, MM and KR contributed to the planning and design of the overall study. CH developed the search strategy. CH, RG, MM, KR, CF, ACG, BC, LG, M'OC and ES participated in critically appraising and editing the manuscript. RG is the guarantor of the review. CH, RG, MM, KR, CF, ACG, BC, LG, M'OC and ES read and approved the final manuscript. The corresponding author attests that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted.

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Competing interests None declared.

Patient and public involvement Patients and/or the public were involved in the design, or conduct, or reporting, or dissemination plans of this research. Refer to the Methods and analysis section for further details.

Patient consent for publication Not applicable.

Provenance and peer review Not commissioned; externally peer reviewed.

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REFERENCES

1 United Nations Department of Economic Social Affairs Population Division. World population ageing: 2017 highlights, 2017
2 World Health Organisation. Integrated care for older people: Realigning primary health care to respond to population ageing, 2018
3 Loyd C, Markland AD, Zhang Y, *et al*. Prevalence of hospital-associated disability in older adults: a meta-analysis. *J Am Med Dir Assoc* 2020;21:e5:455–61.
4 Zhao X, Wang L, Wei N, *et al*. Risk factors of health care–associated infection in elderly patients: a retrospective cohort study performed at a tertiary hospital in China. *BMC Geriatr* 2019;19:1–6.
5 Katz MJ, Roghmann M-C. Healthcare-Associated infections in the elderly: what's new. *Curr Opin Infect Dis* 2016;29:388–93.
6 Glynn LG, Valderas JM, Healy P, *et al*. The prevalence of multimorbidity in primary care and its effect on health care utilization and cost. *Fam Pract* 2011;28:516–23.
7 Frandsen BR, Joynt KE, Rebitzer JB, *et al*. Care fragmentation, quality, and costs among chronically ill patients. *Am J Manag Care* 2015;21:355–62.
8 World Health Organization. *Integrated care for older people: guidelines on community-level interventions to manage declines in intrinsic capacity*, 2017.
9 Liljas AEM, Brattström F, Burström B, *et al*. Impact of Integrated Care on Patient-Related Outcomes Among Older People - A Systematic Review. *Int J Integr Care* 2019;19:6.
10 Valentijn PP, Pereira F, Sterner CW, *et al*. Validation of the rainbow model of integrated care measurement tools (RMIC-MTs) in renal care for patient and care providers. *PLoS One* 2019;14:e0222593.
11 World Health Organization. *Framework on integrated, people-centred health services*. Geneva: World Health Organization, 2016: 2019.
12 Valentijn PP, Vrijhoef HJM, Ruwaard D, *et al*. Towards an international taxonomy of integrated primary care: a Delphi consensus approach. *BMC Fam Pract* 2015;16:1–15.
13 Boesveld IC, Valentijn PP, Hitzert M, *et al*. An approach to measuring integrated care within a maternity care system: experiences from the maternity care network study and the Dutch birth centre study. *Int J Integr Care* 2017;17:6.
14 Dickinson A, Joos S. Barriers to integration of primary care into emergency care: experiences in Germany. *Int J Integr Care* 2021;21:11.
15 Ellis G, Whitehead MA, Robinson D, *et al*. Comprehensive geriatric assessment for older adults admitted to hospital: meta-analysis of randomised controlled trials. *BMJ* 2011;343:d6553.
16 Briggs R, McDonough A, Ellis G, *et al*. Comprehensive geriatric assessment for community-dwelling, high-risk, frail, older people. *Cochrane Database Syst Rev* 2022;5:CD012705.
17 O'Dowd T, Ivers J-H, Handy D. *A future together building a better GP and primary care service*, 2017.
18 DoH C. Primary care: A new direction: Quality and fairness-A health system for you. In: *Children DoH*. Dublin, 2001.
19 Department of Health HSE. *Sláintecare implementation strategy and next steps*. Dublin, Ireland, 2018.
20 World Health Organisation. *Integrated care models: an overview*, 2016.
21 Béland F, Bergman H, Lebel P, *et al*. A system of integrated care for older persons with disabilities in Canada: results from a randomized controlled trial. *J Gerontol A Biol Sci Med Sci* 2006;61:367–73.
22 Sommers LS, Marton KI, Barbaccia JC, *et al*. Physician, nurse, and social worker collaboration in primary care for chronically ill seniors. *Arch Intern Med* 2000;160:1825–33.
23 Metzelthin SF, van Rossum E, de Witte LP, *et al*. Effectiveness of interdisciplinary primary care approach to reduce disability in community dwelling frail older people: cluster randomised controlled trial. *BMJ* 2013;347:f5264.
24 Blom J, den Elzen W, van Houwelingen AH, *et al*. Effectiveness and cost-effectiveness of a proactive, goal-oriented, integrated care model in general practice for older people. A cluster randomised controlled trial: Integrated Systematic Care for older People--the ISCOPE study. *Age Ageing* 2016;45:30–41.
25 Higgins JPT TJ, Chandler J, Cumpston M. *Cochrane Handbook for systematic reviews of interventions version 6.3 (updated February 2022) Cochrane*, 2022.
26 Shamseer L, Moher D, Clarke M, *et al*. Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015: elaboration and explanation. *BMJ* 2015;349:g7647.
27 Moher D, Liberati A, Tetzlaff J, *et al*. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *PLoS Med* 2009;6:e1000097.
28 Covinsky KE, Justice AC, Rosenthal GE, *et al*. Measuring prognosis and case mix in hospitalized elders. The importance of functional status. *J Gen Intern Med* 1997;12:203–8.
29 Mahoney FI, BARTHEL DW. Functional evaluation: the BARTHEL index. *Md State Med J* 1965;14:61–5.

30 Kempen GI, Miedema I, Ormel J, *et al*. The assessment of disability with the Groningen activity restriction scale. conceptual framework and psychometric properties. *Soc Sci Med* 1996;43:1601–10.
31 Burns R, Nichols LO, Martindale-Adams J, *et al*. Interdisciplinary geriatric primary care evaluation and management: two-year outcomes. *J Am Geriatr Soc* 2000;48:8–13.
32 Hughes JM, Freiermuth CE, Shepherd-Banigan M, *et al*. Emergency department interventions for older adults: a systematic review. *J Am Geriatr Soc* 2019;67:1516–25.
33 Ouzzani M, Hammady H, Fedorowicz Z, *et al*. Rayyan-a web and mobile APP for systematic reviews. *Syst Rev* 2016;5:210.
34 Sterne JAC, Savović J, Page MJ, *et al*. Rob 2: a revised tool for assessing risk of bias in randomised trials. *BMJ* 2019;366:l4898.
35 Schünemann H, Bro ek J,, *et al*. *Handbook for grading the quality of evidence and the strength of recommendations using the grade approach (updated October 2013) grade Working group*, 2013.
36 Hozo SP, Djulbegovic B, Hozo I. Estimating the mean and variance from the median, range, and the size of a sample. *BMC Med Res Methodol* 2005;5:1–10.
37 R R. Planning the analysis at protocol stage. In: *Heterogeneity and subgroup analyses in Cochrane consumers and communication group reviews*, 2016.
38 Veroniki AA, Jackson D, Bender R, *et al*. Methods to calculate uncertainty in the estimated overall effect size from a random-effects meta-analysis. *Res Synth Methods* 2019;10:23–43.
39 MacFarlane A, Galvin R, O'Sullivan M, *et al*. Participatory methods for research prioritization in primary care: an analysis of the world Café approach in Ireland and the USA. *Fam Pract* 2017;34:278–84.
40 National clinical programme for older people (NCPOP). Health Service Executive and Royal College of Physicians Ireland. In: *A guide to comprehensive geriatric assessment for older people*, 2016.
41 Valentijn PP, Boesveld IC, van der Klauw DM, *et al*. Towards a taxonomy for integrated care: a mixed-methods study. *Int J Integr Care* 2015;15:e003.
42 Klompstra L, Ekdahl AW, Krevers B, *et al*. Factors related to health-related quality of life in older people with multimorbidity and high health care consumption over a two-year period. *BMC Geriatr* 2019;19:1–8.

Supplementary file 1

PRISMA-P Reporting Guideline Checklist

Section and topic	Item No	Checklist item	Location where item is reported
ADMINISTRATIVE INFORMATION			
Title:			Page 1
Identification	1a	Identify the report as a protocol of a systematic review	Page 1&6
Update	1b	If the protocol is for an update of a previous systematic review, identify as such	N/A
Registration	2	If registered, provide the name of the registry (such as PROSPERO) and registration number	
Authors:			
Contact	3a	Provide name, institutional affiliation, e-mail address of all protocol authors; provide physical mailing address of corresponding author	Page 1
Contributions	3b	Describe contributions of protocol authors and identify the guarantor of the review	Page 1&11
Amendments	4	If the protocol represents an amendment of a previously completed or published protocol, identify as such and list changes; otherwise, state plan for documenting important protocol amendments	N/A
Support:			
Sources	5a	Indicate sources of financial or other support for the review	Page 11
Sponsor	5b	Provide name for the review funder and/or sponsor	Page 11
Role of sponsor or funder	5c	Describe roles of funder(s), sponsor(s), and/or institution(s), if any, in developing the protocol	Page 11
INTRODUCTION			
Rationale	6	Describe the rationale for the review in the context of what is already known	Page 4-6
Objectives	7	Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators, and outcomes (PICO)	Page 6-8
METHODS			
Eligibility criteria	8	Specify the study characteristics (such as PICO, study design, setting, time frame) and report characteristics	Page 6-8 &supplementary file 3

		(such as years considered, language, publication status) to be used as criteria for eligibility for the review	
Information sources	9	Describe all intended information sources (such as electronic databases, contact with study authors, trial registers or other grey literature sources) with planned dates of coverage	Page 6
Search strategy	10	Present draft of search strategy to be used for at least one electronic database, including planned limits, such that it could be repeated	Supplementary file 2
Study records:			
Data management	11a	Describe the mechanism(s) that will be used to manage records and data throughout the review	Page 8
Selection process	11b	State the process that will be used for selecting studies (such as two independent reviewers) through each phase of the review (that is, screening, eligibility and inclusion in meta-analysis)	Page 8-10
Data collection process	11c	Describe planned method of extracting data from reports (such as piloting forms, done independently, in duplicate), any processes for obtaining and confirming data from investigators	Page 8
Data items	12	List and define all variables for which data will be sought (such as PICO items, funding sources), any pre-planned data assumptions and simplifications	Page 7-9
Outcomes and prioritisation	13	List and define all outcomes for which data will be sought, including prioritisation of main and additional outcomes, with rationale	Page 7
Risk of bias in individual studies	14	Describe anticipated methods for assessing risk of bias of individual studies, including whether this will be done at the outcome or study level, or both; state how this information will be used in data synthesis	Page 9
Data synthesis	15a	Describe criteria under which study data will be quantitatively synthesised	Page 9 & 10
	15b	If data are appropriate for quantitative synthesis, describe planned summary measures, methods of handling data and methods of combining data from studies, including any planned exploration of consistency (such as I^2, Kendall's τ)	Page 9 & 10
	15c	Describe any proposed additional analyses (such as sensitivity or subgroup analyses, meta-regression)	Page 9 & 10

	15d	If quantitative synthesis is not appropriate, describe the type of summary planned	Page 9 & 10
Meta-bias(es)	16	Specify any planned assessment of meta-bias(es) (such as publication bias across studies, selective reporting within studies)	Page 9
Confidence in cumulative evidence	17	Describe how the strength of the body of evidence will be assessed (such as GRADE)	Page 9

Supplementary file 2

MEDLINE (OVID) Sample Search Strategy

Number	Search Term
1	exp Aged/
2	Geriatric Assessment/
3	Health Services for the Aged/
4	(((geriatric or older person* or older adult* or aged or geriatric* or geriatric assessment or aged, 80) and over) or senior* or elderly or old or older or frail elderly or frail).ti. or (((geriatric or older person* or older adult* or aged or geriatric* or geriatric assessment or aged, 80) and over) or senior* or elderly or old or older or frail elderly or frail).ab.
5	1 or 2 or 3 or 4
6	Primary Health Care.ti. or Primary Health Care.ab.
7	Physicians, Family.ti. or Physicians, Family.ab.
8	Physicians, Primary Care.ti. or Physicians, Primary Care.ab.
9	General Practice.ti. or General Practice.ab.
10	General Practitioners.ti. or General Practitioners.ab.
11	Family Practice.ti. or Family Practice.ab.
12	Practice Patterns, Physicians'.ti. or Practice Patterns, Physicians'.ab.
13	Ambulatory Care.ti. or Ambulatory Care.ab.
14	Integrated care.ti. or Integrated care.ab.
15	comprehensive care.ti. or comprehensive care.ab.
16	Community Health Centers.ti. or Community Health Centers.ab.
17	Community Health Services.ti. or Community Health Services.ab.
18	Community Health Planning.ti. or Community Health Planning.ab.
19	Community-Based Participatory Research.ti. or Community-Based Participatory Research.ab.
20	Independent Living.ti. or Independent Living.ab.
21	primary care physician.ti. or primary care physician.ab.
22	primary care practice*.ti. or primary care practice*.ab.
23	primary care setting.ti. or primary care setting.ab.
24	family physician*.ti. or family physician*.ab.
25	(communit* adj3 (care or healthcare or service? or network? or based or initiative* or intervention* or schem* or participat* or project* or program* or activit* or partnership* or action or strategy*)).ti. or (communit* adj3 (care or healthcare or service? or network? or based or initiative* or intervention* or

	schem* or participat* or project* or program* or activit* or partnership* or action or strategy*)).ab.
26	(primary adj2 (care or healthcare)).ti. or (primary adj2 (care or healthcare)).ab.
27	(family practi* or family doctor* or family physician* or gp* or general practi*).ti. or (family practi* or family doctor* or family physician* or gp* or general practi*).ab.
28	((home or domicil*) adj3 (care or healthcare or nurs* or rehabilit* or service or services or treatment? or therapy or therapies or therapist? or visiting or visit?)).ti. or ((home or domicil*) adj3 (care or healthcare or nurs* or rehabilit* or service or services or treatment? or therapy or therapies or therapist? or visiting or visit?)).ab.
29	6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28
30	5 and 29
31	randomi?ed controlled trial.ti. or randomi?ed controlled trial.ab.
32	random allocation.ti. or random allocation.ab.
33	controlled clinical trials.ti. or controlled clinical trials.ab.
34	cluster randomi?ed controlled trials.ti. or cluster randomi?ed controlled trials.ab.
35	clinical trial.ti. or clinical trial.ab.
36	random*.ti. or random*.ab.
37	trial.ti. or trial.ab.
38	(quasi-random* or quasi random* or pseudo-random* or pseudo-random*).ti. or (quasi-random* or quasi random* or pseudo-random* or pseudo-random*).ab.
39	rct.ti. or rct.ab.
40	31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39
41	30 and 40

Supplementary file 3
PICO data extraction form

Measure	Inclusion	Exclusion
Setting	Primary care/Community setting	Hospital ED Nursing home Acute care unit Assisted Living facilities Community hospitals
Population	Community-dwelling adults ≥65 years	Individuals <65 years, individuals not living at home
Intervention	Assessment and/or intervention in primary care by GP in conjunction with a member of a multidisciplinary team including one/more health and social care professionals including at least one of the following: - Clinical Pharmacist - Dietitian - Medical Social Worker - Occupational Therapist - Physiotherapist - Psychologist - Speech and Language Therapist	Assessment and/or intervention carried out in primary care by a member of a multidisciplinary team which does not include one of the selected categories
Comparison	Usual Care	
Outcome	One or more of the following: Primary outcome: - Functional status Secondary outcomes: - Primary Healthcare use - Secondary Healthcare use - Participant Satisfaction with Care - Quality of Life	

	- Mortality - Nursing Home admission	
Study Design	- Randomised controlled trials - Cluster- Randomised controlled trials - Quasi Randomised controlled trials	- Case studies - Observational studies - Retrospective chart reviews - Review articles - News - Editorials - Commentaries
Publication Date	No time limitations	
Publication Language	No language limitations	

Supplementary file 4.

Taxonomy of 21 key features for integrated care

Main categories and domains	**Study x**	**Study x**	**Study x**	**Study x**	**Study x**	**Study x**
Scope of integrated care						
Person-focused care						
Centrality of client needs						
Population based care						
Centrality of population needs						
Type of integration processes						
Clinical integration						
Case management						
Continuity						
Interaction between professional and client						
Individual multidisciplinary care plan						
Professional integration						
Inter-professional education						
Agreements on interdisciplinary collaboration						
Value creation for the professional						
Organisational integration						
Inter-organisational governance						

Inter-organisational strategy						
Trust						
System integration						
Alignment of regulatory frameworks						
Environmental climate						
Enablers for integration						
Functional integration						
Learning organisations						
Information management						
Regular feedback of performance indicators						
Normative integration						
Shared vision						
Reliable behaviour						
Visionary leadership						
Linking cultures						

Supplementary file 5
Data Extraction Form

Data	**Notes to reviewer**	**Location in text**
Reviewer name		
Author		
Year		
Title		
Study design		
Available at		
Country		
Population - Inclusion/exclusion criteria - Sample size - Age - Gender - Other baseline demographic information - Referral Source of participants - Method of recruitment - Number of participants		
Intervention - Team composition - Assessment type - Intervention type - Duration - Follow-up - How was integrated care defined		
Comparison -Description of comparison group		
Outcome - Outcome measured and definition -Data type (dichotomous, continuous, ordinal)		
Results		
Confounding Variables		
Missing data		
Risk of bias - Risk of bias		

- Selection bias - Random sequence generation - Allocation concealment - Performance bias - Detection bias - Attrition bias - Reporting bias - Other bias		
Conclusion		