BMJ Open

Health-Related Preferences of Older Patients with Multimorbidity: the protocol for an Evidence Map.

Journal:	*BMJ Open*
Manuscript ID	bmjopen-2019-029724
Article Type:	Protocol
Date Submitted by the Author:	11-Feb-2019
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Keywords:	Multimorbidity, Patient preference, Aged

TITLE

Health-Related Preferences of Older Patients with Multimorbidity: The protocol for an Evidence Map.

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ABSTRACT

Introduction:

Interaction of conditions and treatments, complicated care needs and substantial treatment burden make patient-physician encounters involving multimorbid older patients highly complex. To optimally integrate patients' preferences, define and prioritise realistic treatment goals and individualise care, a patient-centred approach is recommended. However, the preferences of multimorbid patients have not been systematically investigated in relation to their health status. The purpose of this evidence map is to explore current research addressing health-related preferences of older patients with multimorbidity (MM), and to identify knowledge clusters and research gaps.

Methods and analysis:

To identify relevant research, we will conduct searches in the electronic databases MEDLINE, EMBASE, PsycINFO, PSYNDEX, CINAHL, Social Science Citation Index, Social Science Citation Index Expanded and the Cochrane library from their inception. We will check references of relevant articles and carry out cited reference research (forward citation tracking).

Two independent reviewers will screen titles and abstracts, check full texts for eligibility and extract the data. Any disagreement will be resolved and consensus reached with the help of a third reviewer. We will include both qualitative and quantitative studies, and address preferences from the patients' perspectives in a multimorbid population over the age of 60 years. Data extraction tables will present study and patient characteristics, aim of study, and methods used to identify preferences and outcomes (i.e., type of preferences). We will summarise the data using tables and figures (i.e. bubble plot) to present the research landscape and to describe clusters and gaps.

Ethics and dissemination:

Due to the nature of the proposed evidence map, ethics approval will not be required. Results from our research will be disseminated by means of specifically prepared materials for patients, at relevant (inter-)national conferences and via publication in peer-reviewed journals.

Registration:

Open Science Framework (OSF): DOI 10.17605/OSF.IO/MCRWQ.

Strengths and limitations of this study:

Strengths are the multinational and multidisciplinary team, which covers the necessary area of expertise and has considerable methodological experience and skills.

Furthermore, a patient's representative will be involved in designing the study to ensure that from the beginning, patient-relevant questions are defined, and results discussed accordingly.

The search will also be broad-based, use a sensitive rather than a specific strategy, and cover a wide range of databases, terms and search strategies (i.e. forward citation tracking).

In addition, selection criteria will be broad (i.e. both qualitative and quantitative studies will be considered) and no restrictions will be placed on setting or language of publication.

The main limitation is poor indexing and the lack of, or non-standardized definition of, a research topic (e.g., expressed as satisfaction, experience or perspectives).

INTRODUCTION

Multimorbidity (MM) is defined as the co-occurrence of two or more chronic or acute diseases and medical conditions in one person (1). The prevalence of MM increases significantly with age, rising from about 50% at the age of 60 years to more than 80% at the age of 80, although estimates vary widely depending on the employed definition of MM (2–6). Interaction of conditions and treatments, complicated care needs and substantial treatment burden make patient-physician encounters involving multimorbid older patients highly complex, and the clinical management of these patients extremely challenging (7).

Although interventions to improve relevant outcomes in patients with MM still lack high-quality evidence (8,9), existing principles (10), clinical practice guidelines (11) and care models (12) all recommend a patient-centred approach that takes patient preferences into consideration. MM can be associated with overwhelming management burden, which makes it necessary for physicians and patients to prioritise treatment plans by considering both the reduction of symptoms and the patients' quality of life. As every treatment option consists of a specific combination of benefits, harms and burden, it is important that physicians understand the need to take patients' preferences and priorities into account in the decision-making process. Tailoring treatments to each individual patient's needs and preferences is likely to improve adherence to self-management interventions and medication (13).

The GRADE working group define preferences as choices that patients make when "considering the potential benefits, harms, costs, limitations, and inconveniences of the management options in relation to one another" (14). Overall, preferences include patients' beliefs, expectations, desires, perspectives and goals (14). Some preferences, such as the avoidance of pain, are well-established and stable, and the patient is fully aware of them. Other preferences, however, must be developed from scratch. This is the case when initial preferences are inadequate to the task of solving the decision a person is faced with. The elucidation and construction of preferences is a complex process that several disciplines have investigated from different perspectives (15–18).

Healthcare decision-making in MM requires that health problems are prioritised in terms of desired *vs*. undesired outcomes - a situation that patients often have no experience with. Clinical decision elements may be unfamiliar to them, and the available choices may present a conflict in that one goal can only be achieved by forgoing another (16). Moreover, MM is often characterised by a state of shifting priorities in self-management that can change from day to day (19). Hence, most healthcare-related preferences must be constructed during a process of elicitation that is part of the decision-making process (16).

Although several tools have been developed to assess multimorbid patients' preferences (e.g. for different treatment options or outcomes) in terms of the prioritisation of their health-related goals (20), no structured attempt has yet been made to summarise the current state of research on healthcare-related preferences in this patient population. However, the broad nature of this topic requires that existing evidence is mapped out, i.e. a systematic search of existing knowledge in the field should be conducted to identify gaps and/or future research needs (21). Evidence mapping is an innovative method of synthesising evidence when the research question is too broad to perform a "traditional" systematic review. Both evidence maps (EM) and scoping reviews have recently been recommended by the Agency for Healthcare Research and Quality (AHRQ)'s Evidence-based Practice Center program (22) as a first step towards systematically mapping existing research that can help answer broad-based questions. The two emerging methods differ in the way they present their results: scoping reviews present a narrative description of results, whereas evidence maps use visual formats (e.g. bubble plots) (23).

In this article, we report the protocol of an EM to: (i) systematically identify and describe key characteristics of research on health-related preferences of older patients with MM; (ii) display the existing research landscape in visual formats; (iii) identify evidence clusters to guide subsequent knowledge synthesis (systematic reviews and meta-analysis); and, (iv) identify evidence gaps to inform patients, clinicians, researchers, policy-makers and funding agencies, and to help identify future research priorities. This work will provide us with a thorough overview of research on the

health-related preferences of older patients with MM.

METHODS AND ANALYSIS

The aim of EMs is (21) to "collate, describe, and catalogue" knowledge of a broad subject area (24). EMs are particularly effective when research questions are wide-ranging because they explore rather than summarise evidence. Consequently, EMs do not include meta-analysis, or compare the strength of evidence between studies but chart concepts, themes and the amount and type of evidence available.

The present protocol will follow, where applicable, the 'PRISMA Extension for Scoping Reviews` (PRISMA-ScR) checklist (25) (see Additional file 1).

[About here: link to Additional file 1. Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist]

Following the framework originally establish by Arksey and O`Malley (26), refined by Levac et al (27) and further developed by the Joanna Brigs Institute (28), six steps will be used to create the EM: 1) Identifying a broad clinical question; 2) Identifying relevant studies; 3) Study selection; 4) Charting the data; 5) Reporting the results; 6) Consultation.

Step 1. Identifying a broad clinical question

A pilot test of an EM for our research question (published elsewhere) was performed as part of a collaboration between the Institute of General Practice at Johann Wolfgang Goethe University (Frankfurt) and the Institute for Evidence in Medicine (for Cochrane Germany Foundation), Freiburg. It showed the feasibility of the mapping approach and areas for improvement, thus helping to refine the research question and the methods to be used.

We established a multidisciplinary research team of 11 experts – some of whom had more than one area of expertise - from 5 countries (Australia, Canada, Germany, Spain, The Netherlands). In addition to a patient representative (1), the professionals represented primary care (2), internal

medicine (1), geriatrics (1), cognitive psychology (1), public health and health services research (2), methodology (3), shared decision-making (1), epidemiology (1), and knowledge translation (1). At the project kick-off meeting in April 2018, all members of the multidisciplinary research team contributed to the definition of the scope of the EM. Based on the results of previous exploratory research, we defined the following question to be addressed by our EM: What specific health-related preferences of older patients with MM are described in current literature?

Step 2. Identifying relevant studies

In order to identify relevant published studies, we will conduct a literature search in the following electronic databases: MEDLINE (1946 to 2018) via Wolters Kluwer's search interface Ovid (indexed and non-indexed databases), CINHAL (1981 to 2018), PsycINFO (1800s to 2018) and PSYNDEX via EBSCOhost, Science Citation Index Expanded (1945 to 2018), and Social Science Citation index (1956 to 2018) via Clarivate Analytics' Web of Science, and EMBASE (1988 to 2018) via Ovid and Cochrane Database (CENTRAL, TRIALS). We will check references of relevant articles and perform cited reference research (forward citation tracking) based on the 10 most relevant studies found in our initial search (e.g., if keywords provided by the author contained the terms "multimorbidity" and "patient preferences" and/ or described a specific method for eliciting patients' preferences, such as conjoint analysis). Authors of conference proceedings with no published results in academic journals will be contacted and asked for any unpublished results. Secondary research (i.e., systematic reviews, synthesis of qualitative studies, scoping reviews) studies on related topics will be reviewed and references will be checked for possible inclusion in the EM. We will also search for ongoing trials in clinicaltrials.gov and the WHO register.

We will follow PRESS Peer Review of Electronic Search Strategies recommendations and develop the final search strategy in collaboration with an expert medical sciences librarian (29).

The full electronic search strategy for the MEDLINE database is provided in Additional file 2.

[About here: link to Additional file 2. Search strategy used for MEDLINE database]

Based on the results of pilot testing, we agreed with all collaborative partners upon the following eligibility criteria for the EM during the kick-off meeting in April 2018 (see Table 1):

[About here: Table 1. Inclusion & exclusion criteria]

Participants/population

Older patients (mean and/or median age ≥ 60 years) with MM (two or more simultaneous acute or chronic conditions (1)) of any type will be considered.

Outcomes

Our phenomena of interest (outcomes) will be (i) health-related preferences relating to the organisation of health-care; (ii) preferences for specific information, communication, or involvement in a shared decision-making process; (iii) preferences relating to desired, undesired and competing outcomes (in terms of safety and effectiveness); (iv) prioritisation of health problems or conditions; (v) screening or diagnostic procedure preferences; and (vi) treatment preferences. The classification of the outcomes will be discussed and consecutively adapted, depending on the literature findings. This classification will further allow content analysis and the establishment of research clusters and gaps.

Study setting

We will not apply any restrictions to geographical location of the study or language of publication, and we will include studies conducted in any setting, i.e. any health care context in any country (including low and middle-income countries).

Study design

We will include qualitative and quantitative studies that address the phenomena of interest defined above from the patients' perspectives.

We will exclude case reports, narrative reviews and editorials, and articles without details on methodology. We will exclude interventional studies testing interventions of limited availability or whose legal status is unclear (e.g. euthanasia). Studies addressing only the preferences of caregivers, family, or medical and/or other professionals, will not be considered.

Step 3. Study selection

Bibliographic details of all identified references will first be uploaded to Endnote© and then converted into COVIDENCE©, which will automatically detect duplicate documents. Two reviewers (AIG, JN or KW) will independently screen titles and abstracts and will independently check full texts of the included articles for eligibility. Any disagreement will be resolved and consensus reached with the help of a third reviewer (CS). Before screening, a stepwise calibration exercise will be performed on a sample of 50 studies, with the aim of achieving 80% agreement between the two reviewers. Inclusion and exclusion criteria will be reviewed and refined as necessary during the calibration period.

Step 4. Charting the data

Data extraction tables will be created using Excel and will include, when available: study characteristics such as research type and setting (health care context, country of origin, study period); patient characteristics (sample size, age, sex, definition of MM); aim of study; characteristics of the preferences, such as methods used to elucidate patients' preferences, framing and definition of preferences (e.g., treatment preferences, diagnostic preferences, desired, undesired and competing outcome preferences - as guided by the above description of the phenomena of interest) and results (see Table 2).

[About here: Table 2. Data extraction framework]

Following a calibration exercise on five full texts, two reviewers (AIG, JN or CS) will independently extract the data. To check the adequacy of the extracted information, the data extraction file will be shared with other authors (CM, JB, MvA, TH and SS), and changes performed where necessary.

Step 5. Reporting the results

We will summarise the data using tables and figures (i.e. bubble plot) to present the evidence landscape and to elucidate clusters and gaps. For each year, we will identify the number of primary and secondary research studies, as well as conferences and doctoral theses, which describe patients'

preferences. We will describe the identified studies in terms of characteristics such as location, setting and study design (i.e. observational - qualitative, quantitative or mixed-methods – or interventional studies), sub-population according to age or MM pattern / severity if possible, and study objectives aggregated according to research topic (i.e. type of preference) (Table 2).

Clustering of research topics will be performed by applying content analysis (30,31) and based on coding by two independent reviewers (AIG, JN or CS). The results will be entered into the data extraction file, which will then be reviewed by the other researchers (CM, JB, MvA, TH and SS). Categories for the analysis of the obtained data will be modified accordingly, along with the development of the EM, and agreed upon after consultation with the research team.

Step 6. Consultation

The development of the EM will follow an iterative process and all members of the research team will be consulted during all steps of the project, including the identification of relevant literature, study selection and data extraction. In November 2018, we held a workshop to present the results of the preliminary search strategy and exploratory investigation, and to obtain feedback before conducting further searches and other activities. We discussed interim results, refined the methodology and agreed on the best formats for reporting our findings. Cluster definitions of the identified research topics were discussed and agreed upon by all authors. All necessary changes were established before continuing with the development of the EM.

Patient and public involvement

A patient representative from the Federal Joint Committee “Gemeinsamer Bundesausschuss“ participated actively in all the six steps followed to create the EM.

ETHICS AND DISSEMINATION

Due to the nature of the proposed evidence map, ethics approval will not be required. We will prepare presentations to disseminate the study findings to healthcare providers and patients, and at relevant

national and international conferences, and we aim to publish the results of the study in peer-reviewed journals. We will provide recommendations for primary research that are based on the identified knowledge gaps, and recommendations for secondary research that are based on knowledge clusters.

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AUTHORS' CONTRIBUTIONS

AIG wrote the initial draft of the protocol. CM is the guarantor of the review. CS and JM provided methodological guidance and revisions of the manuscript. CS and JN assisted in the identification of databases and reviewed the search strategy. JB, MvA, TN, JN, OW, KR, TH, FG and SS are co-supervisors of this project, provided advice at all stages of the development of the protocol, and contributed to the revision of the manuscript. All authors read and approved the final manuscript.

FUNDING STATEMENT

This work was supported by the German Federal Ministry of Education and Research, grant number 01GL1729. The funder had no role in developing the protocol for this review.

COMPETING INTERESTS STATEMENT

None declared

WORD COUNT

2,209 words

Table 1. Inclusion & exclusion criteria

Inclusion criteria	Exclusion criteria
⇒ Qualitative and quantitative studies addressing health-related preferences (priorities, goal-oriented, goal attainment, shared decision-making, patient-centred, patient-oriented, "satisfaction") from the patient's perspective ⇒ Age: average age of 60 or older, geriatric patients, elderly patients ⇒ Polypharmacy: with or without polypharmacy ⇒ Multimorbidity: Comorbidity, multiple chronic conditions ⇒ No restrictions: We will not apply any restrictions with respect to geographical location, health care context, country, and language	⇒ Case reports, ⇒ Narrative reviews ⇒ Editorials ⇒ Articles providing no details on methodology ⇒ Interventional studies of limited availability, or whose legal status is unclear (e.g. euthanasia) ⇒ Studies addressing only preferences of caregivers and medical professionals

Table 2. Data extraction framework

Bibliometrics	Description	Coding
First Author, year of publication		
Study characteristics	Publication type	Research article, conference, thesis, study protocol
	Study type	Primary or secondary research
	Language	e.g. English
	Geographical location	Country, region, city
	Study setting	Hospital, general practice, nursing home, other
	Study method	Observational (i.e. qualitative, quantitative, mixed methods) or interventional study
Patient characteristics	Definition of MM	(authors' description)
	Number of patients	Study sample
	Age	(years)
	Sex	(% females)
Methods of data collection	Type of data collection	Interview, semi-structured interview, survey, focus group, questionnaire (authors' description)
	Method of eliciting patients' preferences (PtP)	Tool definition (authors' description)
Outcome	Definition of (PtP) and priorities	(authors' definition)

	Type of PtP assessed	(reviewers' definition)
Study aim		(authors' description)
Results / Conclusions		(authors' description)

PtP: patients' preferences

Additional file 1.

Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	Page 1, line 2
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	Page 4, lines 65-89
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	Page 6, lines 105-150
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	Page 7, lines 151-157
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	Page 5, line 91
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	Pages 9-10, lines 187-223
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	Page 9, lines 187-197
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	Page 10, line 226

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	Pages 10-11, lines 229-235
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	Page 11, lines 237-246
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	Page 11, lines 237-246
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	Click here to enter text.
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	Pages 11-12, lines 248-261
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	Click here to enter text.
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	Click here to enter text.
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	Click here to enter text.
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	Click here to enter text.
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	Click here to enter text.
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review	Click here to enter text.

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
		questions and objectives, and consider the relevance to key groups.	
Limitations	20	Discuss the limitations of the scoping review process.	Click here to enter text.
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	Click here to enter text.
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	Page 16, lines 377-378

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.
* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.
† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).
‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.
§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

From: Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. Ann Intern Med. ;169:467–473. doi: 10.7326/M18-0850

Additional file 2. Search strategy used for MEDLINE database (search interface: Ovid; Host: Wolters Kluwer)

MEDLINE 1946 to the third week of April, 2018,

MEDLINE Daily Update April 26, 2018,

MEDLINE In-Process & Other Non-Indexed Citations April 26, 2018,

MEDLINE Epub Ahead of Print April 26, 2018

Search date (yyyy-mm-dd): 2018-04-27

#	Searches	Results	Annotations
1	exp aged/	2800655	#1 to #8: Aspect Aged
2	Geriatrics/	28648	
3	(old*3 adj2 (adult*2 or people or person* or patient* or age*2 or man or men or wom#n or client* or residen*)).ti,ab,kf.	551680	
4	(elder* or geriat* or geronto* or frail* or senior? or agedly).ti,ab,kf.	314577	
5	(high*3 age*2 or late* life* or late* live*).ti,ab,kf.	21918	

6	((liv* or life*) adj2 long*3 adj2 (adult* or people or person* or patient* or man or men or wom?n or client* or residen*)).ti,ab,kf.	2540	
7	advanced in years.ti,ab,kf. or betagt*.ot.	162	
8	or/1-7	3248520	
9	comorbidity/	92917	#9 to #21: Aspect Multi-morbidity
10	Multiple Chronic Conditions/	178	
11	exp chronic disease/ and (multi or multiple or concurren* or complex*).ti,ab,kf.	20443	
12	(comorbid* or co-morbid*).ti,ab,kf,ot. or (komorbid* or ko-morbid*).ot.	140228	
13	(multimorbid* or multi*-morbid*).ti,ab,kf,ot.	4057	
14	(polymorbid* or poly morbid*).ti,ab,kf,ot.	292	
15	multidisease*.ti,ab,kf.	39	
16	((multi or multiple) adj2 (ill or illness* or condition* or disorder* or syndrom* or disease*)).ti,ab,kf.	30204	

17	(complex* adj2 (patient* or disease* or ill or illness* or condition* or disorder*)).ti,ab,kf.	42426	
18	(concurren* adj2 (disease* or ill or illness* or condition* or disorder*)).ti,ab,kf.	4305	
19	(multimedicat* or multi*-medicat* or polymedicat* or poly-medicat* or polypharmac* or poly-pharmac*).ti,ab,kf.	8133	
20	Polypharmacy/	3790	
21	or/9-20	297020	
22	8 and 21	110795	Aged AND Multi-morbidity
23	exp patient centered care/	16400	#23 to #49: Aspect patient-centered care
24	exp patient satisfaction/	78556	
25	decision making/	83248	
26	choice behaviour/	28960	
27	Health Priorities/	10119	
28	((patient? or client? or person*2) adj2 prefer*).ti,ab,kf.	18606	

29	((patient? or client? or person*2) adj2 priorit*).ti,ab,kf.	2490	
30	(treatment adj2 (goal? or preference? or priorit*)).ti,ab,kf.	11750	
31	goal attainment.ti,ab,kf.	1550	
32	(goal oriented* or goaloriented*).ti,ab,kf.	1425	
33	goals/	14804	
34	(patient cent* adj2 (care or approach* or therap* or treatment or medic*)).ti,ab,kf.	9128	
35	(person cent* adj2 (care or approach* or therap* or treatment or medic*)).ti,ab,kf.	2349	
36	(client cent* adj2 (care or approach* or therap* or treatment or medic*)).ti,ab,kf.	556	
37	(patient oriented adj2 (care or approach* or therap* or treatment or medic*)).ti,ab,kf.	375	
38	(person oriented adj2 (care or approach* or therap* or treatment or medic*)).ti,ab,kf.	114	

39	(client oriented adj2 (care or approach* or therap* or treatment or medic*)).ti,ab,kf.	19	
40	(patient cent?redness or client cent?redness or person cent?redness).ti,ab,kf.	1408	
41	(patientcent* or clientcent* or personcent*).ti,ab,kf.	24	
42	(patientoriented* or clientoriented* or personoriented*).ti,ab,kf.	4	
43	(patient*orientier* or klient*orientier* or patient*zentrier* or klient*zentrier* or person*orientier* or person*zentrier*).ot.	179	
44	((patient* or klient* or person*) adj (zentrier* or orientier*)).ot.	24	
45	((goal* or priorit* or target* or value* or preference*) adj2 (patient* or individual* or person* or client*)).ti,ab,kf.	63093	
46	((goal* or priorit* or target* or preference*) adj2 treatment*).ti,ab,kf.	32182	
47	((patient* or client* or person*) adj2 choice*).ti,ab,kf.	9970	

48	shared decision making.ti,ab,kf.	5495	
49	or/23-48	326625	
50	22 and 49	4208	Aged AND Multi-morbidity AND patient-centered care
51	protocol.ti.	35122	Textword protocol in title
52	21 and 49 and 51	89	Multi-morbidity AND patient-centered care AND protocol in title
53	50 or 52	4259	(Aged AND Multi-morbidity AND patient-centred care) OR (Multi-morbidity AND patient-centred care AND protocol in title)
54	exp animals/ not humans/	4450254	Exclusion of animals

55	53 not 54	4258	
56	case reports.pt.	1875801	Exclusion of editorials and case reports
57	(case? adj3 report).ti.	302363	
58	editorial.pt.	456208	
59	editorial.ti.	34313	
60	or/56-59	2443711	
61	55 not 60	4111	
62	remove duplicates from 61	4080	Exclusion of duplicates. **Final result**

/ = Medical Subject Heading (MeSH)

Exp = exploded Mesh term

* = truncation, any number of characters

*2, *3 = truncation: from 0 to 2, 0 to 3 characters

? = 0 or 1 character

= 1 character

.ti,ab,kf. = title, abstract, keyword heading word

.ti. = title

.ot. = original title

.mp. = title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier

.pt. = publication type

adj*n* = Search terms within *n* words in any order

BMJ Open

Health-Related Preferences of Older Patients with Multimorbidity: the protocol for an Evidence Map.

Journal:	*BMJ Open*
Manuscript ID	bmjopen-2019-029724.R1
Article Type:	Protocol
Date Submitted by the Author:	21-Jun-2019
Complete List of Authors:	GONZALEZ, ANA; Johann Wolfgang Goethe University, Institute of General Practice; Red de Investigación en Servicios de Salud en Enfermedades Crónicas (REDISSEC) Schmucker, Christine; Medical Center, Faculty of Medicine, University of Freiburg, Institute for Evidence in Medicine (for Cochrane Germany Foundation) Blom, Jeanet; Leiden University Medical Center, Department of Public Health and Primary Care van den Akker, Marjan; Johann Wolfgang Goethe University, Institute of General Practice Nguyen, Truc; Johann Wolfgang Goethe University, Institute of General Practice Nothacker, Julia; Medical Center, Faculty of Medicine, University of Freiburg, Institute for Evidence in Medicine (for Cochrane Germany Foundation) Meerpohl, Joerg; Medical Center, Faculty of Medicine, University of Freiburg Röttger, Kristian; Federal Joint Committee "Gemeinsamer Bundesausschuss", Patient representative Wegwarth, Odette; Max Planck Institute for Human Development, Center for Adaptive Rationality Hoffmann, Tammy; Bond University, Centre for Research in Evidence-Based Practice (CREBP), Faculty of Health Sciences and Medicine Straus, Sharon; University of Toronto, Department of Medicine Gerlach, Ferdinand; Johann Wolfgang Goethe University, Institute of General Practice Muth, Christiane; Johann Wolfgang Goethe University, Institute of General Practice
Primary Subject Heading:	Patient-centred medicine
Secondary Subject Heading:	Evidence based practice, General practice / Family practice, Geriatric medicine, Research methods
Keywords:	Multimorbidity, Patient preference, Aged

TITLE

Health-Related Preferences of Older Patients with Multimorbidity: The protocol for an Evidence Map.

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ABSTRACT

Introduction:

Interaction of conditions and treatments, complicated care needs and substantial treatment burden make patient-physician encounters involving multimorbid older patients highly complex. To optimally integrate patients' preferences, define and prioritise realistic treatment goals and individualise care, a patient-centred approach is recommended. However, the preferences of older patients, who are especially vulnerable and frequently multimorbid, have not been systematically investigated with regard to their health status. The purpose of this evidence map is to explore current research addressing health-related preferences of older patients with multimorbidity, and to identify knowledge clusters and research gaps.

Methods and analysis:

To identify relevant research, we will conduct searches in the electronic databases MEDLINE, EMBASE, PsycINFO, PSYNDEX, CINAHL, Social Science Citation Index, Social Science Citation Index Expanded and the Cochrane library from their inception. We will check reference lists of relevant articles and carry out cited reference research (forward citation tracking). Two independent reviewers will screen titles and abstracts, check full texts for eligibility and extract the data. Any disagreement will be resolved and consensus reached with the help of a third reviewer. We will include both qualitative and quantitative studies, and address preferences from the patients' perspectives in a multimorbid population over the age of 60 years. There will be no restrictions on the publication language. Data extraction tables will present study and patient characteristics, aim of study, and methods used to identify preferences and outcomes (i.e., type of preferences). We will summarise the data using tables and figures (i.e. bubble-plot) to present the research landscape and to describe clusters and gaps.

Ethics and dissemination:

Due to the nature of the proposed evidence map, ethics approval will not be required. Results from our research will be disseminated by means of specifically prepared materials for patients, at relevant (inter-)national conferences and via publication in peer-reviewed journals.

Registration:

Open Science Framework (OSF): DOI 10.17605/OSF.IO/MCRWQ.

Strengths and limitations of this study:

Strengths of the study include, first, the considerable expertise, methodological experience and skills that result from having a multinational and multidisciplinary study team that also includes a patient's representative.

Second, the search will also be broad-based, use a sensitive rather than a specific strategy, and cover a wide range of databases, terms and search strategies (e.g. forward citation tracking).

Third, selection criteria will be broad (i.e. both qualitative and quantitative studies will be considered) and no restrictions will be placed on setting or language of publication.

The main study limitation is poor indexing of articles and the lack of, or non-standardized definition of, 'patient preferences' (e.g., expressed as satisfaction, experience or perspectives).

The planned evidence map is expected to help researchers identify clusters and gaps in evidence on preferences of older patients with multimorbidity.

INTRODUCTION

Multimorbidity is defined as the co-occurrence of two or more or acute diseases and medical conditions in one person (1). The prevalence of multimorbidity increases significantly with age, rising from about 50% at the age of 60 years to more than 80% at the age of 80, although estimates vary widely depending on the employed definition of multimorbidity (2–7). Interaction of conditions and treatments, complicated care needs and substantial treatment burden make patient-physician encounters involving multimorbid older patients highly complex, and the clinical management of these patients extremely challenging (8–10).

Although interventions to improve relevant outcomes in older patients with multimorbidity still lack high-quality evidence (11,12), existing principles (13), clinical practice guidelines (14), recommendations for research (9) and care models (15) all recommend a patient-centred approach that takes patient preferences into consideration. Multimorbidity can be associated with overwhelming management burden, which makes it necessary for physicians and patients to prioritise treatment plans by considering both the reduction of symptoms and the patients' quality of life (16,17). As every treatment option consists of a specific combination of benefits, harms and burden, it is important that physicians understand the need to take older patients' preferences and priorities into account in the decision-making process. Tailoring treatments to each individual older patient's needs and preferences is likely to improve adherence to self-management interventions and medication (18).

The GRADE working group define preferences as choices that patients make when "considering the potential benefits, harms, costs, limitations, and inconveniences of the management options in relation to one another" (19). Overall, preferences include patients' beliefs, expectations, desires, perspectives and goals (19). Certain preferences, such as the avoidance of pain, are stable and well articulated by patients,. However, most preferences relating to the medical decision-making process have to be broken down into their individual components, as the patient is often not familiar with them. For example, the potential benefits and harms of a new drug treatment have to be taken into

consideration and weighed against each other and across diseases, especially in in older patients with multimorbidity. The elucidation and construction of preferences is a complex process that several disciplines have investigated from different perspectives (20–23).

Healthcare decision-making in multimorbidity requires that health problems are prioritised in terms of desired *vs*. undesired outcomes - a situation that patients often have no experience with (24). Clinical decision elements may be unfamiliar to them, and the available choices may present a conflict in that one goal can only be achieved by forgoing another (21). Moreover, multimorbidity is often characterised by a state of shifting priorities in self-management that can change from day to day (25). Hence, most healthcare-related preferences must be constructed during a process of elicitation that is part of the decision-making process (21).

Although several tools have been developed to assess multimorbid patients' preferences (e.g. for different treatment options or outcomes) in terms of the prioritisation of their health-related goals (26), no structured attempt has yet been made to summarise the current state of research on healthcare-related preferences in this patient population. However, the broad nature of this topic requires that existing evidence is mapped out, i.e. a systematic search of existing knowledge in the field should be conducted to identify gaps and/or future research needs (27).

In this article, we report the protocol of an evidence map to: (i) systematically identify and describe key characteristics of research on health-related preferences of older patients with multimorbidity; (ii) display the existing research landscape in visual formats; (iii) identify evidence clusters to guide subsequent knowledge synthesis (systematic reviews and meta-analysis); and, (iv) identify evidence gaps to inform patients, clinicians, researchers, policy-makers and funding agencies, and to help identify future research priorities. This work will provide us with a thorough overview of research on the health-related preferences of older patients with multimorbidity.

METHODS AND ANALYSIS

Evidence mapping is an innovative method of synthesising evidence that is particularly useful when the research question is too broad to permit a "traditional" systematic review to be performed. Evidence maps have recently been recommended by the Agency for Healthcare Research and Quality (AHRQ)'s Evidence-based Practice Center program (28) as a first step towards systematically mapping existing research (clusters and gaps in evidence) that can help answer broad-based questions. They usually use visual formats (e.g. bubble plots) to analyse and present results (29).

The aim of evidence maps is (27) to "collate, describe, and catalogue" knowledge of a broad subject area (30). Evidence maps are particularly effective when research questions are wide-ranging because they explore rather than summarise evidence. Consequently, evidence maps do not include meta-analysis or compare the strength of evidence between studies but chart concepts, themes and the amount and type of evidence available.

The present protocol will follow, where applicable, the 'PRISMA Extension for Scoping Reviews` (PRISMA-ScR) checklist (31) (see Additional file 1).

[About here: link to Additional file 1. Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist]

Following the framework originally establish by Arksey and O`Malley (32), refined by Levac et al (33) and further developed by the Joanna Briggs Institute (34), six steps will be used to create the evidence map: 1) Identifying a broad clinical question; 2) Identifying relevant studies; 3) Study selection; 4) Charting the data; 5) Reporting the results; 6) Consultation.

Step 1. Identifying a broad clinical question

A pilot test of an evidence map for our research question (published elsewhere) was performed as part of a collaboration between the Institute of General Practice at Johann Wolfgang Goethe University (Frankfurt) and the Institute for Evidence in Medicine (for Cochrane Germany Foundation), Freiburg. It showed the feasibility of the mapping approach and areas for improvement, thus helping to refine the research question and the methods to be used.

We established a multidisciplinary research team of 11 experts – some of whom had more than one area of expertise - from 5 countries (Australia, Canada, Germany, Spain, The Netherlands). In addition to a patient representative (1), the professionals represented primary care (2), internal medicine (1), geriatrics (1), cognitive psychology (1), public health and health services research (2), methodology (3), shared decision-making (1), epidemiology (1), and knowledge translation (1). At the project kick-off meeting in April 2018, all members of the multidisciplinary research team contributed to the definition of the scope of the evidence map. Based on the results of previous exploratory research, we defined the following question to be addressed by our evidence map: What specific health-related preferences of older patients with multimorbidity are described in the available literature?

Step 2. Identifying relevant studies

In order to identify relevant published studies, we will conduct a literature search in the following electronic databases: MEDLINE (1946 to 2018) via Wolters Kluwer's search interface Ovid (indexed and non-indexed databases), CINAHL (1981 to 2018), PsycINFO (1800s to 2018) and PSYNDEX via EBSCOhost, Science Citation Index Expanded (1945 to 2018), and Social Science Citation index (1956 to 2018) via Clarivate Analytics' Web of Science, and EMBASE (1988 to 2018) via Ovid, and Cochrane Database (CENTRAL, TRIALS). We will check the reference lists of included articles (backward citation tracking) and carry out forward citation tracking using the Web of Science Core Collection and Google Scholar. Additionally, we will search for related articles in Pubmed. Authors of conference proceedings that have not published a full set of results will be contacted. Secondary research (i.e., systematic reviews, synthesis of qualitative studies, scoping reviews) studies on related topics will be reviewed and references will be checked for possible inclusion in the evidence map. We will also search for ongoing trials in clinicaltrials.gov and the WHO register.

We followed the recommendations of PRESS Peer Review of Electronic Search Strategies and developed the final search strategy in collaboration with an expert medical sciences librarian (35).

The full electronic search strategy for the MEDLINE database is provided in Additional file 2.

[About here: link to Additional file 2. Search strategy used for MEDLINE database]

Based on the results of pilot testing, we agreed with all collaborative partners upon the following eligibility criteria for the evidence map during the kick-off meeting in April 2018 (see Table 1):

[About here: Table 1. Inclusion & exclusion criteria]

Participants/population

Older patients (mean and/or median age ≥ 60 years) with multimorbidity (two or more simultaneous acute or chronic conditions (1)) of any type will be considered.

Outcomes

Our phenomena of interest (outcomes) will be (i) preferences related to the organisation of healthcare; (ii) preferences for specific information, communication, or involvement in a shared decision-making process; (iii) preferences relating to desired, undesired and competing outcomes (in terms of safety and effectiveness); (iv) prioritisation of health problems or conditions; (v) screening or diagnostic procedure preferences; and (vi) treatment preferences. The classification of the outcomes will be discussed and consecutively adapted, depending on the literature findings. This classification will further allow content analysis and the establishment of research clusters and gaps.

Study setting

We will not apply any restriction to the geographical location of the study or the language of publication, and we will include studies conducted in any setting, i.e. any health care context in any country (including low and middle-income countries).

Study design

We will include qualitative and quantitative studies that address the phenomena of interest defined above from the patients' perspectives.

We will exclude case reports, narrative reviews and editorials. We will leave out studies investigating preferences for or against interventions of limited availability or whose legal status is unclear (e.g.

euthanasia, which is neither legal nor available in most Western countries). Studies addressing only the preferences of caregivers, family, or medical and/or other professionals, will not be considered.

Step 3. Study selection

Bibliographic details of all identified references will first be uploaded to Endnote© and then converted into COVIDENCE©, which will automatically detect duplicate documents. Two reviewers (AIG, JN or KW) will independently screen titles and abstracts and will independently check full texts of the included articles for eligibility. Any disagreement will be resolved and consensus reached with the help of a third reviewer (CS). Before screening, a stepwise calibration exercise will be performed on a sample of 50 studies, with the aim of achieving 80% agreement between the two reviewers. In case 80% agreement is not reached, our inclusion and exclusion criteria will be refined to reach this cut-off (e.g. defined more stringently). Refined criteria will be calibrated on a new sample of 50 studies and repeated until this threshold is reached. We will report any changes to the inclusion and exclusion criteria that result from the calibration exercise as deviations from the published protocol.

Step 4. Charting the data

Data extraction tables will be created using Excel and will include, when available: study characteristics such as research type (study design / methodology) and setting (health care context, country of origin, study period); patient characteristics (sample size, age, sex, definition of multimorbidity); aim of study; characteristics of the preferences, such as methods used to elucidate patients' preferences, framing and definition of preferences (e.g., treatment preferences, diagnostic preferences, desired, undesired and competing outcome preferences - as guided by the above description of the phenomena of interest) and results (see Table 2).

[About here: Table 2. Data extraction framework]

Following a calibration exercise on five full texts, two reviewers (AIG, JN or CS) will independently extract the data. To check the adequacy of the extracted information, the data extraction file will be shared with other authors (CM, JB, MvA, TH and SS), and changes performed where necessary.

Step 5. Reporting the results

We will summarise the data using tables and figures (i.e. bubble plot) to present the evidence landscape and to elucidate clusters and gaps. For each year, we will identify the number of primary and secondary research studies, as well as conferences and doctoral theses, which describe patients' preferences. We will describe the identified studies in terms of characteristics such as location, setting and study design (i.e. observational - qualitative, quantitative or mixed-methods – or interventional studies), sub-population according to age or multimorbidity pattern / severity if possible, and study objectives aggregated according to research topic (i.e. type of preference) (Table 2).

Clustering of research topics will be performed by applying content analysis (36,37) to summarise the types of preference described in the study. Based on coding by two independent reviewers (AIG, JN or CS), overarching themes will be identified and aggregated. For this purpose, the results will be entered into the data extraction file, which will then be reviewed by the other researchers (CM, JB, MvA, TH and SS). Categories for the analysis of the obtained data will be modified accordingly, along with the development of the evidence map, and agreed upon after consultation with the research team.

Step 6. Consultation

The development of the evidence map will follow an iterative process and all members of the research team will be consulted during all steps of the project, including the identification of relevant literature, study selection and data extraction. In November 2018, we held a workshop to present the results of the preliminary search strategy and exploratory investigation, and to obtain feedback before conducting further searches and other activities. We discussed interim results, refined the methodology and agreed on the best formats for reporting our findings. Cluster definitions of the identified research topics were discussed and agreed upon by all authors. All necessary changes were established before continuing with the development of the evidence map.

The present study started on February 1st 2018 and is scheduled to end on October 31st 2019.

Patient and public involvement

A patient representative (KR) from the Federal Joint Committee "Gemeinsamer Bundesausschuss (G-BA)" will actively participate in all six steps required to create the evidence map. As a result of his work on the G-BA board of patients' representatives, KR has considerable expertise in evidence-based medicine in a health care context, and an understanding of the pivotal role of patients' preferences in the provision of effective health care. The G-BA constitutes the highest decision-making body for the joint self-administration of stakeholders in the German health service, and the statutory health insurance service catalogue for over 70 million insured individuals is based on its guidelines."

ETHICS AND DISSEMINATION

Due to the nature of the proposed evidence map, ethics approval will not be required. We will prepare presentations to disseminate the study findings to healthcare providers and patients, and at relevant national and international conferences, and we aim to publish the results of the study in peer-reviewed journals. We will provide recommendations for primary research that are based on the identified knowledge gaps, and recommendations for secondary research that are based on knowledge clusters.

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AUTHORS' CONTRIBUTIONS

AIG wrote the initial draft of the protocol. CM is the guarantor of the review. CS and JM provided methodological guidance and revisions of the manuscript. CS and JN assisted in the identification of databases and reviewed the search strategy. JB, MvA, TN, JN, OW, KR, TH, FG and SS are co-supervisors of this project, provided advice at all stages of the development of the protocol, and contributed to the revision of the manuscript. All authors read and approved the final manuscript.

FUNDING STATEMENT

This work was supported by the German Federal Ministry of Education and Research, grant number 01GL1729. The funder had no role in developing the protocol for this review.

COMPETING INTERESTS STATEMENT

None declared

WORD COUNT

2,209 words

406 **Table 1. Inclusion & exclusion criteria**

Inclusion criteria	Exclusion criteria
⇒ Qualitative and quantitative studies addressing health-related preferences (priorities, goal-oriented, goal attainment, shared decision-making, patient-centred, patient-oriented, "satisfaction") from the patient's perspective ⇒ Age: average age of 60 or older, geriatric patients, elderly patients ⇒ Polypharmacy: with or without polypharmacy ⇒ Multimorbidity: Comorbidity, multiple chronic conditions ⇒ No restrictions: We will not apply any restrictions to the geographical location, health care context, country, and publication language of the study	⇒ Case reports, ⇒ Narrative reviews ⇒ Editorials ⇒ Studies investigating preferences for or against interventions that are not generally available or only legal in limited contexts (e.g. euthanasia) ⇒ Studies addressing only preferences of caregivers and healthcare professionals

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409 **Table 2. Data extraction framework**

Bibliometrics	**Description**	**Coding**
First Author, year of publication		
Study characteristics	Publication type	Research article, conference, thesis, study protocol
	Study type	Primary or secondary research
	Language	e.g. English
	Geographical location	Country, region, city
	Study setting	Hospital, general practice, nursing home, other
	Study method	Observational (i.e. qualitative, quantitative, mixed methods) or interventional study
Patient characteristics	Definition of multimorbidity	(authors' description)
	Number of patients	Study sample
	Age	(years)
	Sex	(% females)
Methods of data collection	Type of data collection	Interview, semi-structured interview, survey, focus group, questionnaire (authors' description)
	Method of eliciting patients' preferences (PtP)	Tool definition (authors' description)
Outcome	Definition of (PtP) and priorities	(authors' definition)

	Type of PtP assessed	(reviewers' definition)
Study aim		(authors' description)
Results / Conclusions		(authors' description)

PtP: patients' preferences

Additional file 1.

Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	Page 1, line 2
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	Page 4, lines 65-90
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	Pages 7-8, lines 108-155
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	Page 8, lines 149-155
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	Page 5, line 92
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	Pages 11, lines 211-233
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	Page 10, lines 193-206
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	Page 11, line 207; additional file 2

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	Pages 12, lines 235-244
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	Page 12, lines 246-256
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	Page 12, lines 246-252; table 2
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	Click here to enter text.
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	Page 13, lines 258-272
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	Click here to enter text.
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	Click here to enter text.
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	Click here to enter text.
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	Click here to enter text.
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	Click here to enter text.
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review	Click here to enter text.

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
		questions and objectives, and consider the relevance to key groups.	
Limitations	20	Discuss the limitations of the scoping review process.	Click here to enter text.
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	Click here to enter text.
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	Page 18, lines 400-401

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.
* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.
† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).
‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.
§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

From: Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. Ann Intern Med. ;169:467–473. doi: 10.7326/M18-0850

Additional file 2. Search strategy used for MEDLINE database (search interface: Ovid; Host: Wolters Kluwer)

MEDLINE 1946 to the third week of April, 2018,

MEDLINE Daily Update April 26, 2018,

MEDLINE In-Process & Other Non-Indexed Citations April 26, 2018,

MEDLINE Epub Ahead of Print April 26, 2018

Search date (yyyy-mm-dd): 2018-04-27

#	Searches	Results	Annotations
1	exp aged/	2800655	#1 to #8: Aspect Aged
2	Geriatrics/	28648	
3	(old*3 adj2 (adult*2 or people or person* or patient* or age*2 or man or men or wom#n or client* or residen*)).ti,ab,kf.	551680	
4	(elder* or geriat* or geronto* or frail* or senior? or agedly).ti,ab,kf.	314577	
5	(high*3 age*2 or late* life* or late* live*).ti,ab,kf.	21918	

6	((liv* or life*) adj2 long*3 adj2 (adult* or people or person* or patient* or man or men or wom?n or client* or residen*)).ti,ab,kf.	2540	
7	advanced in years.ti,ab,kf. or betagt*.ot.	162	
8	or/1-7	3248520	
9	comorbidity/	92917	#9 to #21: Aspect Multi-morbidity
10	Multiple Chronic Conditions/	178	
11	exp chronic disease/ and (multi or multiple or concurren* or complex*).ti,ab,kf.	20443	
12	(comorbid* or co-morbid*).ti,ab,kf,ot. or (komorbid* or ko-morbid*).ot.	140228	
13	(multimorbid* or multi*-morbid*).ti,ab,kf,ot.	4057	
14	(polymorbid* or poly morbid*).ti,ab,kf,ot.	292	
15	multidisease*.ti,ab,kf.	39	
16	((multi or multiple) adj2 (ill or illness* or condition* or disorder* or syndrom* or disease*)).ti,ab,kf.	30204	

17	(complex* adj2 (patient* or disease* or ill or illness* or condition* or disorder*)).ti,ab,kf.	42426	
18	(concurren* adj2 (disease* or ill or illness* or condition* or disorder*)).ti,ab,kf.	4305	
19	(multimedicat* or multi*-medicat* or polymedicat* or poly-medicat* or polypharmac* or poly-pharmac*).ti,ab,kf.	8133	
20	Polypharmacy/	3790	
21	or/9-20	297020	
22	8 and 21	110795	Aged AND Multi-morbidity
23	exp patient centered care/	16400	#23 to #49: Aspect patient-centered care
24	exp patient satisfaction/	78556	
25	decision making/	83248	
26	choice behaviour/	28960	
27	Health Priorities/	10119	
28	((patient? or client? or person*2) adj2 prefer*).ti,ab,kf.	18606	

29	((patient? or client? or person*2) adj2 priorit*).ti,ab,kf.	2490	
30	(treatment adj2 (goal? or preference? or priorit*)).ti,ab,kf.	11750	
31	goal attainment.ti,ab,kf.	1550	
32	(goal oriented* or goaloriented*).ti,ab,kf.	1425	
33	goals/	14804	
34	(patient cent* adj2 (care or approach* or therap* or treatment or medic*)).ti,ab,kf.	9128	
35	(person cent* adj2 (care or approach* or therap* or treatment or medic*)).ti,ab,kf.	2349	
36	(client cent* adj2 (care or approach* or therap* or treatment or medic*)).ti,ab,kf.	556	
37	(patient oriented adj2 (care or approach* or therap* or treatment or medic*)).ti,ab,kf.	375	
38	(person oriented adj2 (care or approach* or therap* or treatment or medic*)).ti,ab,kf.	114	

39	(client oriented adj2 (care or approach* or therap* or treatment or medic*)).ti,ab,kf.	19	
40	(patient cent?redness or client cent?redness or person cent?redness).ti,ab,kf.	1408	
41	(patientcent* or clientcent* or personcent*).ti,ab,kf.	24	
42	(patientoriented* or clientoriented* or personoriented*).ti,ab,kf.	4	
43	(patient*orientier* or klient*orientier* or patient*zentrier* or klient*zentrier* or person*orientier* or person*zentrier*).ot.	179	
44	((patient* or klient* or person*) adj (zentrier* or orientier*)).ot.	24	
45	((goal* or priorit* or target* or value* or preference*) adj2 (patient* or individual* or person* or client*)).ti,ab,kf.	63093	
46	((goal* or priorit* or target* or preference*) adj2 treatment*).ti,ab,kf.	32182	
47	((patient* or client* or person*) adj2 choice*).ti,ab,kf.	9970	

48	shared decision making.ti,ab,kf.	5495	
49	or/23-48	326625	
50	22 and 49	4208	Aged AND Multi-morbidity AND patient-centered care
51	protocol.ti.	35122	Textword protocol in title
52	21 and 49 and 51	89	Multi-morbidity AND patient-centered care AND protocol in title
53	50 or 52	4259	(Aged AND Multi-morbidity AND patient-centred care) OR (Multi-morbidity AND patient-centred care AND protocol in title)
54	exp animals/ not humans/	4450254	Exclusion of animals

55	53 not 54	4258	
56	case reports.pt.	1875801	Exclusion of editorials and case reports
57	(case? adj3 report).ti.	302363	
58	editorial.pt.	456208	
59	editorial.ti.	34313	
60	or/56-59	2443711	
61	55 not 60	4111	
62	remove duplicates from 61	4080	Exclusion of duplicates. **Final result**

/ = Medical Subject Heading (MeSH)

Exp = exploded Mesh term

* = truncation, any number of characters

*2, *3 = truncation: from 0 to 2, 0 to 3 characters

? = 0 or 1 character

= 1 character

.ti,ab,kf. = title, abstract, keyword heading word

.ti. = title

.ot. = original title

.mp. = title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier

.pt. = publication type

adj*n* = Search terms within *n* words in any order