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BMJ Open

Health-related preferences of older patients with multimorbidity: an evidence map.

Journal:	<i>BMJ Open</i>
Manuscript ID	bmjopen-2019-034485
Article Type:	Original research
Date Submitted by the Author:	22-Sep-2019
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Keywords:	GENERAL MEDICINE (see Internal Medicine), GERIATRIC MEDICINE, INTERNAL MEDICINE

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3 1 **TITLE**
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5 2 Health-related preferences of older patients with multimorbidity: an evidence map.
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78 *both authors contributed equally

79 **both authors contributed equally

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3 81 **ABSTRACT**
4

5 82 **Objectives:** To systematically identify knowledge clusters and research gaps in the health-
6
7 83 related preferences of older patients with multimorbidity by mapping current evidence.
8

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10 84 **Design:** Evidence map.
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12 85 **Data sources:** MEDLINE, EMBASE, PsycINFO, PSYINDEX, CINAHL and Science Citation
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14 86 Index/Social Science Citation Index/-Expanded from inception to April 2018.
15

16 87 **Study selection:** Studies reporting primary research on health-related preferences of older
17
18 88 patients (mean age ≥ 60 years) with multimorbidity (≥ 2 chronic/acute conditions).
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20
21 89 **Data extraction:** Two independent reviewers assessed studies for eligibility, extracted data
22
23 90 and clustered the studies using MAXQDA-18[®] content analysis software.
24

25 91 **Results:** We included 152 studies (79% studies from US/UK/CAN/AUS&NZ) (57,093 patients).
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27 92 All used an observational design except for one interventional study: 63 (41%) were qualitative
28

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30 93 (59, cross-sectional, 4 longitudinal), 85 (57%) quantitative (63 cross-sectional, 22 longitudinal),
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32 94 and 3 (2%) used mixed methods. The setting was specialised care in 85 (56%) and primary care
33

34 95 in 54 (36%) studies. We identified seven clusters of studies on preferences: end-of-life care
35

36 96 (n=51, 34%), self-management (n=34, 22%), treatment (n=32, 21%), involvement in shared
37

38 97 decision making (n=25, 17%), health outcome prioritisation/goal setting (n=19, 13%),
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40 98 healthcare service (n=12, 8%) and screening/diagnostic testing (n= 1, 1%). Terminology (e.g.
41

42 99 preferences, views, perspectives), and concepts (e.g. trade-offs, decision regret, goal setting)
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44 100 used to describe health-related preferences varied substantially between studies.
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46
47 101 **Conclusion:** Our study provided the first evidence map on the preferences of older patients
48

49 102 with multimorbidity. Included studies were mostly conducted in developed countries and
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51 103 covered a broad range of issues. Evidence on patient preferences concerning decision-making
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53 104 on screening and diagnostic testing was scarce. Differences in employed terminology, decision-
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55 105 making components and concepts, as well as the sparsity of intervention studies, are
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106 challenges for future research into evidence-based decision support seeking to elicit the
107 preferences of older patients with multimorbidity and help them construct preferences.
108 **Registration:**
109 Open Science Framework (OSF): DOI 10.17605/OSF.IO/MCRWQ.

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3 110 **Strengths and limitations of this study**
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- 6 111 • This evidence map presents a systematic overview of studies addressing a variety of
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8 112 health-related preferences in older patients with multimorbidity.
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12 113 • We identified clusters of studies on, for example, health outcome prioritisation and end-
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14 114 of-life care preferences; few studies addressed preference-sensitive decisions on screening
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16 115 and diagnostic testing.
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20 116 • The terminology and concepts used to address health-related preferences varied
21
22 117 considerably in the included studies, highlighting a need for more standardisation to
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24 118 improve further research.
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119 INTRODUCTION

120 Multimorbidity, defined as the co-occurrence of medical conditions in a person (1), is a
121 growing public health concern that affects approximately two-thirds of people over the age of
122 60 years (2,3). Patients with multimorbidity generally experience a higher burden of disease,
123 physical disabilities, adverse drug reactions, more frequent hospital admissions, reduced
124 quality of life, and increased mortality compared to those with a single condition (4,5). As
125 patients face new and growing demands to organise and coordinate their own care to comply
126 with treatment regimens, multiple chronic conditions are often associated with high treatment
127 burden in addition to the burden of the diseases themselves. (6). If patients are overwhelmed
128 by the burden, they limit their compliance to their preferred tasks (7). Moreover, the care of
129 patients with multimorbidity is challenging, as treatments for one condition may adversely
130 affect another (8). Robust evidence supporting decision-making in these patients is scarce (2),
131 and the use of multiple disease-based guidelines is inappropriate, as they do not adequately
132 consider potentially interacting conditions and treatments (9,10).

133 The delivery of health care in patients with multimorbidity requires a patient-centred
134 approach, that is *“respectful of and responsive to individual patient preferences, needs, and
135 values, and ensuring that patient values guide all clinical decisions”* (11). The *“Ariadne
136 principles”* (12) stress the importance of physicians and patients sharing realistic treatment
137 goals, and of individualising management and follow-up by taking patients’ preferences into
138 consideration when making clinical decisions. Recent clinical guidelines on multimorbidity have
139 embraced this approach and emphasise the incorporation of patients’ preferences in clinical
140 decision-making, for example in the selection of appropriate self-management activities and
141 treatment options, as well as in the prioritisation of health outcomes (13). Similarly, the
142 consideration of patients' views in the form of patient-reported experiences and care
143 outcomes have been recognised as critical to the achievement of high-performing health
144 systems that are responsive to the needs of people with multimorbidity (14).

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3 145 It remains unclear how health-related preferences can be elicited from older patients with
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5 146 multimorbidity, as patients may be unfamiliar with the decision elements (15). Moreover,
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7 147 concerns have been raised that patients are often provided with too little information about
8
9 148 the benefits and harms of a treatment (16,17), may find it difficult to prioritise health
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11 149 outcomes and make trade-offs, and in consequence, may refrain from participating in the
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13 150 decision making process (18). As evidence maps allow a systematic approach to be used to
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15 151 collate evidence on a broad topic, we used this emerging method to map the health-related
16
17 152 preferences of older patients with multimorbidity (19). In particular, we aimed to (i)
18
19 153 systematically identify and describe key characteristics of research on health-related
20
21 154 preferences of older patients with multimorbidity, (ii) display the landscape of existing
22
23 155 research in visual formats, (iii) identify evidence clusters to guide any subsequent knowledge
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25 156 synthesis (systematic reviews and meta-analysis), and (iv) identify evidence gaps and
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27 157 encourage relevant stakeholders and funding agencies to prioritise these in future research.
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34 159 **METHODS**

35 160 **Reporting protocol and guideline**

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37 161 We have described the methods in a study protocol (20), registered the evidence map in Open
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39 162 Science Framework (OSF, DOI 10.17605/OSF.IO/MCRWQ) and adhered to the 'PRISMA
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41 163 Extension for Scoping Reviews (PRISMA-ScR) checklist (21) where possible (see Supplementary
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43 164 table 1). [About here: link to Supplementary table 1. Preferred Reporting Items for Systematic
44
45 165 reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist]
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51 167 **Systematic literature search**

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53 168 We searched the electronic databases MEDLINE and EMBASE (via Wolters Kluwer's search
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55 169 interface Ovid), PsycINFO, PSYINDEX and CINAHL (via EBSCOhost), and Social Science Citation
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57 170 Index and Science Citation Index Expanded (via Web of Science from Clarivate Analytics) from
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3 171 inception until April 2018. In our search, we combined medical subject headings (MeSH) with
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5 172 keywords covering old age, multimorbidity, polypharmacy and search terms related to patient
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7 173 preferences. The search strategy was adapted to suit the database under review (see
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9 174 Supplementary table 2 on Search strategy in MEDLINE - Ovid). [About here: link to
10
11 175 Supplementary table 2 on Search strategy in MEDLINE (Ovid)]
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14 176 Based on the 32 most relevant studies identified in our initial search (i.e., when keywords
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16 177 provided by the author contained the terms “multimorbidity” and “patient preferences” or
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18 178 “patient priorities” and/ or described a specific method for eliciting patients’ preferences, such
19
20 179 as “conjoint analysis”), we also checked the reference lists of included studies (backward
21
22 180 citation tracking) and conducted a cited reference search (forward citation tracking) using the
23
24 181 Web of Science Core Collection. We checked the reference lists of systematic reviews on
25
26 182 related topics for further studies (hand search) and contacted the authors of conference
27
28 183 proceedings that had not published a full set of results. We searched for ongoing trials in the
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30 184 Register for Clinical Trials (22) and the WHO International Clinical Trials Registry (23).
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186 **Inclusion and exclusion criteria**

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39 187 We included qualitative and quantitative studies involving older patients of 60 years and older
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41 188 with multimorbidity (two or more simultaneous chronic or acute conditions (1)) that
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43 189 addressed health-related patient preferences. We also included studies involving older
44
45 190 patients with chronic conditions that are frequently associated with multimorbidity, even if
46
47 191 they were not reported in detail (chronic heart failure (CHF), chronic obstructive pulmonary
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49 192 disease (COPD), chronic kidney disease (CKD), advanced cancer and frailty) (24–26).
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52 193 We excluded studies investigating preferences relating to interventions of limited availability
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54 194 or whose legal status was unclear (e.g. euthanasia, which is not legal or available in most
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56 195 countries), studies addressing the preferences of caregivers, family, or medical and/or other
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3 196 professionals as well as case reports, narrative reviews and editorials. We did not apply any
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5 197 restrictions to the geographical location of the study or language of publication.
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10 199 **Study selection**

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12 200 Two reviewers (AIG, JN) screened the titles and abstracts of all references identified by
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14 201 electronic searches following a calibration exercise. We obtained full texts of potentially
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16 202 relevant articles, and two reviewers (AIG, JN or CS) independently assessed these for inclusion.
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18 203 Conflicts were resolved by discussion among reviewers.
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23 205 **Mapping the evidence**

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25 206 *(i) Data extraction:* Following the calibration of five full text articles, two reviewers (AIG, JN or
26
27 207 CS) independently extracted data on (1) study characteristics including study design
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29 208 (observational [qualitative, quantitative or mixed-methods, cross-sectional or longitudinal] and
30
31 209 interventional), geographical area, study setting (e.g., primary care), sample size, (2) study aim,
32
33 210 (3) patient population (e.g., definition of multimorbidity, age, sex) and, (4) characteristics of
34
35 211 preferences, such as methods used to elucidate patients' preferences, and definition of
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37 212 preferences according to the authors.
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41 213 *(ii) Types of preference:* We conducted content synthesis analysis (27) to derive overarching
42
43 214 themes. The analysis was based on coding by two independent reviewers (AIG, JN or CS) using
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45 215 MAXQDA-18[®], which were further scrutinised by CM, JWB, MvdA, TSN and MSB (20). The
46
47 216 initial step was to scrutinise title and abstract (focusing on the study aim) of the included
48
49 217 studies to gain a general understanding of what the study was about. The full text was then
50
51 218 read and re-read and codes assigned (e.g. resuscitation preferences (28)), which were later
52
53 219 grouped according to overarching themes (e.g. life-sustaining treatment preferences (28))
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55 220 (27). Reviewers' categorisation of preference types was partly based on a previous
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57 221 classification (i.e. end-of-life preferences, prioritisation of health problems, prioritisation of
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3 222 medication, preferences regarding the role played in decision-making, preferences in surgical
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5 223 treatment methods, prioritisation of treatment goals, determinants of preference, changes in
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7 224 preferences and preferences concerning the organisation of health care) obtained from a pilot
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9 225 study (published elsewhere) of the evidence map.

11 226 *(iii) Mapping:* We tabulated the identified studies, summarised study and patient
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14 227 characteristics, as well as study publications per year, and used bubble plots to display
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16 228 evidence clusters in terms of preference type and study characteristics.

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20 230 **Patient and public involvement**

21 231 A patient representative (KR) from the Federal Joint Committee “Gemeinsamer
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23 232 Bundesausschuss (G-BA)” was involved in the conception and development of the evidence
24
25 233 map, in the interpretation of the findings, and in writing the manuscript. KR has considerable
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27 234 expertise in evidence-based medicine in a health care context, and an understanding of the
28
29 235 pivotal role of patients’ preferences in the provision of effective health care.

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33 237 **RESULTS**

34 238 **Literature search and selection process**

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36 239 Among the 9,145 unique screened references, 152 studies (including over 57,000 patients)
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38 240 were included in the evidence map. We contacted 48 authors of conference papers (13%
39
40 241 answered) and included one further study, which had already been identified in our electronic
41
42 242 search (Figure 1). Table 1 shows key characteristics of included studies. Supplementary table 3
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44 243 presents excluded studies and reasons for exclusion.

45
46 244 [About here Figure 1. Evidence map PRISMA flowchart]

47
48 245 [About here: Table 1. Key characteristics of the included studies]

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50 246 [About here: link to Supplementary table 3. Excluded studies and reasons for exclusion]

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248 **Key characteristics of the included studies and participants**

249 Of the included studies, nearly all were observational (151/152), conducted in developed
250 countries (147/152) (Table 2), published in 2007 or thereafter (128/152) (see Supplementary
251 Figure 1), and written in English.

252 The sample size ranged from 9 to 9,105 patients and captured both sexes (51% female). The
253 mean age of participants ranged from 60 to 85 years. Eight studies (29–36) included different
254 age groups but only data from patients aged 60 years and older were included in the evidence
255 map. Three studies (36–38) provided no age estimate but were included because they clarified
256 that they had only included older patients. In 87 of the included studies, patients with
257 multimorbidity (no index disease defined) or comorbidity (index disease defined plus at least
258 one other associated condition) were investigated, and in the remaining 65 studies, patients
259 with conditions known to be highly associated with multimorbidity were included.

260 [About here: link to Supplementary figure 1. Number of studies published per year]

261 [About here: Table 2. Descriptive summary of the included studies]

262

263 **Types of preference and evidence clusters**

264 Content analysis enabled us to identify seven major types of preference (Table 3). We assigned
265 130 studies (85 %) to one of these types of preference and 22 (15 %) studies (37,39–57) to two
266 types of preference. Terminology (e.g. preferences, views, perspectives), and concepts (e.g.
267 trade-offs, decision regret, goal setting) varied substantially among studies. [About here: Table
268 3. Description of the types of preference investigated in the included studies]

269

270 *End-of-life care preferences*

271 The largest evidence cluster comprised the 51 studies (34 %) addressing end-of-life care
272 preferences, most of which were in specialised care settings (41/51 studies) (Figure 2). Content
273 analysis of this preference revealed that advance care planning (51), in which chronic

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3 274 multimorbid patients with advanced diseases were asked how they would like to be cared for
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5 275 in the final months of their lives, was the main theme (Table 3). The most common theme
6
7 276 within this cluster concerned preferences for specific life-sustaining treatments (29/51)
8
9 277 (28,32–34,36,58–81), such as cardiopulmonary resuscitation or mechanical ventilation.
10
11 278 Additional topics in this cluster addressed themes such as the preferred place of death (e.g.
12
13 279 home versus hospice) (77).
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18 281 *Self-management preferences*

20 282 The second largest evidence cluster included 34 studies (22 %) and addressed patients' self-
21
22 283 management priorities, defined as activities that an individual undertakes to maintain or reduce
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24 284 the effect of a disease/s on their health status (82). Most studies about self-management
25
26 285 preferences were conducted in primary care (21/34). The only intervention study in the
27
28 286 evidence map (83) used a cluster-randomised design to evaluate whether structured priority-
29
30 287 setting consultations led to a sustainable reconciliation of diverging physician-patient views on
31
32 288 the importance of health problems. Overall, content analysis of this evidence cluster revealed
33
34 289 five key themes: (i) patients' prioritisation of their multiple health problems (20/34)
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36 290 (45,47,54,83–99), as an example of which patients were asked how they prioritised their
37
38 291 osteoarthritis over their other conditions (97), (ii) patients' preferences regarding self-
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40 292 management of their medications (8/34) (42,43,47,54,100–103) and, for instance, its
41
42 293 association with treatment adherence (42), (iii) patients' self-care behaviours (3/34) (44,55,104)
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44 294 aimed at accomplishing their life goals (44), (iv) characteristics of eHealth support tools (2/34)
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46 295 (30,105) to help patients self-manage their multiple health conditions (105) and (v) changes in
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48 296 patients' choices resulting from changing circumstances (2/34) (29,30).
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53 298 *Treatment preferences*

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3 299 Thirty-two studies (22 %) investigated a variety of treatment preferences concerning (i)
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5 300 medication (13/32) (37,41–43,47,49,53,54,106–109), perhaps for a specific blood pressure-
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7 301 lowering drug due to its characteristics (e.g. effects and dose schedule) (109), (ii) dialysis as a
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9 302 treatment option in end-stage renal disease (6/32) (48,110–114), (iii) surgery (4/32) (115–118),
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11 303 such as a decision in favour of implantable cardioverter-defibrillators or joint replacement, (iv)
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13 304 chemotherapy (5/32) (35,57,119–121), for which studies may have examined preferences in
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15 305 adjuvant cancer treatments and, (v) non-pharmacological / conservative interventions (3/32)
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17 306 (122–124), such as studies exploring preferences for activity interventions (122).
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308 *Involvement in the shared decision making process*

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25 309 Twenty-five (17 %) studies explored how patients preferred to be involved in the shared
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27 310 decision making process. Studies in this cluster investigated preferred (i) patterns of
28
29 311 engagement (21/25) (37,41,46,48–52,57,125–134), (ii) information (4/25) (39,52,129,135), (iii)
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31 312 communication with providers (1/25) (40) and, (iv) patient decision aids (1/25) (56).
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314 *Healthcare service preferences*

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39 315 Twelve studies (8 %) focused on preferences for certain healthcare services, and specifically (i)
40
41 316 preferred care processes (10/12) (45,136–144), such as continuity of care, accessibility and
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43 317 acceptance of the substitution of a physician by nurses and, (ii) service models (2/12) (31,145),
44
45 318 perhaps asking patients about their preferences regarding Chronic Care Model
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47 319 recommendations (31).
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321 *Health outcome prioritisation and goal setting*

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52
53 322 Nineteen studies (13 %) investigated health outcome prioritisation and goal setting. These may
54
55 323 have been (i) patients' holistic goals for their lives or with respect to their various diseases
56
57 324 (6/19) (44,55,146–149), (ii) health outcome prioritisation (10/19) (53,150–158) - one study in
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3 325 particular addressed the tools patients preferred to use to prioritise health outcomes (150)
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5 326 and (iii) collaborative goal setting among patients, physicians and caregivers (3/19)
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7 327 (104,159,160).
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11 329 *Screening and diagnostic tests*

12 330 One study (161) investigated cancer screening preferences among patients with
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14 331 multimorbidity.
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21 333 [About here: Figure 2 Types of preference investigated in the included studies by setting and
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23 334 study design]
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26 336 **DISCUSSION AND CONCLUSION**

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28 337 This work provides a systematic overview of research on health-related preferences of older
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30 338 patients with multimorbidity.
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34 340 **Evidence clusters**

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36 341 We identified 152 studies, most of which were published within the last decade and conducted
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38 342 in developed countries. The vast majority of studies included in the evidence map used a
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40 343 qualitative or cross-sectional quantitative design.
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43 344 Our clustering approach revealed that studies of patient preference focused on seven areas:
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46 345 end-of life care, self-management, treatment, involvement in shared decision making, health
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48 346 outcome prioritisation/goal setting, healthcare service delivery and screening/diagnostic
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50 347 testing. The size of the evidence clusters varied widely (from 1 to 51 studies) and the research
51
52 348 objectives and settings differed considerably.
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55 349 The largest and most homogenous cluster was of end-of-life preferences (51/152 studies) and
56
57 350 was largely confined to specialised care (41/51). Furthermore, the study objectives revealed
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2
3 351 one overarching theme (advance care planning) and were relatively uniform compared with
4
5 352 the other clusters.
6
7 353 Self-management and treatment preferences were the second (34/51) and third (32/51)
8
9 354 largest clusters respectively. Although studies about self-management preferences were
10
11 355 relatively homogeneous in terms of study setting (they were mostly conducted in primary care
12
13 356 (21/34)), we found considerable variability in the overarching themes. Treatment preferences
14
15 357 were rather heterogeneous, with the cluster containing a variety of settings and themes.
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21 359 **Evidence gaps**

22
23 360 Longitudinal studies were rare and the few that did observe changes in preference over time
24
25 361 were generally about end-of-life care preferences (33,58,59,61,80,162). The only intervention
26
27 362 study we identified (83) highlighted the fragility of prioritisation processes over time, and
28
29 363 showed that health priorities shared by patients and physicians were often not sustainable
30
31 364 two weeks after an intervention. Preferences tend to change when chronic conditions worsen
32
33 365 (33,58,59,61,80,162), additional diagnoses are made that lead patients to prioritise a new
34
35 366 condition over existing ones (88), or new information about treatment options is obtained
36
37 367 (37). However, although crucial in clinical decision making, it is unclear how and why patient
38
39 368 preferences change significantly over time. High quality longitudinal studies are needed to
40
41 369 help physicians deal with changing preferences and to reassess preference-sensitive decisions.
42
43 370 We identified a further research gap in a lack of studies in older patients with multimorbidity
44
45 371 that test the effectiveness (i) of interventions using different methods to elicit/construct
46
47 372 preferences, and (ii) of (complex) interventions that proactively consider patient preferences
48
49 373 among patient-relevant outcomes.
50
51 374 The smallest cluster (containing only one study) concerned the preferences of older patients
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53 375 with multimorbidity with respect to screening or diagnostic tests (161). This finding is
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55 376 surprising, as the additional health-related burden of screening and diagnostic tests can be
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3 377 substantial, and it is well-known that the risk-benefit ratio of such tests can be highly
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5 378 preference-sensitive (13).
6
7 379 It is worthy of note that end-of-life care preferences were mostly assessed in specialised
8
9 380 ambulatory care. As palliative care is a core task in primary care, we would have expected
10
11 381 more studies to address such end-of-life preferences in this setting (163).
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14 382

16 383 **Comparison with other studies**

18 384 This is the first evidence map of health-related preferences in older patients with
19
20 385 multimorbidity. Although previously published evidence summaries, such as scoping or
21
22 386 systematic reviews, partially addressed specific topics relating to some of the clusters
23
24 387 identified in this evidence map, none focused on older patients with multimorbidity.
25
26 388 Four systematic reviews explored preferences in end-of-life care (as well as other preferences,
27
28 389 such as involvement in shared decision making and goal setting): (i) Puts et al. (164,165)
29
30 390 systematically reviewed factors influencing older adults' (not necessarily multimorbid) decision
31
32 391 to accept or refuse cancer treatment, (ii) de Decker et al. (166) confirmed an association of the
33
34 392 wish not to be resuscitated with multimorbidity, (iii) Singh et al. (167) conducted a meta-
35
36 393 analysis on the roles cancer patients (not necessarily multimorbid) prefer to play in treatment
37
38 394 decision-making, and (iv) Vermunt et al. (168) evaluated studies of the effects of interventions
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40 395 that support collaborative goal setting in elderly people with a chronic health condition or
41
42 396 multimorbidity, including our only intervention study (83).
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47 397 Most of the evidence summaries of health-related preferences focused on end-of-life care
48
49 398 preferences , and specifically its determinants(164–166). Further research should concentrate
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51 399 on the clusters and gaps identified in our evidence map in order to enhance our understanding
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53 400 of the preferences of older patients with multimorbidity.
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59 402 **Strengths and limitations**

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3 403 A major strength of our approach is that we used a sensitive strategy that combined controlled
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5 404 terms (i.e. a defined vocabulary to index and retrieve information from the included electronic
6
7 405 databases) and free-text searches in all relevant databases. Furthermore, we did not apply any
8
9 406 restrictions to publication language, design, or geographical location of the studies.

11 407 Additionally, we searched for unpublished studies in registries and contacted authors of
12
13 408 conference papers.

16 409 However, we addressed a broad topic with incomplete indexing (both, multimorbidity and
17
18 410 patient preferences) and may have missed studies. In particular, we did not include search
19
20 411 terms for specific measures of preference (e.g., analytic hierarchy process, discrete choice
21
22 412 experiment, conjoint analyses) in electronic searches, because test searches including them
23
24 413 did not increase sensitivity. Furthermore, we did not search grey literature, as this approach
25
26 414 would not have identified additional relevant studies that could have justified the enormous
27
28 415 effort involved (169).

32 416 Despite the experience gathered in the pilot study (published elsewhere), the use of a lower
33
34 417 age limit of at least 60 years was difficult to operationalise, as studies often included a wide
35
36 418 age range but did not always report separate results for older patients. When the age group
37
38 419 was unclear, we did not include the study.

41 420 Furthermore, we used an iterative process to develop our evidence clusters and the identified
42
43 421 clusters and their definitions were agreed on by all authors. However, inherent to the methods
44
45 422 used, we cannot rule out some subjectivity.

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48 423

50 424 **Conclusions and further research outlook**

52 425 This evidence map provides the first systematic overview of empirical investigations
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54 426 concerning health-related preferences of older patients with multimorbidity. Their objectives
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56 427 addressed a broad range of relevant topics across all settings and used predominantly cross-
57
58 428 sectional and observational qualitative and quantitative methods. Our evidence map also
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3 429 revealed gaps, both in general – such as the scarcity of longitudinal studies to investigate
4
5 430 changes in preferences over time, and of intervention studies, which, with one exception (83)
6
7 431 failed to develop and test interventions to support the construction of health-related
8
9 432 preferences in this population. More specifically, we found a remarkably low number of
10
11 433 studies addressing preferences concerning end-of-life care in a primary care setting, as well as
12
13 434 preferences related to screening and diagnostic testing. Furthermore, the included studies
14
15 435 varied considerably in terms of terminology (e.g. preferences, priorities, views, perceptions)
16
17 436 and decision-making components and concepts (e.g. trade-offs, decision regret, goal setting).
18
19 437 These require further elucidation.
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57 973 **ACKNOWLEDGMENTS**
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3 974 The authors would like to thank Katharina Kunzweiler for her support in the literature
4
5 975 screening process, as well as Jessica Comilang for her assistance in providing full texts of the
6
7 976 screened studies and Pauline Philipp for her support in contacting authors of conference
8
9 977 proceedings manuscripts.
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13 978 **CONTRIBUTORS**

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15
16 979 AIG wrote the initial draft of the protocol. CM is the guarantor of the review. CS and JM
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18 980 provided methodological guidance and revisions to the manuscript. EM developed and carried
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20 981 out the search strategy. CS and JN assisted in the identification of databases and the search
21
22 982 strategy. AIG and JN screened the studies, extracted the data and performed content analysis.
23
24 983 AIG summarised descriptives, and TN and JN assisted with figures. JB, MvA, TN, JN, OW, KR,
25
26 984 TH, FG and SS are co-supervisors of this project, provided advice at all stages of the
27
28 985 development of the protocol, and contributed to the revision of the manuscript. All authors
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30 986 read and approved the final manuscript.
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34 987 **FUNDING**

35
36
37 988 This work was supported by the German Federal Ministry of Education and Research, grant
38
39 989 number 01GL1729.
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43 990 **DISCLAIMER**

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46 991 The funder had no role in developing the protocol for this review.
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49 992 **COMPETING INTERESTS**

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52 993 None declared
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55 994 **DATA SHARING**

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58 995 No additional data available.
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996 **PATIENT AND PUBLIC INVOLVEMENT**

997 Not required.

998 **WORD COUNT**

999 3372

For peer review only

Table 1. Key characteristics of the included studies.**Table 1a. Key characteristics – Qualitative cross-sectional studies (observational)**

Source	Study methods			Patient population			
	Study aim	Setting, country	Data collection	Def of MM	Sample (number)	Age: Mean (SD); range	Sex (% females)
Bayliss, 2008 (136)	To explore processes of care desired by elderly patients with MM, and that may present competing demands for patients and providers	Population based; USA	ssl (f2f)	≥ 2 chronic conditions	26	65-84	50
Belcher, 2006 (134)	To explore the views of older adults regarding participation in medication decision-making	GP & Hospital (outpatient) & Nursing home; USA	ssl (f2f)	≥ 2 chronic conditions + ≥ 1 medications	51	77; 65-89	63
Beverly, 2008 (94)	To define, identify, and rank the values and preferences that older adults express in their diabetes care	Population based; USA	FG	Type 2 diabetes + ≥ 1 comorbidity	35	75; 60-88	57
Beverly, 2011 (95)	To explore the perceived impact of chronic co-morbid conditions on type 2 diabetes self-management in older patients	Population based; USA	FG	Type 2 diabetes + ≥ 1 comorbidity	32	75 (7); 60-88	56
Bower, 2012 (96)	To examine patients' representations of multimorbid long-term conditions and assess how models of illness representation might need modification in the presence of MM	GP; UK	ssl (f2f)	≥ 2 chronic conditions	28	Median 66; 39-89	43
Bravo, 2017 (125)	To identify typologies of decision-making with foreign-born Latino elders with MM who have enrolled in an integrative geriatric health care program	Nursing home; USA	ssl (f2f)	≥ 2 chronic conditions	13	75; 65-85	77
Brown, 2007 (104)	To describe how goals for the self-management of hypertension are developed and whether or not they conform to the characteristics of effective goal-setting	Hospital (outpatient); USA	I (f2f)	Hypertension + comorbidities	30	70 (9); 50-87	100

Browne, 2014 (137)	To examine patient, carer, and professional perspectives on current management of advanced CHF, as well as barriers and facilitators to improved care	GP & Hospital (inpatient); UK	FG & ssl (f2f)	CHF (severe)	30	72; 60-86	27
Caldwell, 2007 (39)	To identify the preferences of patients with advanced CHF regarding communication about their prognosis and its implications	Hospital (outpatient); Canada	I (f2f)	CHF (severe)	20	68; 50-84	30
Caughey, 2017 (108)	To examine how older patients with MM and clinicians balance benefits and harms associated with a medication and in the presence of competing health outcomes	Hospital (outpatient); Australia	I (f2f)	≥2 chronic conditions	15	Median; IQR: 79; 73-86	53
Cheraghi-Sohi, 2013 a (97)	To explore how patients prioritise their osteoarthritis among all their conditions, which factors underlie this prioritisation, and whether and why these priorities change over time	Hospital (outpatient); UK	2a	≥ 2 chronic conditions Osteoarthritis	30	69; 55-86	60
Cheraghi-Sohi, 2013 b (98)	To explore how and why people with MM prioritise some long-term conditions over others, what the potential implications may be for self-management activity, and, in turn, suggest how such information may help clinicians negotiate the management of MM patients	GP; UK	2a	≥ 2 chronic conditions Osteoarthritis	41	68; 39-83	44
Clover, 2004 (51)	To report on a study exploring patients' understanding of their discussions about end-of-life care with nurses in a palliative care setting	Hospital (outpatient); Australia	I (f2f)	Terminal illness	11	74; 57-85	36
DiNapoli, 2016 (106)	To explore middle-aged and older veterans' current disease-management practices, mental health treatment preferences, and challenges they face in living with MM	GP; USA	ssl (f2f)	≥2 score (cumulative Illness Rating Scale for Geriatrics)	28	64 (6)	21
Ekdahl, 2010 (128)	To deepen the knowledge of frail elderly patients' preferences for participation in medical decision-making during hospitalisation	Hospital (inpatient); Sweden	ssl (f2f)	≥ 3 chronic conditions	15	84; 75-96	67
Etkind, 2017 (170)	To understand patient experiences of uncertainty in advanced illness and develop a typology of patients' responses and preferences to inform practice	Hospital (outpatient); UK	2a	Seriously ill patients CHF, COPD, CKD, liver disease or cancer	30	75; 43-95	40

1 2 3 4 5 6 7	Fix, 2014 (92)	To understand barriers to hypertension self-management in patients with hypertension and comorbidities	GP; USA	ssl (f2f)	Hypertension + ≥ 1 comorbidity	48	60 (10)	10
8 9 10 11	Fried, 2003 (151)	To elicit from patients themselves the aspects of treatment decision-making that are most important to them when making end-of-life treatment decisions	Hospital (outpatient); USA	FG & ssl (f2f)	Seriously ill patients CHF, COPD, CKD or cancer	23	70; 60-84	35
12 13 14 15 16	Fried, 2008 (53)	To examine the ways in which older persons with MM think about potentially competing outcomes in order to gain insight into how processes to elicit values regarding these outcomes can be grounded in the patient's perspective	Community; USA	FG	≥ 5 medications	66	75 (6)	67
17 18 19 20 21	Green, 2015 (115)	To examine older adults' attitudes towards ICD implantation in the context of competing health risks and to explore the determinants of ICD decision-making among a group of patients who had faced the decision in the past	Hospital (outpatient); USA	ssl (tel.)	ICD + comorbidities + Geriatric syndromes mean (SD): 6.9 (2.7).	44	78 (5)	29
22 23 24 25 26	Gross, 2015 (161)	To understand how older persons with MM approach decisions about cancer screening	Hospital (outpatient), USA	ssl (f2f)	≥ 2 chronic conditions + ≥ 5 medications	28	65-75: 57% 76-85: 4% >86: 21% Unknown: 18%	82
27 28 29	Hansen, 2015 (99)	To identify reasons for disagreement between patients and their GPs on illnesses	GP; Germany	FG	≥ 3 chronic conditions	21	77; 70-88	48
30 31 32 33	Haverhals, 2011 (100)	To understand the medication self-management issues faced by older adults and caregivers that can be addressed by an electronic personal health application	Hospital (outpatient) & Nursing homes; USA	FG & ssl (f2f)	≥ 2 chronic condition + ≥ 3 medications	32	82; 73-90	60
34 35 36 37 38	Huang, 2005 (55)	To explore self-reported healthcare goals, factors influencing these goals, and self-care practices of older patients with diabetes mellitus	GP; USA	ssl (f2f)	T2 diabetes + hypertension or hypercholesterolemia	28	74; 65-88	57

Jones, 2015 (56)	To assess barriers and facilitators to the use of a patient decision aid designed for serious illness	Hospital (outpatient); USA	FG	Seriously ill patients	12	66; 28-96	66
Kuluski, 2013 (159)	To compare goals across each patient, caregiver and physician triad to determine alignment	GP; Canada	ssl (f2f)	≥ 2 chronic conditions	27	82 (8)	44
Lim, 2017 (146)	To identify what patients with MM describe as most important to their well-being and health	GP; USA	ssl (f2f)	Type 1 or 2 diabetes + ≥ 2 chronic conditions	31	69	45
Lindsay, 2009 (86)	To examine how patients self-manage MM and especially how they prioritise their conditions	GP; UK	FG	Mean conditions: 3.3 (2-8)	53	63	45
Linsky, 2015 (40)	To identify patient perspectives on intentional medication discontinuation in order to optimise medication use	GP; USA	FG & ssl (f2f)	≥ 5 medications	27	66	19
Lyle, 2017 (123)	To explore older people's experiences of living with neurogenic claudication, their preferences for physiotherapy treatment provision and associated outcomes in order to inform an intervention to be tested in a clinical trial	Hospital (outpatient); UK	ssl (f2f)	Lumbar spinal stenosis + comorbidities	15	75; 69-80	40
Manias, 2007 (101)	To investigate perceptions of and experiences with managing drug regimens from the perspectives of patients with osteoarthritis and coexisting chronic conditions and of healthcare professionals from diverse backgrounds	Hospital outpatient & consumer organisation; Australia	FG	Osteoarthritis + comorbidities	34	male: 75 (4) female: 67 (9)	79
McKillop, 2013 (42)	To explore attitudes towards medicines, polypharmacy and adherence in patients with CKD	Hospital (outpatient); UK	ssl (f2f)	CKD	10	60; 29-82	50
McPherson, 2014 (171)	To explore and describe patients' and caregivers' perspectives and roles concerning pain management at home	Community; Canada	ssl (f2f)	Advanced cancer receiving palliative care at home	18	78 (9)	56
Moen, 2009 (102)	To conduct an exploratory study describing multiple medicine use from the elderly patient's perspective	Population based; Sweden	FG	≥ 5 medications	59	76; 67-88	51
Morrow, 2004 (135)	To describe patient-centred instructions for taking CHF medications that were developed as part of a multifaceted pharmacy-based intervention to improve	GP; USA	FG	CHF	16	64	69

	medication adherence and health-related outcomes among older adults with CHF						
Morrow, 2008 (44)	To investigate the life and health goals of older adults with diabetes, and to explore the factors that influence their diabetes self-management	GP; USA	ssl (f2f)	Diabetes + hypertension + comorbidities	24	69	38
Naganathan, 2016 (140)	To understand how patients, informal caregivers and family physicians perceive the value of various formal and informal supports for older adults with MM	GP; Canada	ssl (f2f)	≥ 2 chronic conditions	27	82 (8)	43
Naik, 2016 (147)	To identify a taxonomy of health-related values that frame goals of care of older, MM adults who recently faced cancer diagnosis and treatment	Hospital (outpatient); USA	I (n.a.)	Colorectal, head and neck, gastric, or oesophageal cancers Deyo comorbidity index 6.85	146	65	2
Noël, 2005 (45)*	To explore collaborative care needs and preferences in primary care patients with MM	GP; USA	FG	≥ 2 chronic conditions	60	30-80	20
O'Dell, 2008 (124)	To increase understanding of the views of frail elderly women in residential care related to quality of life, values, and preferences for pelvic floor care	Hospital (outpatient); USA	ssl (f2f)	"Assisted living or long-term care"	25	Assisted living participants: 87; 73-96; Long term care: 81; 65-89	100
Pages-Puigdemont, 2016 (103)	To explore factors that impact on drug compliance and to identify strategies to improve it from the perspective of patients with at least one chronic condition	Hospital (outpatient); Spain	FG	≥ 1 chronic condition Mean comorbidities: 2.3 (1.7)	36	65; 39-90	53
Parks, 2014 (117)	To explore sociocultural factors that might influence African American and Hispanic patients' decisions regarding joint replacement	Hospital (outpatient); USA	ssl (f2f)	Osteoarthritis + comorbidities	36	68 (10)	80
Piamjariyakul, 2014 (172)	To explore end-of-life preferences and determine the presence of signed end-of-life advanced directives	Community; USA	I (f2f)	Cardiovascular disease (severe) + comorbidities	30	70	67

Proctor, 2008 (93)	To examine older adults' perceptions of depression among co-occurring social, medical, and functional problems and to compare the priority of depression with that of other problems	Community; USA	ssl (f2f)	Depression + comorbidities (86%)	40	74 (6)	90
Richardson, 2016 (89)	To identify and elaborate a range of factors that influence how and why patients with comorbid chronic conditions prioritise their conditions	GP & Hospital (outpatient); USA	ssl (f2f)	Comorbidities mean (range): 6 (3-11)	33	61-70: 67%	6
Rifkin, 2010 (47)	To find out how patients prioritise their medical conditions or decide which medications to take	Hospital (outpatient); USA	ssl (f2f)	CKD (stages 3-5D)	20	72; 55-84	60
Ruggiano, 2017 (173)	To expand current knowledge in the area of chronic health self-management, this study examined perceptions of transportation and health self-management among older adults with chronic conditions (i.e., chronic illnesses and disabilities)	Community; USA	ssl (f2f)	≥2 chronic conditions (82%)	37	77; 60-97	68
Schellinger, 2018 (149)	To examine whole-person goals of patients with serious illness identified during their last 2 to 3 years of life	Community; USA	I (f2f)	CHF, cancer and dementia comorbidity score (SD): 5 (1.5)	160	79 (11)	48
Schoenberg, 2009 (91)	Focusing on elders with two or more chronic conditions and low socioeconomic status, to investigate which morbidities older adults prioritise, why, and how they accommodate these conditions.	Community; USA	ssl (f2f)	≥2 chronic conditions	41	70; 55-90	85
Schoenborn, 2015 (142)	To characterise current practice and opportunities for improvement in the care of older adults with MM in an internal medicine residency clinic	Hospital (inpatient); USA	I (f2f)	≥2 chronic conditions	30	74 (7)	73
Seah, 2015 (113)	To gain insight into the decision-making process leading to opting out of dialysis and experience with conservative non-dialytic management from the patients' perspective	Hospital (outpatient); Singapore	ssl (f2f)	CKD (end-stage)	9	Median: 81; 61-84	44
Song, 2013 (48)	To address patient perspectives on the extent of information provided and how decisions to start dialysis are made	Hospital (outpatient); USA	ssl (tel.)	CKD (dialysis) + CCI ≥ 5-6	99	61 (12); 28-89	53

Stapleton, 2005 (72)	To understand how the association between preferences for life-sustaining treatment and depression or quality of life is important in providing care	Hospital (outpatient); USA	I (f2f)	COPD (Oxygen-prescribed)	101	67; 59-74	23
Strachan, 2011 (174)	To examine patients' perspectives on related end-of-life issues	Hospital (outpatient); Canada	I (f2f)	ICD + comorbidities	30	63; 26-87	20
Tariman, 2014 (49)	To examine patient perspectives with regard to the personal and contextual factors relevant to treatment decision-making	Hospital (outpatient); USA	ssl (f2f)	Multiple Myeloma	20	65 (8)	60
Visser, 2009 (114)	To explore the considerations taken into account by patients making decisions concerning renal replacement therapy	Hospital (outpatient); The Netherlands	I (f2f)	CKD + comorbidities	14	77 (7)	43
Walker, 2012 (175)	To explore the experiences of patients attempting to integrate lifestyle changes into their lives	Hospital (outpatient); UK	ssl (f2f)	CKD (Stage 4)	9	76	56
Weir, 2017 (133)	To explore decision-making about polypharmacy among older adults and their companions	Hospital (outpatient); Australia	ssl (f2f)	CCI 1-5+: 80%	30	83; 75-85+	63
Zulman, 2015 (105)*	To understand self-management and health care navigation challenges that patients face due to MM and to identify opportunities to support these patients through new and enhanced eHealth technology	GP; USA	FG	≥ 3 chronic conditions	53	59 (11)	26

Table 1b. Key characteristics – Qualitative longitudinal studies (observational)

Source	Study methods			Patient population			
	Study aim	Setting, country	Data collection	Def of MM	Sample (number)	Age: Mean (SD) or range	Sex (% females)
Baxter, 2012 (29)*	To increase understanding of disabled and chronically ill people's experiences of revisiting choices by considering events that prompted people to reconsider them	Hospital (outpatient) & Community; UK	I (f2f)	Chronic conditions + disabled	20	65+: 35%	75

1 2 3 4 5 6 7 8	Klindtworth, 2015 (62)	To understand how old and very old patients with advanced CHF perceive their disease and to identify their medical, psychosocial and information needs, focusing on the last stages of life	Hospital (inpatient & outpatient); Germany	I (f2f)	CHF (severe)	25	85;71-98	56
9 10 11	Morris, 2011 (30)*	To examine what influences self-management priorities in individuals with multiple long-term conditions and how these change over time	GP; UK	ssl (f2f, tel.)	≥ 3 chronic conditions	21	50; 36-84	48
12 13 14 15 16	Pardon, 2009 (46)	To identify preferences of advanced lung cancer patients to receive information and participate in decision-making concerning treatment options, health-care-setting transfers and end-of-life decision-making	Hospital (outpatient); Belgium	ssl (f2f)	Advanced lung cancer	128	64; 41-86	20

Table 1c. Key characteristics – Quantitative cross-sectional studies (observational)

Source	Study methods			Patient population			
	Study aim	Setting, country	Data collection	Def of MM	Sample (number)	Age: Mean (SD) or range	Sex (% females)
Ainslie, 1994 (37)**	To examine hypotheses that elderly persons refusing minimally described treatment might choose nonaggressive treatment if options were described, and that persons refusing treatment would want an active decision- making role	Community; USA	S	≥2 chronic conditions	116	[older patients]	75
Buttery, 2014 (145)	To investigate older CHF patients’ preferences from hospital, community and home-based service models, and sociodemographic and clinical factors associated with these preferences	Hospital (inpatient); UK	S	CHF (moderate-severe)	106	78 (7)	38
Chanouzas, 2012 (110)	To examine how patient choice of different treatment modalities [haemodialysis, peritoneal dialysis and conservative management] is influenced by personal and demographic parameters	Hospital (outpatient); UK	S	CKD (pre-dialysis)	118	67 (14)	48
Chi, 2017 (126)	To explore preferences for health care decision making among older adults, and identify MM profiles associated	Population based; USA	S	≥ 2 chronic conditions	2,017	65-74: 55% 75-84: 34% ≥85: 12%	57

	with preferring less active, i.e., passive, participation among older US adults						
Chiu, 2016 (50)	To determine the Decision Control Preferences (DCP) of diverse, older adults and whether DCPs are associated with participant characteristics, advance care planning, and communication satisfaction	Hospital (outpatient); USA	S	≥ 2 chronic conditions	146	71 (10)	41
Collins, 2004 (127)	To determine whether psychological variables, particularly depression, influence patients' willingness to share medical decisions with family members or friends	Hospital (outpatient); USA	lc (f2f)	Seriously ill patients CCI ≥ 5	95	70; 44-85	2
Davison, 2010 (176)	To evaluate end-of-life care preferences of CKD patients to help identify gaps between current end-of-life care practice and patients' preferences and to help prioritise and guide future innovation in end of-life care policy	Hospital (outpatient); Canada	S	CKD (stage 4 and 5)	584	68 (14)	46
De Vries, 2015 (109)	To assess whether patients' willingness to add a blood pressure-lowering drug and the importance they attach to specific treatment characteristics differ among age groups in patients with type 2 diabetes	Community; The Netherlands	S	Diabetes + Hypertension	151	68 (9)	42
Downey, 2013 (79)	To investigate patient preferences for life-sustaining therapies, clinicians' accuracy in understanding those preferences, and predictors of patient preference and clinician error	GP; USA	S	COPD	196	69 (10); 39-91	0
Ehman, 2017 (138)	To test if multimorbidity patients may value continuity more highly than healthy patients, and thus may prefer to wait to see their primary care physician (PCP)	GP; USA	S	MM Tier score: 3 or 4	193	62 (65+: 119)	58
Ekdahl, 2011 (129)	To investigate the preferred and the actual degree of control, i.e. the role elderly people with co-morbidities wish to assume and actually had with regard to information and participation in medical decision making during their last stay in hospital	Hospital (inpatient); Sweden	S	≥ 3 chronic conditions	156	83; 76-98	51
Elie, 2018 (177)	To compare SPMI and CMI patients' end-of-life care preferences and comfort level with end-of-life care discussions, and identify potential predictors of interest in medical assistance in dying	Hospital (outpatient); Canada	S	SPMI and CMI	SPMI; 106; CMI 95	SPMI 66 (13); CMI 63 (13)	SPMI: 63; CMI: 60

Flynn, 2007 (178)	To explore relationships between five factors of personality and four preference types that account for multiple components of the health care decision-making process (information exchange, deliberation, and selection of treatment choice)	Population based; USA	S	Mean OARS conditions: 3.8 (2.5); Mean medications: 2.8 (2.5)	5,830	64 (1)	54
Fox, 2018 (122)	To explore older hospitalised patients' perceived acceptability of, and preference for, two low-intensity early activity interventions (bed-to-sitting and sitting-to-walking), and characteristics associated with perceived acceptability and preference	Hospital (inpatient); Canada	S	≥2 chronic conditions	60	79 (8)	53
Fried, 1994 (179)	To characterise the limitation of care in routine geriatric practice in advance of and at the time of a patient's final episode of illness.	GP; USA	Chart	Seriously ill patients CHF, COPD, CKD or cancer	59	84 (8)	85
Fried, 2002a (180)	To examine the effects of the burden of treatment and a variety of possible outcomes on the preferences for care expressed by older patients with serious illnesses	Hospital (inpatient & outpatient); USA	lc (f2f)	Seriously ill patients CHF, COPD, CKD or cancer	226	73 (7)	43
Fried, 2002b (81)	To develop a patient-centred measure of treatment preference applicable across a range of diseases and treatment decisions	Hospital (inpatient & outpatient); USA	Survey	Seriously ill patients CHF, COPD, CKD or cancer	125	73 (7)	43
Fried, 2011a (181)**	To explore the use of a simple tool to elicit older persons' health outcome priorities	GP; USA	lc (f2f)	≥ 4 chronic conditions (69%) + ≥ 4 medications (49%)	357	[older patients]	75
Fried, 2011b (153)	To develop and test a simple tool to elicit the preferences of older persons based on prioritisation of universal health outcomes	Community housing; USA	lc (f2f)	Hypertension + fall risk Mean chronic conditions (SD): 2.9 (1.1)	81	65-74: 16% 75-84: 54% 85+: 30%	69
Girones, 2012 (119)	To examine the relationships between preferences and chemotherapy use in this group of patients	Hospital (inpatient); Spain	S	Lung cancer + comorbidities (84%).	83	77; 70-91	24

Green, 2016 (116)	To explore patients' perceptions of their decision-making experiences related to ICDs	Hospital (outpatient); USA	S	ICD + comorbidities (71%)	295	65-74: 25% 75-84: 23% 85+: 3%	22
Gum, 2010 (139)	To examine use of behavioural health services, treatment preferences, and facilitators and barriers to service use in older adults receiving home-based services within the aging network	Aging network agencies; USA	S	≥ 2 chronic conditions No medication group: 4.4 (2.1); Medication group: 5.7 (2.8)	142	75 (8)	80
Hamelinck, 2016 (120)	To examine patients' preferences for adjuvant chemotherapy and adjuvant hormonal therapy, factors related to minimally required benefit, and patients' self-reported motivations	Hospital (outpatient); The Netherlands	S	Advanced cancer + comorbidities	81	Median: 61; 42-86	100
Hopper, 2016 (54)	Use questionnaires to examine the attitudes of patients and prescribing clinicians to medication withdrawal	Hospital (inpatient & outpatient); Australia	S	CHF + ≥ 5 medications	85	61 (12)	27
Janssen, 2011 (182)	To assess life-sustaining treatment preferences, advance care planning, and the quality of end-of-life care communication in Dutch outpatients with clinically stable but severe COPD or CHF	Hospital (outpatient); The Netherlands	S	COPD or CHF (severe)	185	COPD 66 (9); CHF: 76 (8)	COPD: 38; CHF: 32
Janssen, 2013 (183)	To understand the preferences for life-sustaining treatments of outpatients on dialysis and to study the quality of patient-physician communication about end-of-life care and barriers and facilitators to this communication	Hospital (outpatient); The Netherlands	S	CKD (Dialysis)	80	62 (16)	40
Janssen, 2015 (154)	To rate the relative importance of different outcomes for haemodialysis patients and to analyse whether the relative importance differed among subgroups of patients	Hospital (outpatient); Germany	S	CKD (Dialysis)	4,518	67 (14)	42
Jorgensen, 2013 (57)	To identify potential barriers to adjuvant chemotherapy, use in older patients by examining the associations between patient age, factors influencing chemotherapy	Hospital (outpatient); Australia	S	Colon cancer + ≥1 chronic condition	35	74 (5)	47

	treatment decisions, and preferences for information and decision-making involvement						
Junius-Walker, 2011 (84)	To disclose patients' and doctors' perspectives on individual health and treatment priorities	GP; Germany	lc (f2f)	Mean health problems (SD): 11.9 (5.4)	123	78 (5)	67
Junius-Walker, 2015 (184)	To examine older patients' perceived burden of their health problems	GP; Germany	S	Median of health problems (IQR): 11 (8–15)	836	79 (4)	61
Karel, 2015 (155)	To examine the individual variability, thematic content, and sociodemographic correlates of valued life abilities and activities among MM veterans diagnosed with life-altering cancer	Hospital (outpatient); USA	lc (f2f)	Head and neck, oesophageal, gastric, or colorectal cancer; CCI 6.85 (4.41)	144	0–70: 51% >70: 23%	2
Kerr, 2007 (85)	To understand how the number, type, and severity of comorbidities influence diabetes patients' self-management and treatment priorities	Community; USA	S	Diabetes + comorbidities	1,191	<65: 30% 65–74: 40% >74: 30%	53
Krucien, 2015 (31)*	To identify the preferences of patients with MM for recommendations of the Chronic Care Model	GP; France	S	≥ 1 chronic condition + obstructive sleep apnoea syndrome	150	61-69: 42% ≥ 70: 23%	29
Krumholz, 1998 (32)*	To describe the resuscitation preferences of patients hospitalised with an exacerbation of severe CHF, perceptions of those preferences by their physicians, and the stability of the preferences	Hospital (inpatient); USA	lc (f2f)	CHF (severe)	936	65–74: 28% > 75: 26%	48
Lee, 2006 (185)	To compare attitudes towards making end-of-life decisions in non-demented and mildly demented Chinese subjects	Nursing home; China	S	Dementia / no dementia + comorbidities	56	82 (6)	95
Li, 2016 (63)	To understand treatment preferences of Parkinson patients with regard to end-of-life care	Hospital (outpatient); Singapore	S	≥ 2 chronic conditions Parkinson 54%	136	63	38
Linsky, 2017 (41)	To develop a survey instrument that assesses patients' experience with and attitudes toward deprescribing	GP; USA	S	≥ 5 medications	790	66-75: 43%, ≥ 76: 19%	15

Maida, 2010 (186)	To evaluate the correlations that exist between preferences for pursuing active and aggressive medical interventions	Hospital (outpatient); Canada	S	Advanced cancer	380	73; 19-99	56
McDonald, 2011 (87)	To assess patients' and physicians' perceived importance of clinical problems and to describe the level of concordance between patients and physicians in relation to these problems	Hospital (outpatient); Australia	Ic (f2f)	COPD & asthma	52	70 (8); 55-87	60
Milic, 2016 (43)	To (quantify tablet burden in women with metastatic breast cancer, establish which groups of drugs contribute most to this burden and gain insight into patients' attitudes towards oral anti-cancer treatment	Hospital (inpatient & outpatient); UK	S	Metastatic breast cancer with polypharmacy	100	60; 31-95	100
Moise, 2017 (130)	To assess whether elevated depressive symptoms are associated with decision-making preference in patients with comorbid chronic illness	GP; USA	S	Hypertension + depression. CCI: 3.2 (2.4)	195	64 (9)	72
Morton, 2012 a (112)	To quantify pre-dialysis patients' and pre-dialysis caregivers' preferences for treatment-related attributes of kidney dialysis and the trade-offs they were willing to accept in making a choice between the different dialysis modalities	Hospital (outpatient); Australia	S	CKD (end stage)	105	Median: 63; 55-71	44
Morton, 2012 b (111)	To determine the most important characteristics of dialysis and the trade-offs patients were willing to make in choosing dialysis instead of conservative care	Hospital (outpatient); Australia	S	CKD (end stage)	105	Median: 63; 55-71	44
Moss, 2001 (65)	To examine the attitudes of dialysis patients toward CPR in the dialysis unit	Hospital (outpatient); USA	Ic (f2f)	CKD	469	61 (16)	54
Naik, 2011 (131)	To evaluate the effect of functional health literacy on decision-making preferences; and among those initially preferring a passive decision-making role, to explore how preferences change if their physician actively encourages their involvement	Hospital (outpatient); USA	S	Cardiovascular disease Comorbidities: active style 5.98 (1.67); passive style 5.0 (2.1)	100	71 (6) active decision-making; 75 (6) passive decision-making	100
Obrien, 1995 (66)	To determine life-sustaining treatment preferences among nursing home residents, whether information	Nursing home; USA	Ic (f2f)	> 5 chronic conditions (60%)	421	< 70: 11% 70-79: 25%	80

	regarding CPR affected these preferences, and with whom treatment preferences had been discussed, and to identify factors associated with CPR preferences					80-89: 45% 90-103: 19%	
Pandhi, 2008 (141)	To determine if patients vary in perceptions of safety if interpersonal continuity is disrupted. If so, which characteristics are associated with feeling unsafe?	Community; USA,	S	Chronic conditions + polypharmacy >80%	6,827	64; 63-66	54
Perret-Guillaume, 2011 (132)	To investigate elderly patients' willingness to accept antihypertensive therapy and their desire for information and for participation in medical decisions	Hospital (inpatient); Switzerland	S	Hypertension + comorbidities	120	84 (7)	80
Rahemi, 2018 (69)	To investigate the influence of sociodemographic factors, acculturation, ethnicity, health status, and spirituality on older adults' health-related decisions when confronted with a choice between competing options	Population based; USA	S	Seriously ill patients	451	75 (8)	32
Reinke, 2011 (70)	To assess whether a history of depression or active depressive symptoms is associated with preferences for life-sustaining therapies among veterans with COPD	Hospital (outpatient); USA	S	COPD & depression	376	70 (10)	3
Robben, 2011 (148)	To know what a particular patient values most and what his or her care-related goals are	Community; The Netherlands	Chart	Frail	336	81; 61-99	70
Rodriguez, 2008 (187)	To assess patients' preferred role and perceived level of involvement in medical decision making and test the effects of patients' age and role preference on perceived involvement in medical decision making	GP & Hospital (outpatient); USA	S (tel.)	CHF (advanced)	90	70; 42-88	6
Sharma, 2016 (71)	To determine knowledge of the CPR process, preference for CPR, and desire to participate in end-of-life decision making amongst older hospitalised patients	Hospital (inpatient); New Zealand	S	≥ 2 chronic conditions CCI 5 (4-10)	100	82; 65-98	50
Sudore, 2010 (188)	To examine the prevalence of uncertainty concerning advance decisions about life sustaining treatment among chronically ill, racially=ethnically diverse older adults with varying levels of health literacy; and to assess the associations between literacy and race=ethnicity with decisional uncertainty, hypothesising that low literacy and minority status would each be independently associated with uncertainty	Hospital (outpatient); USA	lc (f2f)	≥ 2 chronic conditions	205	61 (8)	53

Tamura, 2010 (189)	To explore preferences for withdrawal and engagement in advance care planning also in terms of age, race and ethnicity	Hospital (outpatient); USA	S	CKD (end stage)	61	62 (15)	26
Tang, 2015 (73)	To explore heterogeneity and changes in patterns of life sustaining treatment preferences among 2 independent cohorts of terminally ill patients with cancer recruited a decade apart	Hospital (outpatient); Taiwan	S	Advanced cancer	4,353	65-74: 50% 75-85: 20% > 85: 13%	44
Tinetti, 2008 (156)	To determine the priority that older adults with coexisting hypertension and fall risk give to optimising cardiovascular outcomes versus fall- and medication symptom- related outcomes	Nursing home; USA	S	Hypertension + fall risk (frail patients)	123	82 (6)	71
Toto, 2015 (160)	To evaluate the feasibility of generating patient-centred goals using goal attainment scale with older adults who have MM and were recruited through primary care	GP; USA	S	≥ 2 chronic conditions (Geriatric and / or Psychiatry)	27	77 (6)	70
Uhlmann, 1991 (75)	To investigate whether perceived quality of life is associated with preferences for life-sustaining treatment in older adults	Hospital (outpatient); USA	S	Seriously ill patients	258	74	54
Utens, 2013 (143)	To investigate patient preference for treatment place, associated factors and patient satisfaction with a community-based hospital-at-home scheme for COPD exacerbations	Hospital & home care organisations; Netherlands	S	COPD + acute exacerbation CCI > 1: Usual hospital care 27 (39%); Early assisted discharge 32 (46%)	139	68 (11)	62
van Summeren, 2017 (158)	To determine proposed and observed medication changes when using an outcome prioritisation tool during a medication review in general practice	GP; The Netherlands	S	≥ 2 chronic conditions (one cardiovascular disease) + ≥ 5 medications	59	Median: 83; 81-86	51
Wieldraaijer, 2018 (144)	To assess what caregivers patients prefer to contact when faced with symptoms during survivorship care, what patient factors are associated with a preferred	Hospital (outpatient); Netherlands	S	Colorectal cancer + comorbidities	260	67; 32-94	46

	caregiver, and whether the type of symptom is associated with a preferred caregiver						
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Table 1d. Key characteristics – Quantitative longitudinal studies (observational)

Source	Study methods			Patient population			
	Study aim	Setting, country	Data collection	Def of MM	Sample (number)	Age: Mean (SD) or range	Sex (% females)
Brunner-LaRocca, 2012 (28)	To investigate end-of-life and CPR preferences in elderly CHF patients. In addition, predictive factors for willingness to trade survival time for better quality of life, and for wanting resuscitation if necessary, were evaluated	Hospital (outpatient); Switzerland	S	CHF (severe)	622	77 (8)	41
Casarett, 2006 (77)	To determine whether patient preferences are a barrier to hospice enrolment	Hospital (inpatient & outpatient); USA	lc (f2f)	Seriously ill patients CHF, COPD, CKD or cancer	203	73; 60-93	43
Case, 2013 (150)	To assess older adults' attitudes toward eliciting health outcome priorities	Nursing home; USA	S	≥ 4 chronic conditions (69%), ≥ 1 IADLs (26%) + depression (28%)	356	76 (7)	75
Cosgriff, 2007 (78)	To determine the association of preferences with end-of-life care	Hospital (outpatient); USA	lc (f2f)	Seriously ill patients CHF, COPD, CKD or cancer	118	73 (7)	42
Dunlay, 2014 (80)	To evaluate the resuscitation preferences of patients at study enrolment, to describe changes in resuscitation preferences over time, and to assess how resuscitation preferences relate to survival	Hospital (outpatient); USA	S	CHF (severe)	608	74	45
Efficace, 2014 (52)	To assess preferences for involvement in treatment decisions and requests for prognostic information in newly diagnosed higher-risk MDS patients	Hospital (outpatient); Italy	S	MDS with IPSS risk score of intermediate or high risk	280	70; 32-89	37

Fried, 2006 (162)	To examine changes over time in end-of-life treatment preferences, measured in terms of willingness to undergo treatment based on the health state that would result from the treatment, in a cohort of older persons with advanced chronic illness	Hospital (inpatient & outpatient); USA	Ic (f2f)	Seriously ill patients CHF, COPD, CKD or cancer	226	73 (7)	53
Fried, 2007 a (59)	To determine whether preferences for future life-sustaining treatments change over time in a consistent and predictable manner	Community; USA	Ic (f2f)	Seriously ill patients CHF, COPD, CKD or cancer	189	73 (7)	45
Fried, 2007 b (58)	To examine changes in treatment preferences over time	GP; USA	S	Seriously ill patients CHF, COPD, CKD or cancer	226	73 (7)	43
Hamel, 1999 (60)	To determine the effect of age on decisions to withhold life-sustaining therapies	Hospital (inpatient); USA	Ic (f2f)	Seriously ill patients	9,105	Median: 63	44
Hamel, 2000 (36)*,**	To review previously published findings about how patient age influenced patterns of care for seriously ill patients	Hospital (inpatient); USA	Ic (f2f)	Seriously ill patients	9,105	[older patients]	nr
Janssen, 2012 (61)	To investigate 1-year stability of preferences regarding CPR and mechanical ventilation in outpatients with advanced COPD, CHF, or CKD and to identify predictors of changes in preferences	Hospital (outpatient); The Netherlands	Ic (f2f)	Advanced COPD, CHF or CKD	265	67 (13)	36
Lynn, 2000 (64)	To characterise COPD over patients' last 6 months of life	Hospital (inpatient); USA	Ic (f2f)	COPD + ≥ 3 comorbidities	416	72	75
Ostermann, 2003 (67)	To ascertain the initial views of a haemodialysis cohort in the UK in terms of their CPR status in the event of an in-hospital cardiac arrest unrelated to dialysis	Hospital (outpatient); UK	Ic (f2f)	CKD (Haemodialysis)	11	74 (10); 46-81	50
Parr, 2010 (68)	To understand age differences in advanced cancer patients' end-of-life experiences	Hospital (inpatient); USA	Ic (f2f)	Advanced cancer CCI: 10.0 (2.7)	126	72 (6)	50

Rothman, 2007 (107)	To assess the frequency of, reasons for, factors associated with, and outcomes of treatment refusal among older persons with advanced chronic disease	Hospital (outpatient); UK	Ic (f2f)	Advanced cancer, CHF or COPD	226	74 (7)	43
Suggs, 2017 (118)	To analyse factors associated with selection of the following treatment modalities (breast conservation surgery, mastectomy, and contralateral prophylactic mastectomy) in a rural West Virginia tertiary care hospital	Hospital (outpatient); USA	Chart	Breast Cancer (early stage) CCI mean (SD): BCS 2.2 (0.5); M 2.4 (0.7)	226	74 (7)	43
Tang, 2016 (33)*	To explore longitudinal changes in life sustaining treatment preferences and their associations with accurate prognostic awareness, physician-patient end-of-life care discussions, and depressive symptoms in terminally ill cancer patients' final year	Hospital (inpatient); Taiwan	Ic (f2f)	Advanced cancer	302	>65: 32%	43
Teno, 2000 (74)	To evaluate decision-making and outcomes in seriously ill patients with an intensive care unit stay of at least 14 days	Community; USA	Ic (f2f)	Seriously ill patients	1,264	BCS:62 (12) M: 61 (13)	100
Weeks, 1998 (76)	To test the hypothesis that among terminally ill cancer patients an accurate understanding of prognosis is associated with a preference for therapy that focuses on comfort over attempts at life extension	Hospital (inpatient); USA	Ic (f2f)	Advanced cancer	917	62	38
Wright, 2010 (34)*	To examine whether patients' desire for life extending therapy was associated with their end-of-life care	Hospital (outpatient); USA	S	Advanced cancer	301	60-69: 28% > 70: 21%	47
Zafar, 2013 (35)*	To determine how patient's preferences guide the course of palliative chemotherapy for advanced colorectal cancer	Hospital (outpatient); USA	S	Metastatic colorectal cancer	702	65-74: 25% 75: 27%	38
Zulman, 2010 (90)	To understand patterns of patient-provider concordance in the prioritisation of health conditions in patients with MM	GP; USA	S	Diabetes + hypertension + comorbidities	1,169	65 (11)	nr

Table 1e. Key characteristics – Quantitative study (interventional)

Source	Patient population
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	Study aim	Setting, country	Intervention	Randomisation	Data collection	Def of MM	Sample (number)	Age: Mean (SD) or range	Sex (% females)
Junius-Walker, 2012 (83)	To investigate whether a structured priority-setting consultation reconciles the often-differing doctor-patient views on the importance of problems	GP; Germany	Structured priority-setting consultation	CRT (randomisation unit=GPs)	S	Mean health problems: 11.4	317*** (IG=174; CG=143)	78	67

Table 1f. Key characteristics – Mixed-methods studies

Source	Study aim	Setting, country	Data collection	Patient population			
				Def of MM	Sample (number)	Age: Mean (SD) or range	Sex (% females)
Adams, 2013 (190)	To investigate the ease with which patients of differing functional ability use three types of multi-compartment medication device and whether some types are easier to use than others	Hospital (inpatient); USA	S & I (f2f)	1 - 15 medications (median 5)	50	Median: 85; 77-98	76
Puts, 2017 (121)	To better understand the treatment decision process from all perspectives	Hospital (outpatient); Canada	S & I (f2f)	Advanced cancer	32	63–69: 9% 70–79: 56% 80+: 34%	31
van Summeren, 2016 (157)	To explore an outcome prioritisation tool in eliciting individuals' preferred health outcomes (remaining alive, maintaining independence, reducing pain, reducing other symptoms) in the context of medication review in family practice	GP; The Netherlands	S & I (f2f)	≥ 2 chronic conditions (one cardiovascular disease) + ≥ 5 medications	60	84 (4)	52

CCI=Charlson Comorbidity Index; CHF=Chronic Heart Failure; CKD=Chronic Kidney Disease; CMI=Chronic Medically Ill; COPD=Chronic Obstructive Pulmonary Disease; CPR=CardioPulmonary Resuscitation; CRT=Cluster Randomised Controlled Trial; f2f=face-to-face; FG=Focus Groups; GPs=General Practice; IADL=Instrumental Activity of Daily Living; ICD=Implantable Cardioverter Defibrillator; I=open-ended questions interview; Ic=closed-ended questions

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interview; IPSS=International Prognostic Scoring System; IQR=Interquartile Range; MDS=Myelodysplastic Syndromes; MM=Multimorbidity; n=number; nr=not reported; OARS=Older Americans Resources and Services; S=Survey; SD=Standard Deviation; SPMI=Severe and Persistent Mental Illness; ssl=semi-structured interviews; ssl (tel.) = semi-structured interviews (telephone); UK=United Kingdom; USA=United States of America; 2a=Secondary analysis.

* The study included a larger sample based on different (younger) age groups. In the present evidence map, only data from patients of 60 years of age or older were considered. Studies are included if preferences of older patients are addressed separately in the study, even when they included younger populations.

**The study did not report descriptives of age but mentions the included population are "older patients".

***Number of patients analysed.

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Table 2. Descriptive summary of included studies

Variable	Total – n (%)
<i>Study characteristics</i>	
Geographical location	
North America	94 (62 %)
Europe	43 (28 %)
Australia & New Zealand	10 (7 %)
Asia	5 (3 %)
Setting	
Primary care	54 (36 %)
Outpatient specialised	59 (39 %)
Hospital (inpatient & emergency)	26 (17 %)
Nursing homes	5 (3 %)
Interdisciplinary	8 (5 %)
Study design/method	
Qualitative (observational)	63 (42 %)
Cross-sectional (observational)	59 (39 %)
Longitudinal (observational)	4 (6 %)
Quantitative	86 (57 %)
Cross-sectional (observational)	63 (41 %)
Longitudinal (observational)	22 (15 %)
Interventional	1 (1%)
Mixed methods (qualitative and quantitative)	3 (2 %)
Observational (total)	151 (99 %)
Interventional (total)	1 (1%)
Sample size – median (range)	
Observational	
Qualitative	30 (9-160)
Quantitative	196 (11-9,105)
Mixed methods	50 (32-60)
Interventional	317
<i>Patients' characteristics</i>	
Type of condition	
Multimorbidity	58 (38 %)
Comorbidity	29 (19 %)
Heart failure	10 (7 %)
Advanced cancer	16 (11 %)
Chronic kidney disease	15 (10 %)
COPD	4 (3 %)
Mixed (heart failure, COPD...)	20 (13 %)
Age (range)*	60-85
Sex (% female)*	28,905 (51 %)

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*Studies with overlapping population were excluded (n=10)

(36,59,81,94,98,107,111,158,162,180)

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Table 3. Description of the type of preferences investigated in the included studies.

Types of preferences	Definition	Themes	No. of Studies	References
End-of-life Care Preferences	Treatment preferences for resuscitation and critical care. Covers all aspects relating to anticipatory decision-making such as advance directives	Advanced Care Planning	51	(28,32–34,36,39,46,50–52,56,58–81,151,162,170–172,174,176,177,179,180,182,183,185,186,188,189)
		- Life-Sustaining Treatment Preferences	29	(28,32–34,36,58–81)
Self-management Preferences*	Preferences related to the ongoing activities that an individual undertakes to maintain or reduce the effect of a disease/s on his or her health status. It includes how and under what circumstances, patients prioritise conditions and adjust self-management practices, how priorities might change over time, and how these are discussed with healthcare professionals.	eHealth Support	2	(88,105)
		Prioritisation of Health Problems	20	(45,47,54,83–99)
		Medication Self-management	8	(42,43,47,54,100–103)
		Self-Care Behaviours	3	(44,55,104)
		Revisiting Choices	2	(29,88)
Treatment Preferences	Preferences that involve a discrete set of effective treatment options (e.g., radical mastectomy vs lumpectomy with radiation for localised breast cancer). The treatment options can include any intervention with a therapeutic aim.	Medication	13	(37,41–43,47,49,53,54,106–109)
		Dialysis	6	(48,110–114)
		Surgery	4	(115–118)
		Chemotherapy	5	(35,57,119–121)
		Non-pharmacological / conservative	3	(122–124)
	Medication Device	1	(190)	
Involvement in the Shared	Preferences regarding the degree of involvement in discussions with health professionals about	Patterns of engagement	21	(37,41,46,48–52,57,125–134)

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Decision Making Process Preferences*	the options for treatment, the benefits and harms of each therapy, and making collaborative decisions about how to proceed.	Patient Decision Aid	1	(56)
		Information	4	(39,52,129,135)
		Communication with Providers	1	(40)
Healthcare Service Preferences	Preferences related to the quality of care and the planning and delivery of the services the health system provides.	Processes of care	10	(45,136–144)
		- Site of care	2	(139,143)
		- Type of social support	1	(140)
		- Type of caregiver / provider	3	(136,139,144)
		- Type of caregiver / provider	5	(45,136–138)
		- Continuity and Access	1	(142)
		- Guiding principles		
		Service models	2	(31,145)
		- Chronic Care Model	1	(31)
- Cardiac Rehabilitation	1	(145)		
Health Outcome Prioritisation & Goal Setting	Preferences regarding personal health and life outcomes (e.g., function, social activities, and symptom relief) that people hope to achieve through their health care. Health outcome goals that patients prioritise within the context of their care preferences.	Life & Health Goals	6	(44,55,146–149)
		Health Outcome Prioritisation	10	(53,150,151,154–158)
		- Preferred tools	1	(150)
		Collaborative Goal Setting	3	(104,159,160)
- Patient, physician, caregiver agreement	1	(159)		
Screening & Diagnostic Tests	Preferences that involve the decision whether or not to undergo a screening or diagnostic test.	Screening Test	1	(161)
		- Cancer Screening	1	(161)

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Preferences				
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*Three studies are listed twice as they were assigned two different codes

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Figure 1. Evidence map PRISMA flowchart (21)

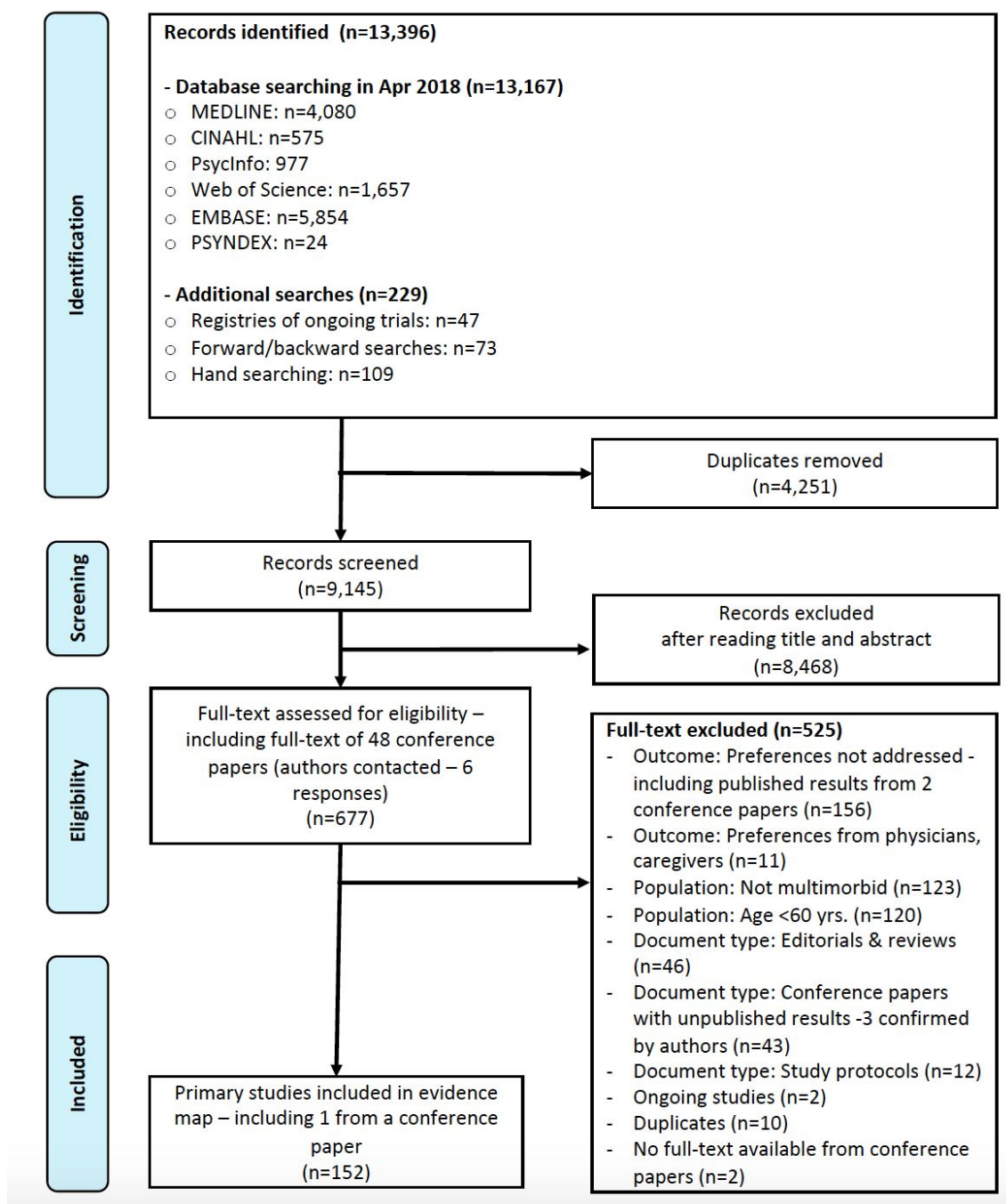
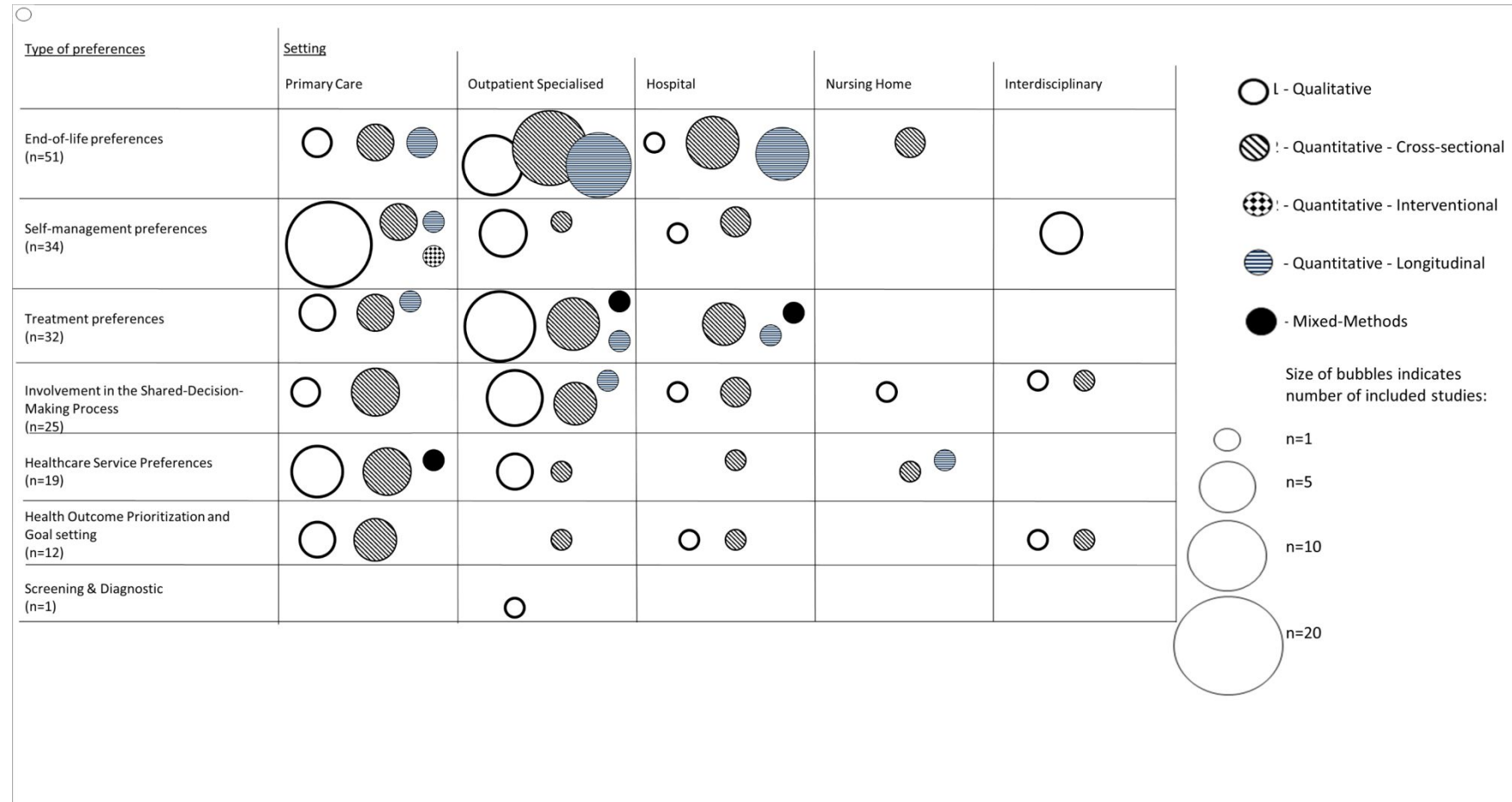
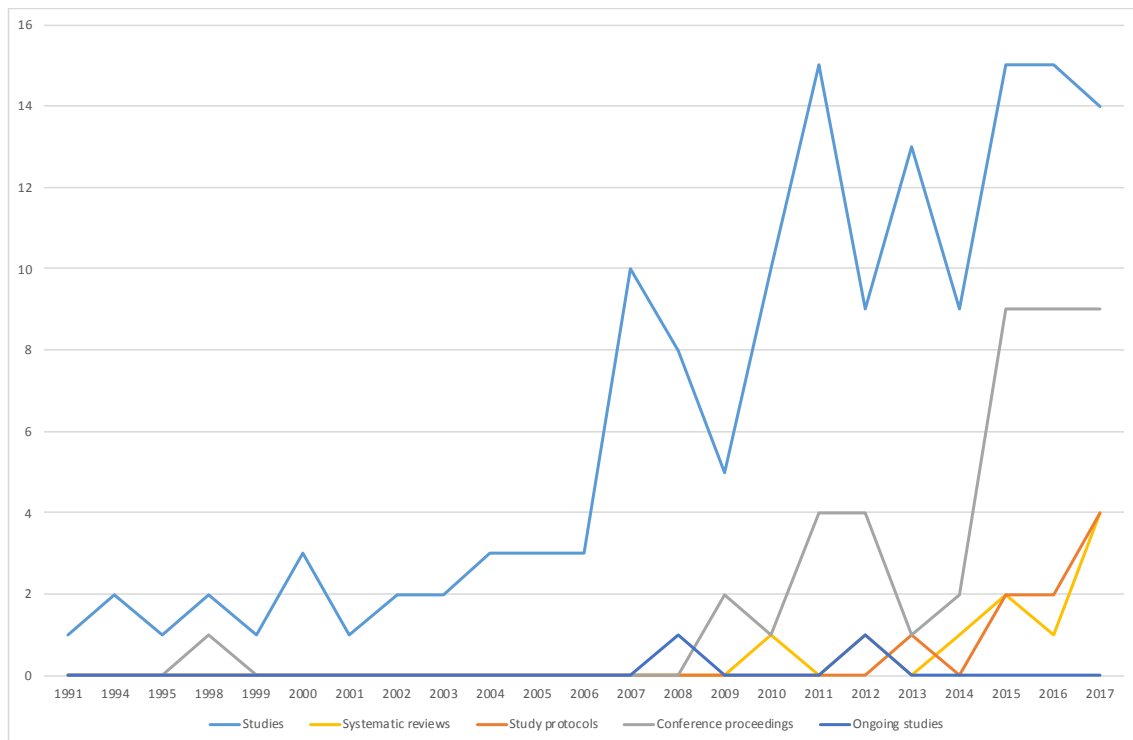


Figure 2. Types of preferences investigated in the included studies by setting and study design*



Size of the circles represent number of studies; pattern coding represents study design. *The bubble plot depicts more than the total number of included studies (n=174 vs. n=152) because 22 studies were assigned to two different types of preferences.

Supplementary figure 1. Number of studies published per year.

1 **Supplementary table 2. Search strategy used for MEDLINE database (search interface: Ovid;**

2 **Host: Wolters Kluwer)**

3 **MEDLINE 1946 to the third week of April, 2018,**

4 **MEDLINE Daily Update April 26, 2018,**

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

6 **MEDLINE Epub Ahead of Print April 26, 2018**

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

#	Searches	Results	Annotations
1	exp aged/	2800655	#1 to #8:
2	Geriatrics/	28648	Aspect Aged
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	

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7	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
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13	7	advanced in years.ti,ab,kf. or betagt*.ot.	162
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16	8	or/1-7	3248520
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20	9	comorbidity/	92917
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23	10	Multiple Chronic Conditions/	178
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27	11	exp chronic disease/ and (multi or multiple or concurren* or complex*).ti,ab,kf.	20443
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33	12	(comorbid* or co-morbid*).ti,ab,kf,ot. or (komorbid* or ko-morbid*).ot.	140228
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40	13	(multimorbid* or multi*-morbid*).ti,ab,kf,ot.	4057
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43	14	(polymorbid* or poly morbid*).ti,ab,kf,ot.	292
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46	15	multidisease*.ti,ab,kf.	39
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50	16	((multi or multiple) adj2 (ill or illness* or condition* or disorder* or syndrom* or disease*)).ti,ab,kf.	30204
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17	(complex* adj2 (patient* or disease* or ill or illness* or condition* or disorder*)).ti,ab,kf.	42426	
18	(concurrent* adj2 (disease* or ill or illness* or condition* or disorder*)).ti,ab,kf.	4305	
19	(multimedication* or multi*-medication* or polymedication* or poly-medication* or polypharmacy* or poly-pharmacy*).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:
24	exp patient satisfaction/	78556	Aspect patient-
25	decision making/	83248	centered care
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

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4	48	shared decision making.ti,ab,kf.	5495
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30	52	21 and 49 and 51	89
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56	case reports.pt.	1875801	Exclusion of editorials
57	(case? adj3 report).ti.	302363	and case reports
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

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9 / = Medical Subject Heading (MeSH)

10 Exp = exploded Mesh term

11 * = truncation, any number of characters

12 *2, *3 = truncation: from 0 to 2, 0 to 3 characters

13 ? = 0 or 1 character

14 # = 1 character

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

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16 .ti. = title

17 .ot. = original title

18 .mp. = title, abstract, original title, name of substance word, subject heading word, keyword

19 heading word, protocol supplementary concept word, rare disease supplementary concept

20 word, unique identifier

21 .pt. = publication type

22 adj_n = Search terms within n words in any order

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Source	Reason for exclusion
— — —. 2014. 'Abstracts of Papers Presented at the Health Services Research and Pharmacy Practice Conference, HSRPP 2014', International Journal of Pharmacy Practice. Conference: Health Services Research and Pharmacy Practice Conference, HSRPP, 22.	Document type: Editorials & reviews
— — —. 2018. 'Poster Abstracts - Post Acute and Long Term Care Medicine 2018', Journal of the American Medical Directors Association. Conference: Society for Post Acute and Long Term Care Medicine Annual Conference, 19.	Document type: Editorials & reviews
Adams, E. K., R. Houchens, G. E. Wright, and J. Robbins. 1991. 'Predicting hospital choice for rural Medicare beneficiaries: the role of severity of illness', Health Services Research, 26: 583-612.	Population: Not multimorbid
Adeniji, C., C. Kenning, P. A. Coventry, and P. Bower. 2015. 'What are the core predictors of 'hassles' among patients with multimorbidity in primary care? A cross sectional study', BMC Health Services Research, 15: 255.	Outcome: Preferences not addressed
Aikens, J. E., D. E. Nease Jr, and M. S. Klinkman. 2008. 'Explaining patients' beliefs about the necessity and harmfulness of antidepressants', Annals of Family Medicine, 6: 23-29.	Population: Age <60 yrs.
Akpan, A., C. Roberts, G. Turner, and J. Banerjee. 2017. 'Developing an internationally agreed standard set of health outcome measures for older people', Age and Ageing, 46 (Supplement 1): i35.	Outcome: Preferences not addressed
Al Onazi, M., M. Al Jondeby, M. Azeem, and A. Al Sayyari. 2011. 'Factors affecting Saudi hemodialysis patients' perception of healthcare providers' empathy', Arab journal of nephrology and transplantation, 4: 71-76.	Outcome: Preferences not addressed
Alami, S., D. Desjeux, M. M. Lefevre-Colau, A. S. Boisgard, E. Boccard, F. Rannou, and S. Poiraudau. 2011. 'Management of pain induced by exercise and mobilization during physical therapy programs: views of patients and care providers', BMC Musculoskeletal Disorders, 12: 172.	Population: Age <60 yrs.
Albada, A., and M. Triemstra. 2009. 'Patients' priorities for ambulatory hospital care centres. A survey and discrete choice experiment among elderly and chronically ill patients of a Dutch hospital', Health Expect, 12: 92-105.	Population: Age <60 yrs.
Alderman, A. K., S. T. Hawley, J. Waljee, M. Mujahid, M. Morrow, and S. J. Katz. 2008. 'Understanding the impact of breast reconstruction on the surgical decision-making process for breast cancer', Cancer, 112: 489-94.	Population: Age <60 yrs.
Allen, D., V. Badro, L. Denyer-Willis, M. Ellen Macdonald, A. Pare, T. Hutchinson, P. Barre, R. Beauchemin, H. Bocti, A. Broadbent, and S. R. Cohen. 2015. 'Fragmented care and whole-person illness: Decision-making for people with chronic end-stage kidney disease', Chronic Illness, 11: 44-55.	Outcome: Preferences not addressed
AlRuthia, Yazed Sulaiman. 2016. 'The value of online medication rating systems to older adults and their association with self-reported outcomes', 76.	Outcome: Preferences not addressed
Alsinnawi, M., A. E. Slee, J. S. Banerji, K. L. Dahl, S. Akapame, Iii J. D. Massman, E. M. Wolff, and J. M. Corman. 2016. 'Does a clear understanding of life expectancy increase decisional conflict and anxiety for men with newly diagnosed prostate cancer?', Journal of Urology, 1): e31.	Document type: Conference proceedings

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46	Amblas-Novellas, J., J. Espauella, L. Rexach, B. Fontecha, M. Inzitari, C. Blay, and X. Gomez-Batiste. 2015. 'Frailty, severity, progression and shared decision-making: A pragmatic framework for the challenge of clinical complexity at the end of life', <i>European Geriatric Medicine</i> , 6: 189-94.	Population: Age <60 yrs.
	Anonymous. 2013. '2013 CAEP/ACMU Scientific Abstracts, CAEP 2013', <i>Canadian Journal of Emergency Medicine</i> , 15 (Suppl 1): S1.	Document type: Editorials & reviews
	Apkarian, A. Vania, Yamaya Sosa, Beth R. Krauss, P. Sebastian Thomas, Bruce E. Fredrickson, Robert E. Levy, R. Norman Harden, and Dante R. Chialvo. 2004. 'Chronic pain patients are impaired on an emotional decision-making task', <i>Pain</i> , 108: 129-36.	Population: Age <60 yrs.
	Arain, A., M. Tammaa, F. Chaudhary, S. Gill, S. Yousuf, N. Bangalore-Vittal, P. Singh, S. Jabeen, S. Ali, Y. Song, and N. J. Azar. 2016. 'Communicating the diagnosis of psychogenic nonepileptic seizures: The patient perspective', <i>Journal of Clinical Neuroscience</i> , 28: 67-70.	Population: Age <60 yrs.
	Arends, R. Y., C. Bode, E. Taal, and M. A. Van de Laar. 2013. 'The role of goal management for successful adaptation to arthritis', <i>Patient Education & Counseling</i> , 93: 130-8.	Population: Not multimorbid
	Arora, N. K., B. B. Reeve, R. D. Hays, S. B. Clauser, and I. Oakley-Girvan. 2011. 'Assessment of quality of cancer-related follow-up care from the cancer survivor's perspective', <i>Journal of Clinical Oncology</i> , 29: 1280-9.	Population: Not multimorbid
	Aspinall, P. A., Z. K. Johnson, A. Azuara-Blanco, A. Montarzino, R. Brice, and A. Vickers. 2008. 'Evaluation of quality of life and priorities of patients with glaucoma', <i>Investigative Ophthalmology and Visual Science</i> , 49: 1907-15.	Population: Not multimorbid
	Audulv, Å, K. Norbergh, K. Asplund, and Å Hörnsten. 2009. 'An ongoing process of inner negotiation -- a Grounded Theory study of self-management among people living with chronic illness', <i>Journal of Nursing & Healthcare of Chronic Illnesses</i> , 1: 283-93.	Population: Age <60 yrs.
	Auerbach, A. D., R. Katz, S. Z. Pantilat, R. Bernacki, J. Schnipper, P. Kaboli, T. Wetterneck, D. Gonzales, V. Arora, J. Zhang, and D. Meltzer. 2008. 'Factors associated with discussion of care plans and code status at the time of hospital admission: Results from the Multicenter Hospitalist Study', <i>Journal of Hospital Medicine</i> , 3: 437-45.	Outcome: Preferences not addressed
	Bagge, M., J. Tordoff, P. Norris, and S. Heydon. 2013. 'Older people's attitudes towards their regular medicines', <i>J Prim Health Care</i> , 5: 234-42.	Outcome: Preferences not addressed
	Baijal, G., T. Gupta, C. Hotwani, S. G. Laskar, A. Budrukkar, V. Murthy, and J. P. Agarwal. 2012. 'Impact of comorbidity on therapeutic decision-making in head and neck cancer: audit from a comprehensive cancer center in India', <i>Head & Neck</i> , 34: 1251-4.	Population: Age <60 yrs.
	Baker, Tamara A., Melissa L. O'Connor, Rosalyn Roker, and Jessica L. Krok. 2013. 'Satisfaction With Pain Treatment in Older Cancer Patients', <i>Journal of Hospice & Palliative Nursing</i> , 15: 455-63.	Outcome: Preferences not addressed
	Ballantyne, P. J., M. A. M. Gignac, and G. A. Hawker. 2007. 'A patient-centered perspective on surgery avoidance for hip or knee arthritis: Lessons for the future', <i>Arthritis Care and Research</i> , 57: 27-34.	Outcome: Preferences not addressed
	Bardai, A., S. H. M. Brown, U. Hafeez, and A. H. Abdelhafiz. 2013. 'Survey exploring elderly patients' viewpoints of the multi-compartment compliance aids', <i>Age and Ageing</i> , 2): ii5.	Document type: Conference proceedings

Barron, J., M. Bedra, J. Wood, and J. Finkelstein. 2014. 'Exploring three perspectives on feasibility of a patient portal for older adults', <i>Studies in health technology and informatics</i> , 202: 181-84.	Outcome: Preferences not addressed
Bartlett Ellis, Rebecca J., and Janet L. Welch. 2017. 'Medication-taking behaviours in chronic kidney disease with multiple chronic conditions: a meta-ethnographic synthesis of qualitative studies', <i>Journal of Clinical Nursing</i> , 26: 586-98.	Document type: Editorials & reviews
Bayliss, E. A., J. F. Steiner, D. H. Fernald, L. A. Crane, and D. S. Main. 2003. 'Descriptions of barriers to self-care by persons with comorbid chronic diseases', <i>Ann Fam Med</i> , 1: 15-21.	Outcome: Preferences not addressed
Beaulaurier, R. L., M. J. Mintzer, D. T. D'Amore, and M. Torres. 2016. 'Social factors in non-urgent use of an emergency department by the elderly', <i>Journal of the American Geriatrics Society</i> , 1): S191-S92.	Document type: Conference proceedings
Bell, S. P., and A. Saraf. 2014. 'Risk stratification in very old adults: How to best gauge risk as the basis of management choices for patients aged over 80', <i>Progress in Cardiovascular Diseases</i> , 57: 197-203.	Outcome: Preferences not addressed
Benham-Hutchins, M., N. Stagers, M. Mackert, A. H. Johnson, and D. deBronkart. 2017. "'I want to know everything": a qualitative study of perspectives from patients with chronic diseases on sharing health information during hospitalization', <i>BMC Health Services Research</i> , 17: 529.	Population: Age <60 yrs.
Bennahum, D. A., W. B. Forman, B. Vellas, and I. L. Albarède. 1997. 'Life expectancy, comorbidity, and quality of life - A framework of reference for medical decisions', <i>Clinics in Geriatric Medicine</i> , 13: 33-&.	Document type: Editorials & reviews
Benson, J., and N. Britten. 2002. 'Patients' decisions about whether or not to take antihypertensive drugs: qualitative study', <i>British Medical Journal</i> , 325: 873-76A.	Population: Not multimorbid
Bergin, R., J. Emery, R. Bollard, and V. White. 2017. 'How rural and urban patients in Australia with colorectal or breast cancer experience choice of treatment provider: A qualitative study', <i>European Journal of Cancer Care</i> , 26: n/a-n/a.	Population: Not multimorbid
Berna, F., A. S. Goritz, P. M. Llorca, P. Vidailhet, G. Fond, and S. Moritz. 2017. 'Would I take antipsychotics, if I had psychotic symptoms? Examining determinants of the decision to take antipsychotics', <i>Progress in Neuro-Psychopharmacology and Biological Psychiatry</i> , 77: 155-63.	Population: Age <60 yrs.
Berner, Y. N. 2018. '[Patient Oriented Care in Chronic Conditions]', <i>Harefuah</i> , 157: 228-31.	Outcome: Preferences not addressed
Beverly, E. A., L. A. Wray, C. J. Chiu, and C. L. LaCoe. 2014. 'Older Adults' Perceived Challenges With Health Care Providers Treating Their Type 2 Diabetes and Comorbid Conditions', <i>Cd (Clinical Diabetes)</i> , 32: 12-7.	Outcome: Preferences not addressed
Blackhall, L. J., S. T. Murphy, G. Frank, V. Michel, and S. Azen. 1995. 'ETHNICITY AND ATTITUDES TOWARD PATIENT AUTONOMY', <i>Jama-Journal of the American Medical Association</i> , 274: 820-25.	Population: Not multimorbid
Bleicher, R. J., P. Abrahamse, S. T. Hawley, S. J. Katz, and M. Morrow. 2008. 'The influence of age on the breast surgery decision-making process', <i>Annals of Surgical Oncology</i> , 15: 854-62.	Population: Not multimorbid

1 2 3 4 5	Blom, J. W., M. El Azzi, D. M. Wopereis, L. Glynn, C. Muth, and M. L. van Driel. 2015. 'Reporting of patient-centred outcomes in heart failure trials: are patient preferences being ignored?', <i>Heart Failure Reviews</i> , 20: 385-92.	Outcome: Preferences not addressed
6 7 8 9	Blome, C., A. Costanzo, E. Dauden, C. Ferrandiz, G. Girolomoni, R. Gniadecki, L. Iversen, A. Menter, K. Michaelis-Wittern, A. Morita, H. Nakagawa, K. Reich, and M. Augustin. 2016. 'Patient-relevant needs and treatment goals in nail psoriasis', <i>Quality of Life Research: An International Journal of Quality of Life Aspects of Treatment, Care & Rehabilitation</i> , 25: 1179-88.	Population: Age <60 yrs.
10 11 12	Boehmer, K. R., A. Abu Dabrh, M. R. Gionfriddo, P. Erwin, and V. M. Montori. 2018. 'Does the chronic care model meet the emerging needs of people living with multimorbidity? A systematic review and thematic synthesis', <i>PLoS ONE</i> , 13: 17.	Document type: Editorials & reviews
13 14	Boeni, F., K. E. Hersberger, and I. Arnet. 2014. 'Multidrug punch cards in primary care: A mixed methods study on patients' preferences and impact on adherence', <i>Frontiers in Pharmacology</i> , 5 (SEP) (no pagination).	Outcome: Preferences not addressed
15 16 17	Bokhof, B., and U. Junius-Walker. 2016. 'Reducing Polypharmacy from the Perspectives of General Practitioners and Older Patients: A Synthesis of Qualitative Studies', <i>Drugs and Aging</i> , 33: 249-66.	Document type: Editorials & reviews
18 19 20 21	Bonney, A., S. C. Jones, and D. Iverson. 2012. 'The older patient, the general practitioner and the trainee: patients' attitudes and implications for training', <i>Education for primary care : an official publication of the Association of Course Organisers, National Association of GP Tutors, World Organisation of Family Doctors</i> , 23: 186-95.	Population: Not multimorbid
22 23	Bonney, A., S. C. Jones, L. Phillipson, and D. Iverson. 2010. 'General practice registrars - attitudes of older patients', <i>Australian Family Physician</i> , 39: 419-24.	Population: Not multimorbid
24 25 26	Borgsteede, S. D., L. Deliens, C. Graafland-Riedstra, A. L. Francke, G. van der Wal, and D. L. Willems. 2007. 'Communication about euthanasia in general practice: opinions and experiences of patients and their general practitioners', <i>Patient Educ Couns</i> , 66: 156-61.	Outcome: Preferences not addressed
27 28 29 30	Borum, M. L., J. Lynn, and Z. Zhong. 2000. 'Blood transfusion administration in seriously ill patients: an evaluation of SUPPORT data. Study to Understand Prognoses and Preferences for Outcomes and Risks of Treatments', <i>Journal of the American Geriatrics Society</i> , 48: S39-43.	Population: Not multimorbid
31 32	Bove, A. M., A. D. Lynch, C. Ammendolia, and M. Schneider. 2018. 'Patients' experience with nonsurgical treatment for lumbar spinal stenosis: a qualitative study', <i>Spine Journal: Official Journal of the North American Spine Society</i> , 18: 639-47.	Population: Not multimorbid
33 34	Bower, P. 2013. 'Multimorbidity in patients with arthritis: Experience of care and self-management', <i>Rheumatology (United Kingdom)</i> , 1): i3.	Duplicates
35 36 37	Bower, P., M. Hann, J. Rick, K. Rowe, J. Burt, M. Roland, J. Protheroe, G. Richardson, and D. Reeves. 2013. 'Multimorbidity and delivery of care for long-term conditions in the English National Health Service: baseline data from a cohort study', <i>Journal of health services research & policy</i> , 18: 29-37.	Outcome: Preferences not addressed
38 39 40	Bowling, A., and S. Ebrahim. 2001. 'Measuring patients' preferences for treatment and perceptions of risk', <i>Quality in Health Care</i> , 10: I2-I8.	Document type: Editorials & reviews

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21 22 23 24	Youssef, E., V. Cooper, A. Miners, C. Llewellyn, A. Pollard, M. Lagarde, M. Sachikonye, C. Sabin, C. Foreman, N. Perry, E. Nixon, and M. Fisher. 2016. 'Understanding HIV-positive patients' preferences for healthcare services: A protocol for a discrete choice experiment', <i>BMJ Open</i> , 6 (7) (no pagination).	Population: Age <60 yrs.
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Supplementary table 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
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.	Pages 5-6
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 8-9
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 conceptualise the review questions and/or objectives.	Page 9
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 6
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 10-11
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 9-10
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; Suppl table 2.
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	Page 10-11
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms, or forms that were tested by the team before being used, and whether data charting was done independently or in	Page 10

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
		duplicate) and any processes for obtaining and confirming data from investigators.	
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	Page 11
Critical appraisal of individual sources of evidence	12	If applicable, 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).	Not applicable
Synthesis of results	13	Describe the methods of dealing with and summarising the data that were charted.	Page 11-12
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.	Page 12; Suppl table 3, Figure 1.
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	Page 12; Table 1.
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	Not applicable
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.	Pages 13-16; Tables 2 and 3.
Synthesis of results	18	Summarise and/or present the charting results as they relate to the review questions and objectives.	Pages 13-16; Figure 2
DISCUSSION			
Summary of evidence	19	Summarise the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	Pages 16-18
Limitations	20	Discuss the limitations of the scoping review process.	Page 19
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.	Page 20
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 41

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

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3 * Where *sources of evidence* (see second footnote) come from, such as bibliographic
4 databases, social media platforms, and Web sites.

5 † A more inclusive/heterogeneous term used to account for the different types of evidence or
6 data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy
7 documents) that may be eligible for inclusion in a scoping review as opposed to only studies.
8 This is not to be confused with *information sources* (see first footnote).

9 ‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI
10 guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.

11 § The process of systematically examining research evidence to assess its validity, results, and
12 relevance before using it to inform a decision. This term is used for items 12 and 19 instead of
13 "risk of bias" (which is more applicable to systematic reviews of interventions) to include and
14 acknowledge the various sources of evidence that may be used in a scoping review (e.g.,
15 quantitative and/or qualitative research, expert opinion, and policy document).
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21 *From:* Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension
22 for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. *Ann Intern Med.*169:467–473.
23 doi: 10.7326/M18-0850
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BMJ Open

Health-related preferences of older patients with multimorbidity: an evidence map.

Journal:	<i>BMJ Open</i>
Manuscript ID	bmjopen-2019-034485.R1
Article Type:	Original research
Date Submitted by the Author:	23-Oct-2019
Complete List of Authors:	<p>GONZALEZ, ANA; Johann Wolfgang Goethe-Universität Frankfurt am Main, Institute of General Medicine; Red de Investigación en Servicios de Salud en Enfermedades Crónicas</p> <p>Schmucker, Christine; University of Freiburg Faculty of Medicine, Institute for Evidence in Medicine (for Cochrane Germany Foundation), Medical Center - University of Freiburg</p> <p>Nothacker, Julia; University of Freiburg Faculty of Medicine, Institute for Evidence in Medicine (for Cochrane Germany Foundation), Medical Center - University of Freiburg</p> <p>Motschall, Edith ; University of Freiburg Faculty of Medicine, Institute of Medical Biometry and Statistics</p> <p>Nguyen, Truc; Johann Wolfgang Goethe-Universität Frankfurt am Main, Institute of General Practice</p> <p>Brueckle, Maria-Sophie; Johann Wolfgang Goethe-Universität Frankfurt am Main, Institut of General Practice</p> <p>Blom, Jeanet; Leiden University Medical Center, Department of Public Health and Primary Care</p> <p>van den Akker, Marjan; Johann Wolfgang Goethe-Universität Frankfurt am Main, Institute of General Practice; Maastricht University, Department of Family Medicine, Care and Public Health Research Institute (CAPHRI)</p> <p>Röttger, Kristian; Gemeinsamer Bundesausschuss, Patient representative, Federal Joint Committee</p> <p>Wegwarth, Odette; Max-Planck-Institute for Human Development, Center for Adaptative Rationality</p> <p>Hoffmann, Tammy; Bond University Faculty of Health Sciences and Medicine, Institute for Evidence-Based Healthcare</p> <p>Straus, Sharon; University of Toronto, Department of Medicine</p> <p>Gerlach, Ferdinand; Johann Wolfgang Goethe-Universität Frankfurt am Main, Institute of General Medicine</p> <p>Meerpohl, Joerg; University of Freiburg Faculty of Medicine, Institute for Evidence in Medicine (for Cochrane Germany Foundation), Medical Center - University of Freiburg</p> <p>Muth, Christiane; Johann Wolfgang Goethe-Universität Frankfurt am Main, Institut of General Practice</p>
Primary Subject Heading:	Geriatric medicine
Secondary Subject Heading:	Evidence based practice

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Keywords:	GENERAL MEDICINE (see Internal Medicine), INTERNAL MEDICINE, GERIATRIC MEDICINE

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Manuscripts

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3 1 **TITLE**
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5 2 Health-related preferences of older patients with multimorbidity: an evidence map.
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3 80 **ABSTRACT**
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5 81 **Objectives:** To systematically identify knowledge clusters and research gaps in the health-
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7 82 related preferences of older patients with multimorbidity by mapping current evidence.
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10 83 **Design:** Evidence map (systematic review variant).
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12 84 **Data sources:** MEDLINE, EMBASE, PsycINFO, PSYINDEX, CINAHL and Science Citation
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14 85 Index/Social Science Citation Index/-Expanded from inception to April 2018.
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16 86 **Study selection:** Studies reporting primary research on health-related preferences of older
17
18 87 patients (mean age ≥ 60 years) with multimorbidity (≥ 2 chronic/acute conditions).
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20
21 88 **Data extraction:** Two independent reviewers assessed studies for eligibility, extracted data
22
23 89 and clustered the studies using MAXQDA-18[®] content analysis software.
24

25 90 **Results:** The 152 included studies (62% from North America, 28% from Europe) comprised
26
27 91 57,093 patients overall (range 9-9,105). All used an observational design except for one
28
29 92 interventional study: 63 (41%) were qualitative (59, cross-sectional, 4 longitudinal), 85 (57%)
30
31 93 quantitative (63 cross-sectional, 22 longitudinal), and 3 (2%) used mixed methods. The setting
32
33 94 was specialised care in 85 (56%) and primary care in 54 (36%) studies. We identified seven
34
35 95 clusters of studies on preferences: end-of-life care (n=51, 34%), self-management (n=34, 22%),
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37 96 treatment (n=32, 21%), involvement in shared decision making (n=25, 17%), health outcome
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39 97 prioritisation/goal setting (n=19, 13%), healthcare service (n=12, 8%) and screening/diagnostic
40
41 98 testing (n= 1, 1%). Terminology (e.g. preferences, views, perspectives), and concepts (e.g.
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43 99 trade-offs, decision regret, goal setting) used to describe health-related preferences varied
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47 100 substantially between studies.
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50 101 **Conclusion:** Our study provides the first evidence map on the preferences of older patients
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52 102 with multimorbidity. Included studies were mostly conducted in developed countries and
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54 103 covered a broad range of issues. Evidence on patient preferences concerning decision-making
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56 104 on screening and diagnostic testing was scarce. Differences in employed terminology, decision-
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58 105 making components and concepts, as well as the sparsity of intervention studies, are
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3 106 challenges for future research into evidence-based decision support seeking to elicit the
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5 107 preferences of older patients with multimorbidity and help them construct preferences.
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7 108 **Registration:**
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9 109 Open Science Framework (OSF): DOI 10.17605/OSF.IO/MCRWQ.
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For peer review only

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3 110 **Strengths and limitations of this study**
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6 111 • This evidence map presents a systematic overview of studies addressing a variety of
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9 112 health-related preferences in older patients with multimorbidity.

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12 113 • We identified clusters of studies on, for example, health outcome prioritisation and end-
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14 114 of-life care preferences; few studies addressed preference-sensitive decisions on screening
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16 115 and diagnostic testing.

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20 116 • The terminology and concepts used to address health-related preferences varied
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22 117 considerably in the included studies, highlighting a need for more standardisation to
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24 118 improve further research.
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119 INTRODUCTION

120 Multimorbidity, defined as the co-occurrence of medical conditions in a person (1), is a
121 growing public health concern that affects approximately two-thirds of people over the age of
122 60 years (2,3). Patients with multimorbidity generally experience a higher burden of disease,
123 physical disabilities, adverse drug reactions, more frequent hospital admissions, reduced
124 quality of life, and increased mortality compared to those with a single condition (4,5). As
125 patients face new and growing demands to organise and coordinate their own care to comply
126 with treatment regimens, multiple chronic conditions are often associated with high treatment
127 burden in addition to the burden of the diseases themselves. (6). If patients are overwhelmed
128 by the burden, they limit their compliance to their preferred tasks (7). Moreover, the care of
129 patients with multimorbidity is challenging, as treatments for one condition may adversely
130 affect another (8). Robust evidence supporting decision-making in these patients is scarce (2),
131 and the use of multiple disease-based guidelines is inappropriate, as they do not adequately
132 consider potentially interacting conditions and treatments (9,10).

133 The delivery of health care in patients with multimorbidity requires a patient-centred
134 approach, that is *“respectful of and responsive to individual patient preferences, needs, and
135 values, and ensuring that patient values guide all clinical decisions”* (11). The *“Ariadne
136 principles”* (12) stress the importance of physicians and patients sharing realistic treatment
137 goals, and of individualising management and follow-up by taking patients’ preferences into
138 consideration when making clinical decisions. Recent clinical guidelines on multimorbidity have
139 embraced this approach and emphasise the incorporation of patients’ preferences in clinical
140 decision-making, for example in the selection of appropriate self-management activities and
141 treatment options, as well as in the prioritisation of health outcomes (13). Similarly, the
142 consideration of patients' views in the form of patient-reported experiences and care
143 outcomes have been recognised as critical to the achievement of high-performing health
144 systems that are responsive to the needs of people with multimorbidity (14).

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3 145 It remains unclear how health-related preferences can be elicited from older patients with
4
5 146 multimorbidity, as patients may be unfamiliar with the decision elements (15). Moreover,
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7 147 concerns have been raised that patients are often provided with too little information about
8
9 148 the benefits and harms of a treatment (16,17), may find it difficult to prioritise health
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11 149 outcomes and make trade-offs, and in consequence, may refrain from participating in the
12
13 150 decision making process (18). As evidence maps allow a systematic approach to be used to
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15 151 collate evidence on a broad topic, we used this emerging method to map the health-related
16
17 152 preferences of older patients with multimorbidity (19). In particular, we aimed to (i)
18
19 153 systematically identify and describe key characteristics of research on health-related
20
21 154 preferences of older patients with multimorbidity, (ii) display the landscape of existing
22
23 155 research in visual formats, (iii) identify evidence clusters to guide any subsequent knowledge
24
25 156 synthesis (systematic reviews and meta-analysis), and (iv) identify evidence gaps and
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27 157 encourage relevant stakeholders and funding agencies to prioritise these in future research.
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34 159 **METHODS**

36 160 **Reporting protocol and guideline**

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39 161 We described the methods in a study protocol (20) that has since been subject to no
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41 162 amendments, registered the evidence map in Open Science Framework (OSF, DOI
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43 163 10.17605/OSF.IO/MCRWQ) and adhered to the 'PRISMA Extension for Scoping Reviews
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45 164 (PRISMA-ScR) checklist (21) where possible (see Table S1). [About here: link to Table S1.
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47 165 Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping
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49 166 Reviews (PRISMA-ScR) Checklist]

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54 168 **Systematic literature search**

56
57 169 We searched the electronic databases MEDLINE and EMBASE (via Wolters Kluwer's search
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59 170 interface Ovid), PsycINFO, PSYINDEX and CINAHL (via EBSCOhost), and Social Science Citation
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3 171 Index and Science Citation Index Expanded (via Web of Science from Clarivate Analytics) from
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5 172 inception until April 2018. In our search, we combined medical subject headings (MeSH) with
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7 173 keywords covering old age, multimorbidity, polypharmacy and search terms related to patient
8
9 174 preferences. The search strategy was adapted to suit the database under review (see Table S2
10
11 175 on Search strategy in MEDLINE - Ovid). [About here: link to Table S2 on Search strategy in
12
13 176 MEDLINE (Ovid)]
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16 177 Based on the 32 most relevant studies identified in our initial search (i.e., when keywords
17
18 178 provided by the author contained the terms “multimorbidity” and “patient preferences” or
19
20 179 “patient priorities” and/ or described a specific method for eliciting patients’ preferences, such
21
22 180 as “conjoint analysis”), we also checked the reference lists of included studies (backward
23
24 181 citation tracking) and conducted a cited reference search (forward citation tracking) using the
25
26 182 Web of Science Core Collection. We checked the reference lists of systematic reviews on
27
28 183 related topics for further studies (hand search) and contacted the authors of conference
29
30 184 proceedings that had not published a full set of results. We searched for ongoing trials in the
31
32 185 Register for Clinical Trials (22) and the WHO International Clinical Trials Registry (23).
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39 187 **Inclusion and exclusion criteria**

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41 188 We included qualitative and quantitative studies involving older patients of 60 years and older
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43 189 with multimorbidity (two or more simultaneous chronic or acute conditions (1)) that
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45 190 addressed health-related patient preferences. We also included studies involving older
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47 191 patients with chronic conditions that are frequently associated with multimorbidity, even if
48
49 192 they were not reported in detail (chronic heart failure (CHF), chronic obstructive pulmonary
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51 193 disease (COPD), chronic kidney disease (CKD), advanced cancer and frailty) (24–26).
52
53 194 We excluded studies investigating preferences relating to interventions of limited availability
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55 195 or whose legal status was unclear (e.g. euthanasia, which is not legal or available in most
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57 196 countries), studies addressing the preferences of caregivers, family, or medical and/or other
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197 professionals as well as case reports, narrative reviews and editorials. We did not apply any
198 restrictions to the geographical location of the study or language of publication.

199

200 **Study selection**

201 Two reviewers (AIG, JN) screened the titles and abstracts of all references identified by
202 electronic searches. Before screening, stepwise calibration was performed on a sample of 50
203 studies, with the aim of achieving 80 % agreement between the two reviewers (20). If 80 %
204 agreement had not been reached, our inclusion and exclusion criteria would have been refined
205 to reach this cut-off. The new criteria would then have required further calibration using a new
206 sample of 50 studies until the threshold was reached. We also obtained full texts of potentially
207 relevant articles, and two reviewers (AIG, JN or CS) independently assessed these for inclusion.
208 Conflicts were resolved by discussion among reviewers.

209

210 **Mapping the evidence**

211 *(i) Data extraction:* Following the calibration of five full text articles, two reviewers (AIG, JN or
212 CS) independently extracted data on (1) study characteristics including study design
213 (observational [qualitative, quantitative or mixed-methods, cross-sectional or longitudinal] and
214 interventional), geographical area, study setting (e.g., primary care), sample size, (2) study aim,
215 (3) patient population (e.g., definition of multimorbidity, age, sex) and, (4) characteristics of
216 preferences, such as methods used to elucidate patients' preferences, and definition of
217 preferences according to the authors.

218 *(ii) Types of preference:* We conducted qualitative relational content analysis (27) to derive
219 overarching themes. The analysis was based on coding by two independent reviewers (AIG, JN
220 or CS) using MAXQDA-18[®], which were further scrutinised by CM, JWB, MvdA, TSN and MSB
221 (20). The initial step was to scrutinise title and abstract (focusing on the study aim) of the
222 included studies to gain a general understanding of what the study was about. The full text

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3 223 was then read and re-read and codes assigned (e.g. resuscitation preferences (28)), which
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5 224 were later grouped according to overarching themes (e.g. life-sustaining treatment
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7 225 preferences (28)) (27). Reviewers' categorisation of preference types was partly based on a
8
9 226 previous classification (i.e. end-of-life preferences, prioritisation of health problems,
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11 227 prioritisation of medication, preferences regarding the role played in decision-making,
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13 228 preferences in surgical treatment methods, prioritisation of treatment goals, determinants of
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15 229 preference, changes in preferences and preferences concerning the organisation of health
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17 230 care) obtained from a pilot study (published elsewhere) of the evidence map.
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19 231 *(iii) Mapping:* We tabulated the identified studies, summarised study and patient
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21 232 characteristics, as well as study publications per year, and used bubble plots to display
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23 233 evidence clusters in terms of preference type and study characteristics.
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235 **Patient and public involvement**

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31 236 A patient representative (KR) from the Federal Joint Committee "Gemeinsamer
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33 237 Bundesausschuss (G-BA)" was involved in the conception and development of the evidence
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35 238 map, in the interpretation of the findings, and in writing the manuscript. KR has considerable
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37 239 expertise in evidence-based medicine in a health care context, and an understanding of the
38
39 240 pivotal role of patients' preferences in the provision of effective health care.
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45 242 **RESULTS**

46 243 **Literature search and selection process**

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48 244 Among the 9,145 unique screened references, 152 studies (comprising over 57,000 patients)
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50 245 were included in the evidence map. As 80 % agreement between the two reviewers was
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52 246 achieved in the first calibration exercise, inclusion and exclusion criteria remained unchanged.
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54 247 We contacted 48 authors of conference papers (13% answered) and included one further
55
56 248 study that had already been identified in our electronic search (Figure 1). Tables S3a-3f show
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249 key characteristics of the included studies. Table S4 presents excluded studies and reasons for
 250 exclusion.

251 [About here Figure 1. Evidence map PRISMA flowchart]

252 [About here: link to Table S3. Key characteristics of the included studies]

253 [About here: link to Table S4. Excluded studies and reasons for exclusion]

254

255 **Key characteristics of the included studies and participants**

256 Of the included studies, all but one were observational (151/152), and nearly all were
 257 conducted in developed countries (147/152) (Table 1, Tables S3a-S3f) and published in 2007 or
 258 thereafter (128/152) (see Figure S1). All studies were written in English.

259 The sample size ranged from 9 to 9,105 patients and captured both sexes (51% female). The
 260 mean age of participants ranged from 60 to 85 years. Eight studies (29–36) included different
 261 age groups but only data from patients aged 60 years and older were included in the evidence
 262 map. Three studies (36–38) provided no age estimate but were included because they clarified
 263 that they had only included older patients. In 87 of the included studies, patients with
 264 multimorbidity (no index disease defined) or comorbidity (index disease defined plus at least
 265 one other associated condition) were investigated, and in the remaining 65 studies, patients
 266 with conditions known to be highly associated with multimorbidity were included.

267 [About here: link to Figure S1. Number of studies published per year]

Table 1. Descriptive summary of included studies

Variable	Total – n (%)
<i>Study characteristics</i>	
Geographical location	
North America	94 (62 %)
Europe	43 (28 %)
Australia & New Zealand	10 (7 %)
Asia	5 (3 %)
Setting	
Primary care	54 (36 %)
Outpatient specialised	59 (39 %)
Hospital (inpatient & emergency)	26 (17 %)

Nursing homes	5 (3 %)
Interdisciplinary	8 (5 %)
Study design/method	
Qualitative (observational)	63 (42 %)
Cross-sectional (observational)	59 (39 %)
Longitudinal (observational)	4 (6 %)
Quantitative	86 (57 %)
Cross-sectional (observational)	63 (41 %)
Longitudinal (observational)	22 (15 %)
Interventional	1 (1%)
Mixed methods (qualitative and quantitative)	3 (2 %)
Observational (total)	151 (99 %)
Interventional (total)	1 (1%)
Sample size – median (range)	83 (9-9,105)
Observational	
Qualitative	30 (9-160)
Quantitative	196 (11-9,105)
Mixed methods	50 (32-60)
Interventional	317
<i>Patients' characteristics</i>	
Type of condition	
Studies describing multimorbid patients*	58 (38 %)
Studies describing patients with an index disease and comorbidity	29 (19 %)
Diabetes	7 (5 %)
Hypertension	5 (3 %)
Depression / Mental illness	4 (3 %)
Cardiovascular disease	4 (3 %)
Osteoarthritis	3 (2 %)
Other	6 (4 %)
Studies describing patients with chronic conditions often associated with multimorbidity	65 (43 %)
Chronic Heart failure	10 (7 %)
Advanced cancer	16 (11 %)
Chronic kidney disease	15 (10 %)
COPD	4 (3 %)
Mixed (heart failure, COPD...)	20 (13 %)
Age (range)**	60-85
Sex (% female)**	28,905 (51 %)

* No further details of included conditions were reported in the majority of studies

**Studies with overlapping population were excluded (n=10) (36,39–47)

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3 **268 Types of preference and evidence clusters**
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5 269 Content analysis (27) enabled us to identify seven major types of preference (Table 2). We
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7 270 assigned 130 studies (85 %) to one of these types of preference and 22 (15 %) studies (37,48–
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9 271 66) to two types of preference. Terminology (e.g. preferences, views, perspectives), and
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11 272 concepts (e.g. trade-offs, decision regret, goal setting) varied substantially among studies.
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13

14 **Table 2. Description of the type of preferences investigated in the included studies.**
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Types of preferences	Definition	Themes	No. of Studies	References
End-of-life Care Preferences	Treatment preferences for resuscitation and critical care. Covers all aspects relating to anticipatory decision-making such as advance directives	Advanced Care Planning	51	(28,32–34,36,41–43,45,48,55,59–61,65,67–102)
		- Life-Sustaining Treatment Preferences	29	(28,32–34,36,42,45,67,68,70,71,76,77,79,81,83,84,87–90,92–95,98–101)
Self-management Preferences*	Preferences related to the ongoing activities that an individual undertakes to maintain or reduce the effect of a disease/s on his or her health status. It includes how and under what circumstances, patients prioritise conditions and adjust self-management practices, how priorities might change over time, and how these are discussed with healthcare professionals.	eHealth Support	2	(103,104)
		Prioritisation of Health Problems	20	(39,40,54,56,63,103,105–118)
		Medication Self-management	8	(51,52,56,63,119–122)
		Self-Care Behaviours	3	(53,64,123)
		Revisiting Choices	2	(29,103)
Treatment Preferences	Preferences that involve a discrete set of effective treatment options (e.g., radical mastectomy vs lumpectomy with radiation for localised breast cancer). The treatment options can	Medication	13	(37,44,50–52,56,58,62,63,124–126)
		Dialysis	6	(46,57,127–130)
		Surgery	4	(131–134)
		Chemotherapy	5	(35,66,135–137)
		Non-pharmacological / conservative	3	(138–140)

	include any intervention with a therapeutic aim.	Medication Device	1	(141)
Involvement in the Shared Decision Making Process Preferences*	Preferences regarding the degree of involvement in discussions with health professionals about the options for treatment, the benefits and harms of each therapy, and making collaborative decisions about how to proceed.	Patterns of engagement	21	(37,50,55,57–61,66,142–151)
		Patient Decision Aid	1	(65)
		Information	4	(48,61,146,152)
		Communication with Providers	1	(49)
Healthcare Service Preferences	Preferences related to the quality of care and the planning and delivery of the services the health system provides.	Processes of care	10	(54,153–161)
			2	(156,160)
		- Site of care	1	(157)
		- Type of social support	3	(153,156,161)
		- Type of caregiver / provider	5	(54,153–155)
		- Continuity and Access	1	(159)
		- Guiding principles		
		Service models	2	(31,162)
		- Chronic Care Model	1	(31)
		- Cardiac Rehabilitation	1	(162)
Health Outcome Prioritisation & Goal Setting	Preferences regarding personal health and life outcomes (e.g., function, social activities, and symptom relief) that people hope to achieve through their health care. Health outcome goals that patients prioritise within the context of their care preferences.	Life & Health Goals	6	(53,64,163–166)
		Health Outcome Prioritisation	10	(47,62,75,167–171)
		- Preferred tools	1	(167)
		Collaborative Goal Setting	3	(123,172,173)
		- Patient, physician, caregiver agreement	1	(172)
Screening & Diagnostic Tests Preferences	Preferences that involve the decision whether or not to undergo a screening or diagnostic test.	Screening Test	1	(174)
		- Cancer Screening	1	(174)

*Three studies are listed twice as they were assigned two different codes

273 *End-of-life care preferences*

274 The largest evidence cluster comprised the 51 studies (34 %) addressing end-of-life care
275 preferences, most of which were in specialised care settings (41/51 studies) (Figure 2). Content
276 analysis of this preference revealed that advance care planning (51), in which multimorbid
277 patients with advanced chronic diseases were asked how they would like to be cared for in the
278 final months of their lives, was the main theme (Table 2). The most common theme within this
279 cluster concerned preferences for specific life-sustaining treatments (29/51) (28,32–
280 34,36,42,45,67,68,70,71,76,77,79,81,83,84,87–90,92–95,98–101), such as cardiopulmonary
281 resuscitation or mechanical ventilation. Additional topics in this cluster addressed themes such
282 as the preferred place of death (e.g. home versus hospice) (67).

284 *Self-management preferences*

285 The second largest evidence cluster included 34 studies (22 %) and addressed patients' self-
286 management priorities, defined as activities that an individual undertakes to maintain or reduce
287 the effect of a disease/s on their health status (175). Most studies about self-management
288 preferences were conducted in primary care (21/34). The only intervention study in the
289 evidence map (113) used a cluster-randomised design to evaluate whether structured priority-
290 setting consultations led to a sustainable reconciliation of diverging physician-patient views on
291 the importance of health problems. Overall, content analysis of this evidence cluster revealed
292 five key themes: (i) patients' prioritisation of their multiple health problems (20/34)
293 (39,40,54,56,63,103,105–118), as an example of which patients were asked how they prioritised
294 their osteoarthritis over their other conditions (117), (ii) patients' preferences regarding self-
295 management of their medications (8/34) (51,52,56,63,119–122) and, for instance, its
296 association with treatment adherence (51), (iii) patients' self-care behaviours (3/34) (53,64,123)

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3 297 aimed at accomplishing their life goals (53), (iv) characteristics of eHealth support tools (2/34)
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5 298 (30,104) to help patients self-manage their multiple health conditions (104) and (v) changes in
6
7 299 patients' choices resulting from changing circumstances (2/34) (29,30).
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11 301 *Treatment preferences*

12 302 Thirty-two studies (22 %) investigated a variety of treatment preferences concerning (i)
13
14 303 medication (13/32) (37,44,50–52,56,58,62,63,124–126), perhaps for a specific blood pressure-
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16 304 lowering drug due to its characteristics (e.g. effects and dose schedule) (124), (ii) dialysis as a
17
18 305 treatment option in end-stage renal disease (6/32) (46,57,127–130), (iii) surgery (4/32) (131–
19
20 306 134), such as a decision in favour of implantable cardioverter-defibrillators or joint
21
22 307 replacement, (iv) chemotherapy (5/32) (35,66,135–137), for which studies may have examined
23
24 308 preferences in adjuvant cancer treatments and, (v) non-pharmacological / conservative
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26 309 interventions (3/32) (138–140), such as studies exploring preferences for activity interventions
27
28 310 (138).
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35 312 *Involvement in the shared decision making process*

36
37 313 Twenty-five (17 %) studies explored how patients preferred to be involved in the shared
38
39 314 decision making process. Studies in this cluster investigated preferred (i) patterns of
40
41 315 engagement (21/25) (37,50,143–151,55,57–61,66,142), (ii) information (4/25) (48,61,146,152),
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43 316 (iii) communication with providers (1/25) (49) and, (iv) patient decision aids (1/25) (65).
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50 318 *Healthcare service preferences*

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52 319 Twelve studies (8 %) focused on preferences for certain healthcare services, and specifically (i)
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54 320 preferred care processes (10/12) (54,153–161), such as continuity of care, accessibility and
55
56 321 acceptance of the substitution of a physician by nurses and, (ii) service models (2/12) (31,162),
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3 322 perhaps asking patients about their preferences regarding Chronic Care Model

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5 323 recommendations (31).

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9 325 *Health outcome prioritisation and goal setting*

10 326 Nineteen studies (13 %) investigated health outcome prioritisation and goal setting. These may

11
12 327 have been (i) patients' holistic goals for their lives or with respect to their various diseases

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14 328 (6/19) (53,64,163–166), (ii) health outcome prioritisation (10/19) (47,62,75,167–171,176,177) -

15
16 329 one study in particular addressed the tools patients preferred to use to prioritise health

17
18 330 outcomes (167) and (iii) collaborative goal setting among patients, physicians and caregivers

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20 331 (3/19) (123,172,173).

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22 332

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24 333 *Screening and diagnostic tests*

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26 334 One study (174) investigated cancer screening preferences among patients with

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28 335 multimorbidity.

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32 337 [About here: Figure 2 Types of preference investigated in the included studies by setting and

33
34 338 study design]

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37
38 340 **DISCUSSION AND CONCLUSION**

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40 341 This work provides a systematic overview of research on health-related preferences of older

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42 342 patients with multimorbidity.

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45
46 344 **Evidence clusters**

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48 345 We identified 152 studies, most of which were published within the last decade and conducted

49
50 346 in developed countries. The vast majority of studies included in the evidence map used a

51
52 347 qualitative or cross-sectional quantitative design (126/152).

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3 348 Our clustering approach revealed that studies of patient preference focused on seven areas:
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5 349 end-of life care, self-management, treatment, involvement in shared decision making, health
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7 350 outcome prioritisation/goal setting, healthcare service delivery and screening/diagnostic
8
9 351 testing. The size of the evidence clusters varied widely (from 1 to 51 studies) and the research
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11 352 objectives and settings differed considerably.

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14 353 The largest and most homogenous cluster was of end-of-life preferences (51/152 studies) and
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16 354 was largely confined to specialised care (41/51). Furthermore, the study objectives revealed
17
18 355 one overarching theme (advance care planning) and were relatively uniform compared with
19
20 356 the other clusters.

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23 357 Self-management and treatment preferences were the second (34/51) and third (32/51)
24
25 358 largest clusters respectively. Although studies about self-management preferences were
26
27 359 relatively homogeneous in terms of study setting (they were mostly conducted in primary care
28
29 360 (21/34)), we found considerable variability in the overarching themes. Treatment preferences
30
31 361 were rather heterogeneous, with the cluster containing a variety of settings and themes.

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34 362 Overall, we identified clusters of evidence. However, as evidence maps do not permit the
35
36 363 critical appraisal of the robustness of evidence, the evidence clusters (i.e. studies) still require
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38 364 verification (19).

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42 43 366 **Evidence gaps**

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45 367 Longitudinal studies were rare and the few that did observe changes in preference over time
46
47 368 generally concerned end-of-life care preferences (33,43,45,71,76,79). The only intervention
48
49 369 study we identified (113) highlighted the fragility of prioritisation processes over time, and
50
51 370 showed that health priorities shared by patients and physicians were often not sustainable
52
53 371 two weeks after an intervention. Preferences tend to change when chronic conditions worsen
54
55 372 (33,43,45,71,76,79), additional diagnoses are made that lead patients to prioritise a new
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57 373 condition over existing ones (103), or new information about treatment options is obtained
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3 374 (37). However, although crucial in clinical decision making, it is unclear how and why patient
4
5 375 preferences change significantly over time. High quality longitudinal studies are needed to
6
7 376 help physicians deal with changing preferences and to reassess preference-sensitive decisions.
8
9 377 We identified a further research gap in a lack of studies in older patients with multimorbidity
10
11 378 that test the effectiveness (i) of interventions using different methods to elicit/construct
12
13 379 preferences, and (ii) of (complex) interventions that proactively consider patient preferences
14
15 380 among patient-relevant outcomes.
16
17 381 The smallest cluster (containing only one study) concerned the preferences of older patients
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19 382 with multimorbidity with respect to screening or diagnostic tests (174). This finding is
20
21 383 surprising, as the additional health-related burden of screening and diagnostic tests can be
22
23 384 substantial, and it is well-known that the risk-benefit ratio of such tests can be highly
24
25 385 preference-sensitive (13).

26
27 386 It is worthy of note that end-of-life care preferences were mostly assessed in specialised
28
29 387 ambulatory care. As palliative care is a core task in primary care, we would have expected
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31 388 more studies to address such end-of-life preferences in this setting (178).
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39 **Comparison with other studies**

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41 391 This is the first evidence map of health-related preferences in older patients with
42
43 392 multimorbidity. Although previously published evidence summaries, such as scoping or
44
45 393 systematic reviews, partially addressed specific topics relating to some of the clusters
46
47 394 identified in this evidence map, none focused on older patients with multimorbidity.
48
49 395 Four systematic reviews explored preferences in end-of-life care (as well as other preferences,
50
51 396 such as involvement in shared decision making and goal setting): (i) Puts et al. (179,180)
52
53 397 systematically reviewed factors influencing older adults' (not necessarily multimorbid) decision
54
55 398 to accept or refuse cancer treatment, (ii) de Decker et al. (181) confirmed an association of the
56
57 399 wish not to be resuscitated with multimorbidity, (iii) Singh et al. (182) conducted a meta-
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3 400 analysis on the roles cancer patients (not necessarily multimorbid) prefer to play in treatment
4
5 401 decision-making, and (iv) Vermunt et al. (183) evaluated studies of the effects of interventions
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7 402 that support collaborative goal setting in elderly people with a chronic health condition or
8
9 403 multimorbidity, including our only intervention study (113).
10
11 404 Most of the evidence summaries of health-related preferences focused on end-of-life care
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13 405 preferences , and specifically its determinants(179–181). Further research should concentrate
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15 406 on the clusters and gaps identified in our evidence map in order to enhance our understanding
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17 407 of the preferences of older patients with multimorbidity.
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409 **Strengths and limitations**

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25 410 A major strength of our approach is that we used a sensitive strategy that combined controlled
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27 411 terms (i.e. a defined vocabulary to index and retrieve information from the included electronic
28
29 412 databases) and free-text searches in all relevant databases. Furthermore, we did not apply any
30
31 413 restrictions to publication language, design, or geographical location of the studies.
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34 414 Additionally, we searched for unpublished studies in registries and contacted authors of
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36 415 conference papers.

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38 416 However, we addressed a broad topic with incomplete indexing (both, multimorbidity and
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40 417 patient preferences) and may have missed studies. In particular, we did not include search
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42 418 terms for specific measures of preference (e.g., analytic hierarchy process, discrete choice
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44 419 experiment, conjoint analyses) in electronic searches, because test searches including them
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46 420 did not increase sensitivity. Furthermore, we did not search grey literature, as this approach
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48 421 would not have identified additional relevant studies that could have justified the enormous
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50 422 effort involved (184).
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54 423 Despite the experience gathered in the pilot study (published elsewhere), the use of a lower
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56 424 age limit of at least 60 years was difficult to operationalise, as studies often included a wide
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3 425 age range but did not always report separate results for older patients. When the age group
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5 426 was unclear, we did not include the study.
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7 427 Furthermore, we used an iterative process to develop our evidence clusters and the identified
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9 428 clusters and their definitions were agreed on by all authors. However, inherent to the methods
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11 429 used, we cannot rule out some subjectivity.
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16 431 **Conclusions and further research outlook**

18 432 This evidence map provides the first systematic overview of empirical investigations
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20 433 concerning health-related preferences of older patients with multimorbidity. Their objectives
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22 434 addressed a broad range of relevant topics across all settings and used predominantly cross-
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24 435 sectional and observational qualitative and quantitative methods. Our evidence map also
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26 436 revealed gaps, both in general – such as the scarcity of longitudinal studies to investigate
27
28 437 changes in preferences over time, and of intervention studies, which, with one exception
29
30 438 (113), failed to develop and test interventions to support the construction of health-related
31
32 439 preferences in this population. More specifically, we found a remarkably low number of
33
34 440 studies addressing preferences concerning end-of-life care in a primary care setting, as well as
35
36 441 preferences related to screening and diagnostic testing. Furthermore, the included studies
37
38 442 varied considerably in terms of terminology (e.g. preferences, priorities, views, perceptions)
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40 443 and decision-making components and concepts (e.g. trade-offs, decision regret, goal setting).
41
42 444 These require further elucidation.
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963 **ACKNOWLEDGMENTS**

964 The authors would like to thank Katharina Wollmann for her support in the literature screening
965 process, as well as Jessica Comilang for her assistance in providing full texts of the screened
966 studies and Pauline Philipp for her support in contacting authors of conference proceedings
967 manuscripts.

968 **CONTRIBUTORS**

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2
3 969 AIG wrote the initial draft of the manuscript. CM is the guarantor of the review. CS and JM
4
5 970 provided methodological guidance and revisions to the manuscript. EM developed and carried
6
7 971 out the search strategy. CS and JN assisted in the identification of databases and the search
8
9 972 strategy. AIG and JN screened the studies, extracted the data and performed content analysis.
10
11 973 AIG summarised descriptives, and TN, MSB and JN assisted with figures. JB, MvA, TN, MSB,
12
13 974 OW, KR, TH, FG and SS are co-supervisors of this project, provided advice at all stages of the
14
15 975 development of the protocol, and contributed to the revision of the manuscript. All authors
16
17 976 read and approved the final manuscript.
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21 977 **FUNDING**
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24 978 This work was supported by the German Federal Ministry of Education and Research, grant
25
26 979 number 01GL1729.
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30 980 **DISCLAIMER**
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32
33 981 The funder had no role in developing the protocol or obtaining the results for this review.
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37 982 **COMPETING INTERESTS**
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39 983 None declared
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42 984 **DATA SHARING**
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45 985 No additional data available.
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49 986 **PATIENT AND PUBLIC INVOLVEMENT**
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52 987 Not required.
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55 988 **WORD COUNT**
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3 991 **FIGURE LEGENDS**
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5 992 **Figure 1. Evidence map PRISMA flowchart**
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7 993 **Figure 2. Types of preference by setting and study design***
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10 994 Circle size represents the number of studies; pattern coding represents the study design. *The
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12 995 bubble plot displays more than the total number of included studies (n=174 vs. n=152) because
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14 996 22 studies were assigned to two different types of preference.
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Figure 1. Evidence map PRISMA flowchart (21)

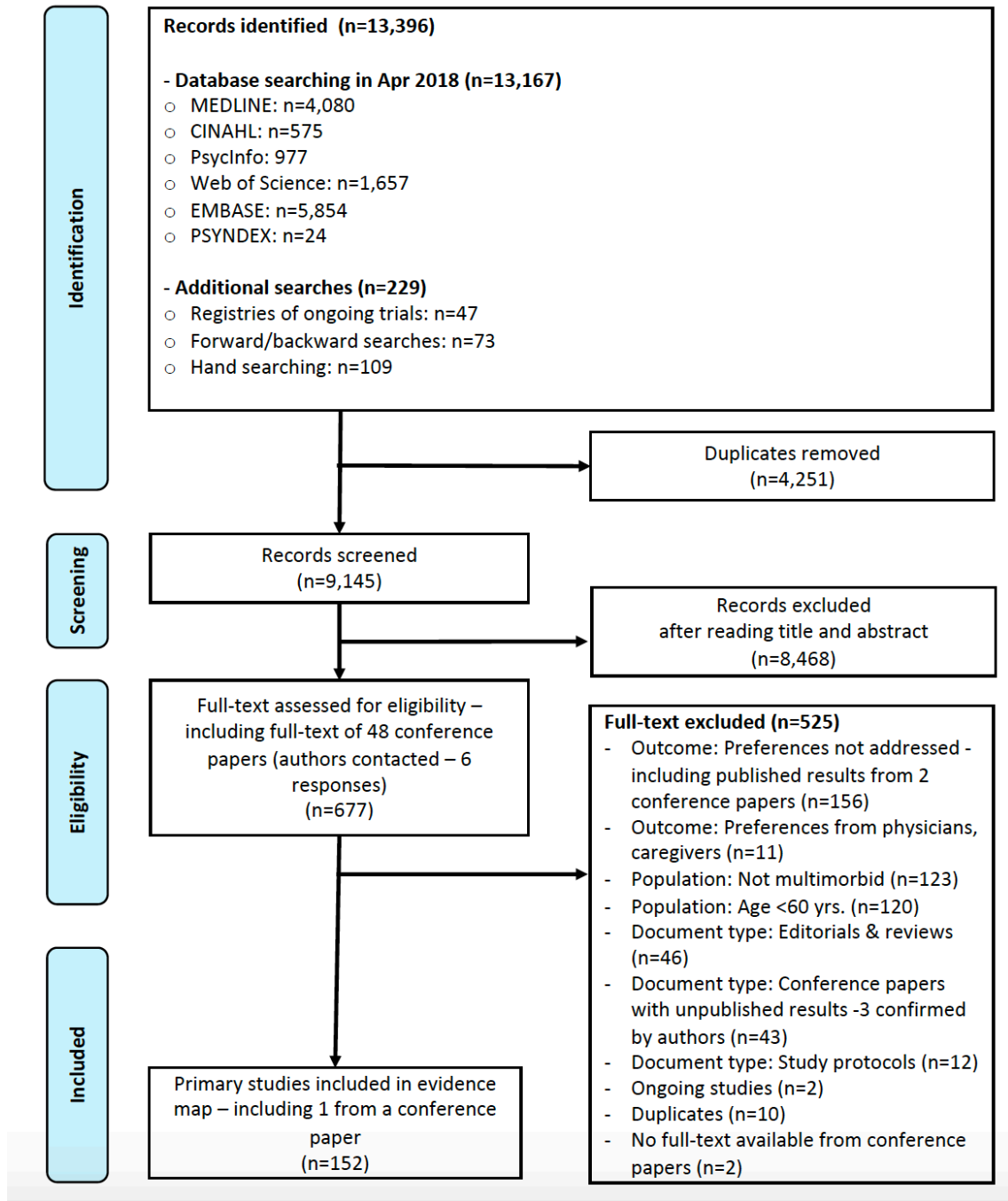
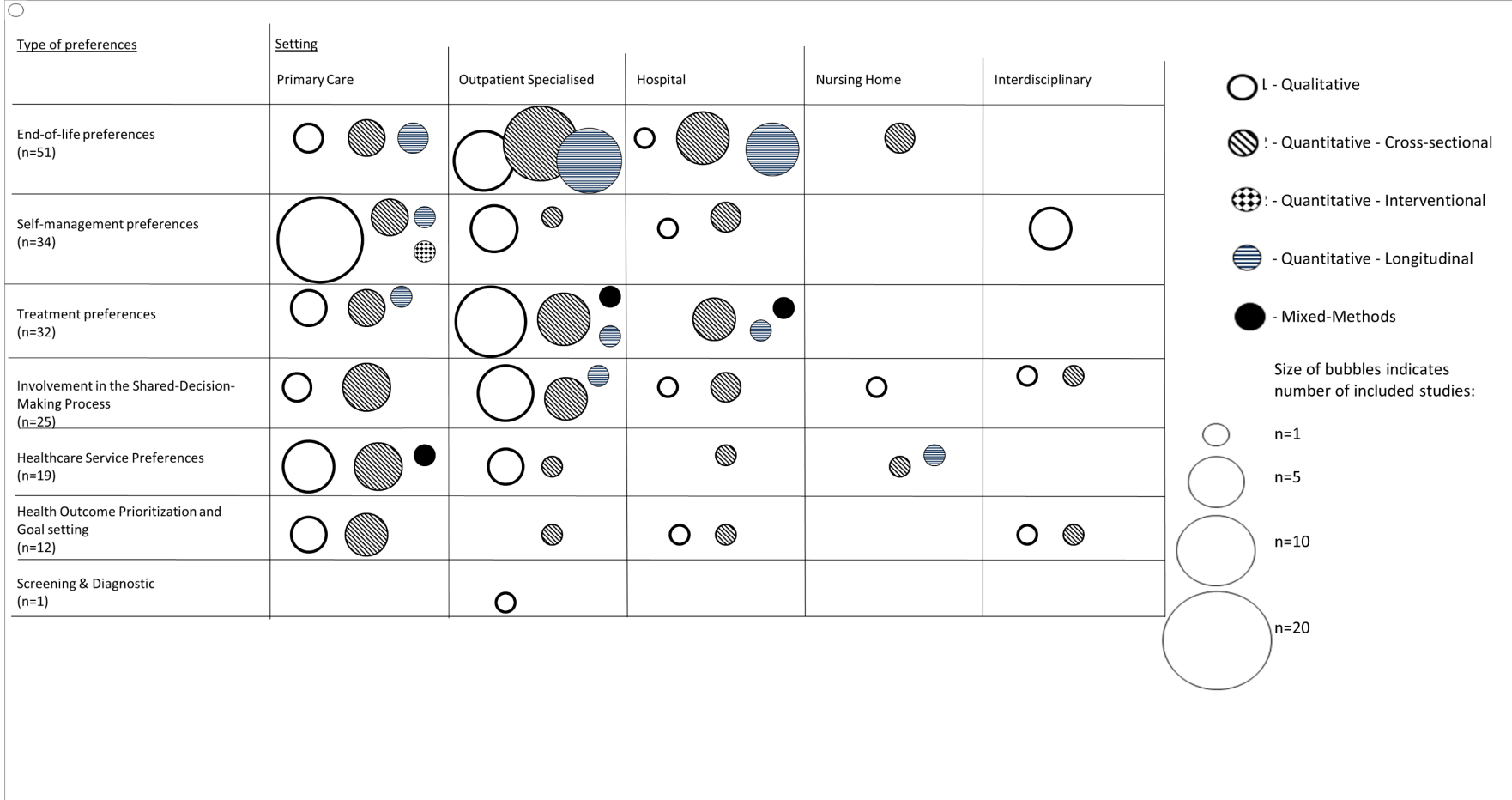


Figure 2. Types of preferences investigated in the included studies by setting and study design*



Size of the circles represent number of studies; pattern coding represents study design. *The bubble plot depicts more than the total number of included studies (n=174 vs. n=152) because 22 studies were assigned to two different types of preferences.

Figure S1. Number of studies published per year.

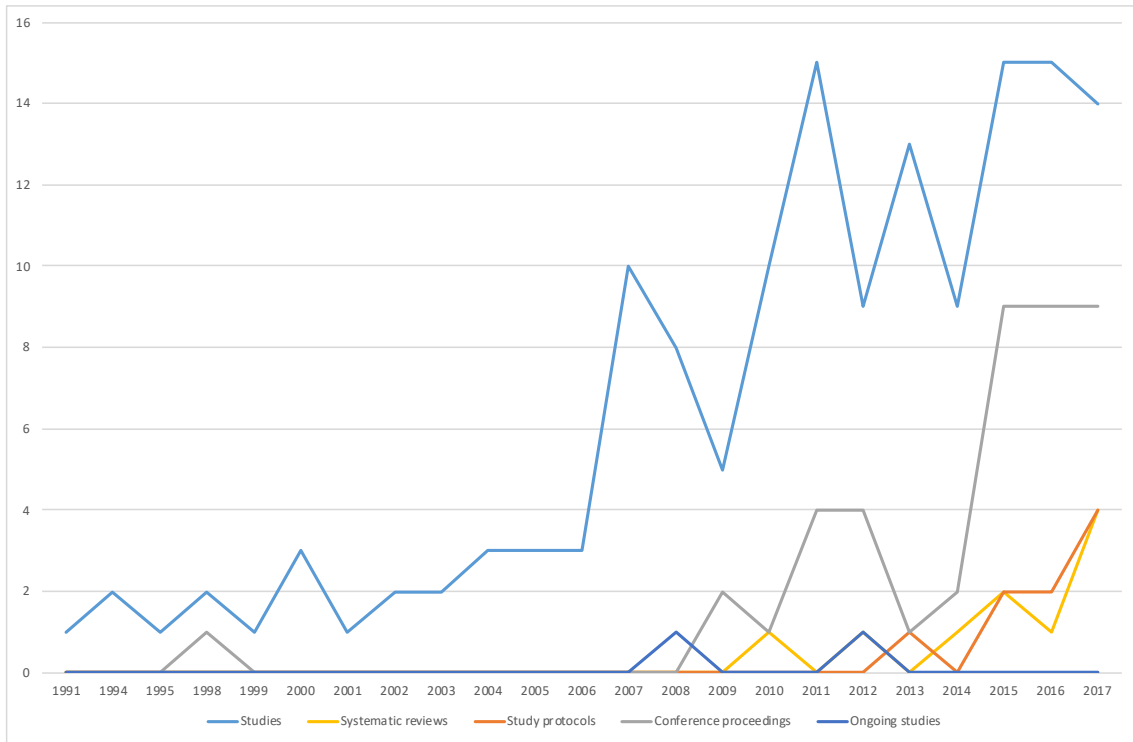


Table S1. Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	Page 1
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.	Pages 5-6
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 8-9
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 conceptualise the review questions and/or objectives.	Page 9
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 6
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 10-11
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 9-10
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; Suppl table 2.
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	Page 10-11
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms, or forms that were tested by the team before being used, and whether data charting was done independently or in	Page 10

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
		duplicate) and any processes for obtaining and confirming data from investigators.	
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	Page 11
Critical appraisal of individual sources of evidence	12	If applicable, 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).	Not applicable
Synthesis of results	13	Describe the methods of dealing with and summarising the data that were charted.	Page 11-12
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.	Page 12; Suppl table 3, Figure 1.
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	Page 12; Table 1.
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	Not applicable
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.	Pages 13-16; Tables 2 and 3.
Synthesis of results	18	Summarise and/or present the charting results as they relate to the review questions and objectives.	Pages 13-16; Figure 2
DISCUSSION			
Summary of evidence	19	Summarise the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	Pages 16-18
Limitations	20	Discuss the limitations of the scoping review process.	Page 19
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.	Page 20
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 41

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

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3 * Where *sources of evidence* (see second footnote) come from, such as bibliographic
4 databases, social media platforms, and Web sites.

5 † A more inclusive/heterogeneous term used to account for the different types of evidence or
6 data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy
7 documents) that may be eligible for inclusion in a scoping review as opposed to only studies.
8 This is not to be confused with *information sources* (see first footnote).

9 ‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI
10 guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.

11 § The process of systematically examining research evidence to assess its validity, results, and
12 relevance before using it to inform a decision. This term is used for items 12 and 19 instead of
13 "risk of bias" (which is more applicable to systematic reviews of interventions) to include and
14 acknowledge the various sources of evidence that may be used in a scoping review (e.g.,
15 quantitative and/or qualitative research, expert opinion, and policy document).
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21 *From:* Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension
22 for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. *Ann Intern Med.*169:467–473.
23 doi: 10.7326/M18-0850
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1 **Table S2. Search strategy used for MEDLINE database (search interface: Ovid; Host: Wolters Kluwer)**

2 MEDLINE 1946 to the third week of April, 2018,

3 MEDLINE Daily Update April 26, 2018,

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

5 MEDLINE Epub Ahead of Print April 26, 2018

6 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	(concurrent* adj2 (disease* or ill or illness* or condition* or disorder*)).ti,ab,kf.	4305	
19	(multimedica* or multi*-medica* or polymedica* or poly-medica* 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:
24	exp patient satisfaction/	78556	Aspect patient-centered
25	decision making/	83248	care
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

1 2 3 4 5 6 7 8 9	43	((patient*orientier* or klient*orientier* or patient*zentrier* or klient*zentrier* or person*orientier* or person*zentrier*).ot.	179	
10 11 12 13 14	44	((patient* or klient* or person*) adj (zentrier* or orientier*)).ot.	24	
15 16 17 18 19	45	((goal* or priorit* or target* or value* or preference*) adj2 (patient* or individual* or person* or client*)).ti,ab,kf.	63093	
20 21 22 23 24	46	((goal* or priorit* or target* or preference*) adj2 treatment*).ti,ab,kf.	32182	
25 26 27 28 29	47	((patient* or client* or person*) adj2 choice*).ti,ab,kf.	9970	
30 31 32	48	shared decision making.ti,ab,kf.	5495	
33 34 35 36 37 38 39	49	or/23-48	326625	
40 41 42 43 44	50	22 and 49	4208	Aged AND Multi-morbidity AND patient-centered care
45 46 47 48 49 50 51	51	protocol.ti.	35122	Textword protocol in title
52 53 54 55 56 57 58 59 60	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

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8 / = Medical Subject Heading (MeSH)

9 Exp = exploded Mesh term

10 * = truncation, any number of characters

11 *2, *3 = truncation: from 0 to 2, 0 to 3 characters

12 ? = 0 or 1 character

13 # = 1 character

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

15 .ti. = title

16 .ot. = original title

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- 17 .mp. = title, abstract, original title, name of substance word, subject heading word, keyword heading
- 18 word, protocol supplementary concept word, rare disease supplementary concept word, unique
- 19 identifier
- 20 .pt. = publication type
- 21 *adjn* = Search terms within *n* words in any order

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Table S3. Key characteristics of the included studies.**Table S3a. Key characteristics – Qualitative cross-sectional studies**

Source	Study methods			Patient population			
	Study aim	Setting, country	Data collection	Def of MM	Sample (number)	Age: Mean (SD); range	Sex (% females)
Bayliss, 2008 (136)	To explore processes of care desired by elderly patients with MM, and that may present competing demands for patients and providers	Population based; USA	ssl (f2f)	≥ 2 chronic conditions	26	65-84	50
Belcher, 2006 (134)	To explore the views of older adults regarding participation in medication decision-making	GP & Hospital (outpatient) & Nursing home; USA	ssl (f2f)	≥ 2 chronic conditions + ≥ 1 medications	51	77; 65-89	63
Beverly, 2008 (94)	To define, identify, and rank the values and preferences that older adults express in their diabetes care	Population based; USA	FG	Type 2 diabetes + ≥ 1 comorbidity	35	75; 60-88	57
Beverly, 2011 (95)	To explore the perceived impact of chronic co-morbid conditions on type 2 diabetes self-management in older patients	Population based; USA	FG	Type 2 diabetes + ≥ 1 comorbidity	32	75 (7); 60-88	56
Bower, 2012 (96)	To examine patients' representations of multimorbid long-term conditions and assess how models of illness representation might need modification in the presence of MM	GP; UK	ssl (f2f)	≥ 2 chronic conditions	28	Median 66; 39-89	43
Bravo, 2017 (125)	To identify typologies of decision-making with foreign-born Latino elders with MM who have enrolled in an integrative geriatric health care program	Nursing home; USA	ssl (f2f)	≥ 2 chronic conditions	13	75; 65-85	77
Brown, 2007 (104)	To describe how goals for the self-management of hypertension are developed and whether or not they conform to the characteristics of effective goal-setting	Hospital (outpatient); USA	I (f2f)	Hypertension + comorbidities	30	70 (9); 50-87	100

Browne, 2014 (137)	To examine patient, carer, and professional perspectives on current management of advanced CHF, as well as barriers and facilitators to improved care	GP & Hospital (inpatient); UK	FG & ssl (f2f)	CHF (severe)	30	72; 60-86	27
Caldwell, 2007 (39)	To identify the preferences of patients with advanced CHF regarding communication about their prognosis and its implications	Hospital (outpatient); Canada	I (f2f)	CHF (severe)	20	68; 50-84	30
Caughey, 2017 (108)	To examine how older patients with MM and clinicians balance benefits and harms associated with a medication and in the presence of competing health outcomes	Hospital (outpatient); Australia	I (f2f)	≥2 chronic conditions	15	Median; IQR: 79; 73-86	53
Cheraghi-Sohi, 2013 a (97)	To explore how patients prioritise their osteoarthritis among all their conditions, which factors underlie this prioritisation, and whether and why these priorities change over time	Hospital (outpatient); UK	2a	≥ 2 chronic conditions Osteoarthritis	30	69; 55-86	60
Cheraghi-Sohi, 2013 b (98)	To explore how and why people with MM prioritise some long-term conditions over others, what the potential implications may be for self-management activity, and, in turn, suggest how such information may help clinicians negotiate the management of MM patients	GP; UK	2a	≥ 2 chronic conditions Osteoarthritis	41	68; 39-83	44
Clover, 2004 (51)	To report on a study exploring patients' understanding of their discussions about end-of-life care with nurses in a palliative care setting	Hospital (outpatient); Australia	I (f2f)	Terminal illness	11	74; 57-85	36
DiNapoli, 2016 (106)	To explore middle-aged and older veterans' current disease-management practices, mental health treatment preferences, and challenges they face in living with MM	GP; USA	ssl (f2f)	≥2 score (cumulative Illness Rating Scale for Geriatrics)	28	64 (6)	21
Ekdahl, 2010 (128)	To deepen the knowledge of frail elderly patients' preferences for participation in medical decision-making during hospitalisation	Hospital (inpatient); Sweden	ssl (f2f)	≥ 3 chronic conditions	15	84; 75-96	67
Etkind, 2017 (170)	To understand patient experiences of uncertainty in advanced illness and develop a typology of patients' responses and preferences to inform practice	Hospital (outpatient); UK	2a	Seriously ill patients CHF, COPD, CKD, liver disease or cancer	30	75; 43-95	40

1 2 3 4 5 6 7	Fix, 2014 (92)	To understand barriers to hypertension self-management in patients with hypertension and comorbidities	GP; USA	ssl (f2f)	Hypertension + ≥ 1 comorbidity	48	60 (10)	10
8 9 10 11	Fried, 2003 (151)	To elicit from patients themselves the aspects of treatment decision-making that are most important to them when making end-of-life treatment decisions	Hospital (outpatient); USA	FG & ssl (f2f)	Seriously ill patients CHF, COPD, CKD or cancer	23	70; 60-84	35
12 13 14 15 16	Fried, 2008 (53)	To examine the ways in which older persons with MM think about potentially competing outcomes in order to gain insight into how processes to elicit values regarding these outcomes can be grounded in the patient's perspective	Community; USA	FG	≥ 5 medications	66	75 (6)	67
17 18 19 20 21	Green, 2015 (115)	To examine older adults' attitudes towards ICD implantation in the context of competing health risks and to explore the determinants of ICD decision-making among a group of patients who had faced the decision in the past	Hospital (outpatient); USA	ssl (tel.)	ICD + comorbidities + Geriatric syndromes mean (SD): 6.9 (2.7).	44	78 (5)	29
22 23 24 25 26	Gross, 2015 (161)	To understand how older persons with MM approach decisions about cancer screening	Hospital (outpatient), USA	ssl (f2f)	≥ 2 chronic conditions + ≥ 5 medications	28	65-75: 57% 76-85: 4% >86: 21% Unknown: 18%	82
27 28 29	Hansen, 2015 (99)	To identify reasons for disagreement between patients and their GPs on illnesses	GP; Germany	FG	≥ 3 chronic conditions	21	77; 70-88	48
30 31 32 33	Haverhals, 2011 (100)	To understand the medication self-management issues faced by older adults and caregivers that can be addressed by an electronic personal health application	Hospital (outpatient) & Nursing homes; USA	FG & ssl (f2f)	≥ 2 chronic condition + ≥ 3 medications	32	82; 73-90	60
34 35 36 37 38	Huang, 2005 (55)	To explore self-reported healthcare goals, factors influencing these goals, and self-care practices of older patients with diabetes mellitus	GP; USA	ssl (f2f)	T2 diabetes + hypertension or hypercholesterole mia	28	74; 65-88	57

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Jones, 2015 (56)	To assess barriers and facilitators to the use of a patient decision aid designed for serious illness	Hospital (outpatient); USA	FG	Seriously ill patients	12	66; 28-96	66
Kuluski, 2013 (159)	To compare goals across each patient, caregiver and physician triad to determine alignment	GP; Canada	ssl (f2f)	≥ 2 chronic conditions	27	82 (8)	44
Lim, 2017 (146)	To identify what patients with MM describe as most important to their well-being and health	GP; USA	ssl (f2f)	Type 1 or 2 diabetes + ≥ 2 chronic conditions	31	69	45
Lindsay, 2009 (86)	To examine how patients self-manage MM and especially how they prioritise their conditions	GP; UK	FG	Mean conditions: 3.3 (2–8)	53	63	45
Linsky, 2015 (40)	To identify patient perspectives on intentional medication discontinuation in order to optimise medication use	GP; USA	FG & ssl (f2f)	≥ 5 medications	27	66	19
Lyle, 2017 (123)	To explore older people's experiences of living with neurogenic claudication, their preferences for physiotherapy treatment provision and associated outcomes in order to inform an intervention to be tested in a clinical trial	Hospital (outpatient); UK	ssl (f2f)	Lumbar spinal stenosis + comorbidities	15	75; 69-80	40
Manias, 2007 (101)	To investigate perceptions of and experiences with managing drug regimens from the perspectives of patients with osteoarthritis and coexisting chronic conditions and of healthcare professionals from diverse backgrounds	Hospital outpatient & consumer organisation; Australia	FG	Osteoarthritis + comorbidities	34	male: 75 (4) female: 67 (9)	79
McKillop, 2013 (42)	To explore attitudes towards medicines, polypharmacy and adherence in patients with CKD	Hospital (outpatient); UK	ssl (f2f)	CKD	10	60; 29-82	50
McPherson, 2014 (171)	To explore and describe patients' and caregivers' perspectives and roles concerning pain management at home	Community; Canada	ssl (f2f)	Advanced cancer receiving palliative care at home	18	78 (9)	56
Moen, 2009 (102)	To conduct an exploratory study describing multiple medicine use from the elderly patient's perspective	Population based; Sweden	FG	≥ 5 medications	59	76; 67-88	51
Morrow, 2004 (135)	To describe patient-centred instructions for taking CHF medications that were developed as part of a multifaceted pharmacy-based intervention to improve	GP; USA	FG	CHF	16	64	69

	medication adherence and health-related outcomes among older adults with CHF						
Morrow, 2008 (44)	To investigate the life and health goals of older adults with diabetes, and to explore the factors that influence their diabetes self-management	GP; USA	ssl (f2f)	Diabetes + hypertension + comorbidities	24	69	38
Naganathan, 2016 (140)	To understand how patients, informal caregivers and family physicians perceive the value of various formal and informal supports for older adults with MM	GP; Canada	ssl (f2f)	≥ 2 chronic conditions	27	82 (8)	43
Naik, 2016 (147)	To identify a taxonomy of health-related values that frame goals of care of older, MM adults who recently faced cancer diagnosis and treatment	Hospital (outpatient); USA	I (n.a.)	Colorectal, head and neck, gastric, or oesophageal cancers Deyo comorbidity index 6.85	146	65	2
Noël, 2005 (45)*	To explore collaborative care needs and preferences in primary care patients with MM	GP; USA	FG	≥ 2 chronic conditions	60	30-80	20
O'Dell, 2008 (124)	To increase understanding of the views of frail elderly women in residential care related to quality of life, values, and preferences for pelvic floor care	Hospital (outpatient); USA	ssl (f2f)	"Assisted living or long-term care"	25	Assisted living participants: 87; 73-96; Long term care: 81; 65-89	100
Pages-Puigdemont, 2016 (103)	To explore factors that impact on drug compliance and to identify strategies to improve it from the perspective of patients with at least one chronic condition	Hospital (outpatient); Spain	FG	≥ 1 chronic condition Mean comorbidities: 2.3 (1.7)	36	65; 39-90	53
Parks, 2014 (117)	To explore sociocultural factors that might influence African American and Hispanic patients' decisions regarding joint replacement	Hospital (outpatient); USA	ssl (f2f)	Osteoarthritis + comorbidities	36	68 (10)	80
Piamjariyakul, 2014 (172)	To explore end-of-life preferences and determine the presence of signed end-of-life advanced directives	Community; USA	I (f2f)	Cardiovascular disease (severe) + comorbidities	30	70	67

1 2 3 4 5 6 7 8	Proctor, 2008 (93)	To examine older adults' perceptions of depression among co-occurring social, medical, and functional problems and to compare the priority of depression with that of other problems	Community; USA	ssl (f2f)	Depression + comorbidities (86%)	40	74 (6)	90
9 10 11	Richardson, 2016 (89)	To identify and elaborate a range of factors that influence how and why patients with comorbid chronic conditions prioritise their conditions	GP & Hospital (outpatient); USA	ssl (f2f)	Comorbidities mean (range): 6 (3-11)	33	61-70: 67%	6
12 13 14	Rifkin, 2010 (47)	To find out how patients prioritise their medical conditions or decide which medications to take	Hospital (outpatient); USA	ssl (f2f)	CKD (stages 3-5D)	20	72; 55-84	60
15 16 17 18 19	Ruggiano, 2017 (173)	To expand current knowledge in the area of chronic health self-management, this study examined perceptions of transportation and health self-management among older adults with chronic conditions (i.e., chronic illnesses and disabilities)	Community; USA	ssl (f2f)	≥2 chronic conditions (82%)	37	77; 60-97	68
20 21 22 23	Schellinger, 2018 (149)	To examine whole-person goals of patients with serious illness identified during their last 2 to 3 years of life	Community; USA	I (f2f)	CHF, cancer and dementia comorbidity score (SD): 5 (1.5)	160	79 (11)	48
24 25 26 27	Schoenberg, 2009 (91)	Focusing on elders with two or more chronic conditions and low socioeconomic status, to investigate which morbidities older adults prioritise, why, and how they accommodate these conditions.	Community; USA	ssl (f2f)	≥2 chronic conditions	41	70; 55-90	85
28 29 30	Schoenborn, 2015 (142)	To characterise current practice and opportunities for improvement in the care of older adults with MM in an internal medicine residency clinic	Hospital (inpatient); USA	I (f2f)	≥2 chronic conditions	30	74 (7)	73
31 32 33	Seah, 2015 (113)	To gain insight into the decision-making process leading to opting out of dialysis and experience with conservative non-dialytic management from the patients' perspective	Hospital (outpatient); Singapore	ssl (f2f)	CKD (end-stage)	9	Median: 81; 61-84	44
34 35 36 37	Song, 2013 (48)	To address patient perspectives on the extent of information provided and how decisions to start dialysis are made	Hospital (outpatient); USA	ssl (tel.)	CKD (dialysis) + CCI ≥ 5-6	99	61 (12); 28-89	53

Stapleton, 2005 (72)	To understand how the association between preferences for life-sustaining treatment and depression or quality of life is important in providing care	Hospital (outpatient); USA	I (f2f)	COPD (Oxygen-prescribed)	101	67; 59-74	23
Strachan, 2011 (174)	To examine patients' perspectives on related end-of-life issues	Hospital (outpatient); Canada	I (f2f)	ICD + comorbidities	30	63; 26-87	20
Tariman, 2014 (49)	To examine patient perspectives with regard to the personal and contextual factors relevant to treatment decision-making	Hospital (outpatient); USA	ssl (f2f)	Multiple Myeloma	20	65 (8)	60
Visser, 2009 (114)	To explore the considerations taken into account by patients making decisions concerning renal replacement therapy	Hospital (outpatient); The Netherlands	I (f2f)	CKD + comorbidities	14	77 (7)	43
Walker, 2012 (175)	To explore the experiences of patients attempting to integrate lifestyle changes into their lives	Hospital (outpatient); UK	ssl (f2f)	CKD (Stage 4)	9	76	56
Weir, 2017 (133)	To explore decision-making about polypharmacy among older adults and their companions	Hospital (outpatient); Australia	ssl (f2f)	CCI 1-5+: 80%	30	83; 75-85+	63
Zulman, 2015 (105)*	To understand self-management and health care navigation challenges that patients face due to MM and to identify opportunities to support these patients through new and enhanced eHealth technology	GP; USA	FG	≥ 3 chronic conditions	53	59 (11)	26

Table S3b. Key characteristics – Qualitative longitudinal studies

Source	Study methods			Patient population			
	Study aim	Setting, country	Data collection	Def of MM	Sample (number)	Age: Mean (SD) or range	Sex (% females)
Baxter, 2012 (29)*	To increase understanding of disabled and chronically ill people's experiences of revisiting choices by considering events that prompted people to reconsider them	Hospital (outpatient) & Community; UK	I (f2f)	Chronic conditions + disabled	20	65+: 35%	75

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Klindtworth, 2015 (62)	To understand how old and very old patients with advanced CHF perceive their disease and to identify their medical, psychosocial and information needs, focusing on the last stages of life	Hospital (inpatient & outpatient); Germany	I (f2f)	CHF (severe)	25	85;71-98	56
Morris, 2011 (30)*	To examine what influences self-management priorities in individuals with multiple long-term conditions and how these change over time	GP; UK	ssl (f2f, tel.)	≥ 3 chronic conditions	21	50; 36-84	48
Pardon, 2009 (46)	To identify preferences of advanced lung cancer patients to receive information and participate in decision-making concerning treatment options, health-care-setting transfers and end-of-life decision-making	Hospital (outpatient); Belgium	ssl (f2f)	Advanced lung cancer	128	64; 41-86	20

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Table S3c. Key characteristics – Quantitative cross-sectional studies (observational)

Source	Study methods			Patient population			
	Study aim	Setting, country	Data collection	Def of MM	Sample (number)	Age: Mean (SD) or range	Sex (% females)
Ainslie, 1994 (37)**	To examine hypotheses that elderly persons refusing minimally described treatment might choose nonaggressive treatment if options were described, and that persons refusing treatment would want an active decision-making role	Community; USA	S	≥2 chronic conditions	116	[older patients]	75
Buttery, 2014 (145)	To investigate older CHF patients' preferences from hospital, community and home-based service models, and sociodemographic and clinical factors associated with these preferences	Hospital (inpatient); UK	S	CHF (moderate-severe)	106	78 (7)	38
Chanouzas, 2012 (110)	To examine how patient choice of different treatment modalities [haemodialysis, peritoneal dialysis and conservative management] is influenced by personal and demographic parameters	Hospital (outpatient); UK	S	CKD (pre-dialysis)	118	67 (14)	48
Chi, 2017 (126)	To explore preferences for health care decision making among older adults, and identify MM profiles associated	Population based; USA	S	≥ 2 chronic conditions	2,017	65-74: 55% 75-84: 34% ≥85: 12%	57

	with preferring less active, i.e., passive, participation among older US adults						
Chiu, 2016 (50)	To determine the Decision Control Preferences (DCP) of diverse, older adults and whether DCPs are associated with participant characteristics, advance care planning, and communication satisfaction	Hospital (outpatient); USA	S	≥ 2 chronic conditions	146	71 (10)	41
Collins, 2004 (127)	To determine whether psychological variables, particularly depression, influence patients' willingness to share medical decisions with family members or friends	Hospital (outpatient); USA	Ic (f2f)	Seriously ill patients CCI ≥ 5	95	70; 44-85	2
Davison, 2010 (176)	To evaluate end-of-life care preferences of CKD patients to help identify gaps between current end-of-life care practice and patients' preferences and to help prioritise and guide future innovation in end of-life care policy	Hospital (outpatient); Canada	S	CKD (stage 4 and 5)	584	68 (14)	46
De Vries, 2015 (109)	To assess whether patients' willingness to add a blood pressure-lowering drug and the importance they attach to specific treatment characteristics differ among age groups in patients with type 2 diabetes	Community; The Netherlands	S	Diabetes + Hypertension	151	68 (9)	42
Downey, 2013 (79)	To investigate patient preferences for life-sustaining therapies, clinicians' accuracy in understanding those preferences, and predictors of patient preference and clinician error	GP; USA	S	COPD	196	69 (10); 39-91	0
Ehman, 2017 (138)	To test if multimorbidity patients may value continuity more highly than healthy patients, and thus may prefer to wait to see their primary care physician (PCP)	GP; USA	S	MM Tier score: 3 or 4	193	62 (65+: 119)	58
Ekdahl, 2011 (129)	To investigate the preferred and the actual degree of control, i.e. the role elderly people with co-morbidities wish to assume and actually had with regard to information and participation in medical decision making during their last stay in hospital	Hospital (inpatient); Sweden	S	≥ 3 chronic conditions	156	83; 76-98	51
Elie, 2018 (177)	To compare SPMI and CMI patients' end-of-life care preferences and comfort level with end-of-life care discussions, and identify potential predictors of interest in medical assistance in dying	Hospital (outpatient); Canada	S	SPMI and CMI	SPMI; 106; CMI 95	SPMI 66 (13); CMI 63 (13)	SPMI: 63; CMI: 60

Flynn, 2007 (178)	To explore relationships between five factors of personality and four preference types that account for multiple components of the health care decision-making process (information exchange, deliberation, and selection of treatment choice)	Population based; USA	S	Mean OARS conditions: 3.8 (2.5); Mean medications: 2.8 (2.5)	5,830	64 (1)	54
Fox, 2018 (122)	To explore older hospitalised patients' perceived acceptability of, and preference for, two low-intensity early activity interventions (bed-to-sitting and sitting-to-walking), and characteristics associated with perceived acceptability and preference	Hospital (inpatient); Canada	S	≥2 chronic conditions	60	79 (8)	53
Fried, 1994 (179)	To characterise the limitation of care in routine geriatric practice in advance of and at the time of a patient's final episode of illness.	GP; USA	Chart	Seriously ill patients CHF, COPD, CKD or cancer	59	84 (8)	85
Fried, 2002a (180)	To examine the effects of the burden of treatment and a variety of possible outcomes on the preferences for care expressed by older patients with serious illnesses	Hospital (inpatient & outpatient); USA	lc (f2f)	Seriously ill patients CHF, COPD, CKD or cancer	226	73 (7)	43
Fried, 2002b (81)	To develop a patient-centred measure of treatment preference applicable across a range of diseases and treatment decisions	Hospital (inpatient & outpatient); USA	Survey	Seriously ill patients CHF, COPD, CKD or cancer	125	73 (7)	43
Fried, 2011a (181)**	To explore the use of a simple tool to elicit older persons' health outcome priorities	GP; USA	lc (f2f)	≥ 4 chronic conditions (69%) + ≥ 4 medications (49%)	357	[older patients]	75
Fried, 2011b (153)	To develop and test a simple tool to elicit the preferences of older persons based on prioritisation of universal health outcomes	Community housing; USA	lc (f2f)	Hypertension + fall risk Mean chronic conditions (SD): 2.9 (1.1)	81	65-74: 16% 75-84: 54% 85+: 30%	69
Girones, 2012 (119)	To examine the relationships between preferences and chemotherapy use in this group of patients	Hospital (inpatient); Spain	S	Lung cancer + comorbidities (84%).	83	77; 70-91	24

Green, 2016 (116)	To explore patients' perceptions of their decision-making experiences related to ICDs	Hospital (outpatient); USA	S	ICD + comorbidities (71%)	295	65-74: 25% 75-84: 23% 85+: 3%	22
Gum, 2010 (139)	To examine use of behavioural health services, treatment preferences, and facilitators and barriers to service use in older adults receiving home-based services within the aging network	Aging network agencies; USA	S	≥ 2 chronic conditions No medication group: 4.4 (2.1); Medication group: 5.7 (2.8)	142	75 (8)	80
Hamelinck, 2016 (120)	To examine patients' preferences for adjuvant chemotherapy and adjuvant hormonal therapy, factors related to minimally required benefit, and patients' self-reported motivations	Hospital (outpatient); The Netherlands	S	Advanced cancer + comorbidities	81	Median: 61; 42-86	100
Hopper, 2016 (54)	Use questionnaires to examine the attitudes of patients and prescribing clinicians to medication withdrawal	Hospital (inpatient & outpatient); Australia	S	CHF + ≥ 5 medications	85	61 (12)	27
Janssen, 2011 (182)	To assess life-sustaining treatment preferences, advance care planning, and the quality of end-of-life care communication in Dutch outpatients with clinically stable but severe COPD or CHF	Hospital (outpatient); The Netherlands	S	COPD or CHF (severe)	185	COPD 66 (9); CHF: 76 (8)	COPD: 38; CHF: 32
Janssen, 2013 (183)	To understand the preferences for life-sustaining treatments of outpatients on dialysis and to study the quality of patient-physician communication about end-of-life care and barriers and facilitators to this communication	Hospital (outpatient); The Netherlands	S	CKD (Dialysis)	80	62 (16)	40
Janssen, 2015 (154)	To rate the relative importance of different outcomes for haemodialysis patients and to analyse whether the relative importance differed among subgroups of patients	Hospital (outpatient); Germany	S	CKD (Dialysis)	4,518	67 (14)	42
Jorgensen, 2013 (57)	To identify potential barriers to adjuvant chemotherapy, use in older patients by examining the associations between patient age, factors influencing chemotherapy	Hospital (outpatient); Australia	S	Colon cancer + ≥1 chronic condition	35	74 (5)	47

	treatment decisions, and preferences for information and decision-making involvement						
Junius-Walker, 2011 (84)	To disclose patients' and doctors' perspectives on individual health and treatment priorities	GP; Germany	Ic (f2f)	Mean health problems (SD): 11.9 (5.4)	123	78 (5)	67
Junius-Walker, 2015 (184)	To examine older patients' perceived burden of their health problems	GP; Germany	S	Median of health problems (IQR): 11 (8-15)	836	79 (4)	61
Karel, 2015 (155)	To examine the individual variability, thematic content, and sociodemographic correlates of valued life abilities and activities among MM veterans diagnosed with life-altering cancer	Hospital (outpatient); USA	Ic (f2f)	Head and neck, oesophageal, gastric, or colorectal cancer; CCI 6.85 (4.41)	144	0-70: 51% >70: 23%	2
Kerr, 2007 (85)	To understand how the number, type, and severity of comorbidities influence diabetes patients' self-management and treatment priorities	Community; USA	S	Diabetes + comorbidities	1,191	<65: 30% 65-74: 40% >74: 30%	53
Krucien, 2015 (31)*	To identify the preferences of patients with MM for recommendations of the Chronic Care Model	GP; France	S	≥ 1 chronic condition + obstructive sleep apnoea syndrome	150	61-69: 42% ≥ 70: 23%	29
Krumholz, 1998 (32)*	To describe the resuscitation preferences of patients hospitalised with an exacerbation of severe CHF, perceptions of those preferences by their physicians, and the stability of the preferences	Hospital (inpatient); USA	Ic (f2f)	CHF (severe)	936	65-74: 28% > 75: 26%	48
Lee, 2006 (185)	To compare attitudes towards making end-of-life decisions in non-demented and mildly demented Chinese subjects	Nursing home; China	S	Dementia / no dementia + comorbidities	56	82 (6)	95
Li, 2016 (63)	To understand treatment preferences of Parkinson patients with regard to end-of-life care	Hospital (outpatient); Singapore	S	≥ 2 chronic conditions Parkinson 54%	136	63	38
Linsky, 2017 (41)	To develop a survey instrument that assesses patients' experience with and attitudes toward deprescribing	GP; USA	S	≥ 5 medications	790	66-75: 43%, ≥ 76: 19%	15

Maida, 2010 (186)	To evaluate the correlations that exist between preferences for pursuing active and aggressive medical interventions	Hospital (outpatient); Canada	S	Advanced cancer	380	73; 19-99	56
McDonald, 2011 (87)	To assess patients' and physicians' perceived importance of clinical problems and to describe the level of concordance between patients and physicians in relation to these problems	Hospital (outpatient); Australia	Ic (f2f)	COPD & asthma	52	70 (8); 55-87	60
Milic, 2016 (43)	To (quantify tablet burden in women with metastatic breast cancer, establish which groups of drugs contribute most to this burden and gain insight into patients' attitudes towards oral anti-cancer treatment	Hospital (inpatient & outpatient); UK	S	Metastatic breast cancer with polypharmacy	100	60; 31-95	100
Moise, 2017 (130)	To assess whether elevated depressive symptoms are associated with decision-making preference in patients with comorbid chronic illness	GP; USA	S	Hypertension + depression. CCI: 3.2 (2.4)	195	64 (9)	72
Morton, 2012 a (112)	To quantify pre-dialysis patients' and pre-dialysis caregivers' preferences for treatment-related attributes of kidney dialysis and the trade-offs they were willing to accept in making a choice between the different dialysis modalities	Hospital (outpatient); Australia	S	CKD (end stage)	105	Median: 63; 55-71	44
Morton, 2012 b (111)	To determine the most important characteristics of dialysis and the trade-offs patients were willing to make in choosing dialysis instead of conservative care	Hospital (outpatient); Australia	S	CKD (end stage)	105	Median: 63; 55-71	44
Moss, 2001 (65)	To examine the attitudes of dialysis patients toward CPR in the dialysis unit	Hospital (outpatient); USA	Ic (f2f)	CKD	469	61 (16)	54
Naik, 2011 (131)	To evaluate the effect of functional health literacy on decision-making preferences; and among those initially preferring a passive decision-making role, to explore how preferences change if their physician actively encourages their involvement	Hospital (outpatient); USA	S	Cardiovascular disease Comorbidities: active style 5.98 (1.67); passive style 5.0 (2.1)	100	71 (6) active decision-making; 75 (6) passive decision-making	100
Obrien, 1995 (66)	To determine life-sustaining treatment preferences among nursing home residents, whether information	Nursing home; USA	Ic (f2f)	> 5 chronic conditions (60%)	421	< 70: 11% 70-79: 25%	80

	regarding CPR affected these preferences, and with whom treatment preferences had been discussed, and to identify factors associated with CPR preferences					80-89: 45% 90-103: 19%	
Pandhi, 2008 (141)	To determine if patients vary in perceptions of safety if interpersonal continuity is disrupted. If so, which characteristics are associated with feeling unsafe?	Community; USA,	S	Chronic conditions + polypharmacy >80%	6,827	64; 63-66	54
Perret-Guillaume, 2011 (132)	To investigate elderly patients' willingness to accept antihypertensive therapy and their desire for information and for participation in medical decisions	Hospital (inpatient); Switzerland	S	Hypertension + comorbidities	120	84 (7)	80
Rahemi, 2018 (69)	To investigate the influence of sociodemographic factors, acculturation, ethnicity, health status, and spirituality on older adults' health-related decisions when confronted with a choice between competing options	Population based; USA	S	Seriously ill patients	451	75 (8)	32
Reinke, 2011 (70)	To assess whether a history of depression or active depressive symptoms is associated with preferences for life-sustaining therapies among veterans with COPD	Hospital (outpatient); USA	S	COPD & depression	376	70 (10)	3
Robben, 2011 (148)	To know what a particular patient values most and what his or her care-related goals are	Community; The Netherlands	Chart	Frail	336	81; 61-99	70
Rodriguez, 2008 (187)	To assess patients' preferred role and perceived level of involvement in medical decision making and test the effects of patients' age and role preference on perceived involvement in medical decision making	GP & Hospital (outpatient); USA	S (tel.)	CHF (advanced)	90	70; 42-88	6
Sharma, 2016 (71)	To determine knowledge of the CPR process, preference for CPR, and desire to participate in end-of-life decision making amongst older hospitalised patients	Hospital (inpatient); New Zealand	S	≥ 2 chronic conditions CCI 5 (4-10)	100	82; 65-98	50
Sudore, 2010 (188)	To examine the prevalence of uncertainty concerning advance decisions about life sustaining treatment among chronically ill, racially=ethnically diverse older adults with varying levels of health literacy; and to assess the associations between literacy and race=ethnicity with decisional uncertainty, hypothesising that low literacy and minority status would each be independently associated with uncertainty	Hospital (outpatient); USA	Ic (f2f)	≥ 2 chronic conditions	205	61 (8)	53

Tamura, 2010 (189)	To explore preferences for withdrawal and engagement in advance care planning also in terms of age, race and ethnicity	Hospital (outpatient); USA	S	CKD (end stage)	61	62 (15)	26
Tang, 2015 (73)	To explore heterogeneity and changes in patterns of life sustaining treatment preferences among 2 independent cohorts of terminally ill patients with cancer recruited a decade apart	Hospital (outpatient); Taiwan	S	Advanced cancer	4,353	65-74: 50% 75-85: 20% > 85: 13%	44
Tinetti, 2008 (156)	To determine the priority that older adults with coexisting hypertension and fall risk give to optimising cardiovascular outcomes versus fall- and medication symptom- related outcomes	Nursing home; USA	S	Hypertension + fall risk (frail patients)	123	82 (6)	71
Toto, 2015 (160)	To evaluate the feasibility of generating patient-centred goals using goal attainment scale with older adults who have MM and were recruited through primary care	GP; USA	S	≥ 2 chronic conditions (Geriatric and / or Psychiatry)	27	77 (6)	70
Uhlmann, 1991 (75)	To investigate whether perceived quality of life is associated with preferences for life-sustaining treatment in older adults	Hospital (outpatient); USA	S	Seriously ill patients	258	74	54
Utens, 2013 (143)	To investigate patient preference for treatment place, associated factors and patient satisfaction with a community-based hospital-at-home scheme for COPD exacerbations	Hospital & home care organisations; Netherlands	S	COPD + acute exacerbation CCI > 1: Usual hospital care 27 (39%); Early assisted discharge 32 (46%)	139	68 (11)	62
van Summeren, 2017 (158)	To determine proposed and observed medication changes when using an outcome prioritisation tool during a medication review in general practice	GP; The Netherlands	S	≥ 2 chronic conditions (one cardiovascular disease) + ≥ 5 medications	59	Median: 83; 81-86	51
Wieldraaijer, 2018 (144)	To assess what caregivers patients prefer to contact when faced with symptoms during survivorship care, what patient factors are associated with a preferred	Hospital (outpatient); Netherlands	S	Colorectal cancer + comorbidities	260	67; 32-94	46

	caregiver, and whether the type of symptom is associated with a preferred caregiver						
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Table S3d. Key characteristics – Quantitative longitudinal studies (observational)

Source	Study methods			Patient population			
	Study aim	Setting, country	Data collection	Def of MM	Sample (number)	Age: Mean (SD) or range	Sex (% females)
Brunner-LaRocca, 2012 (28)	To investigate end-of-life and CPR preferences in elderly CHF patients. In addition, predictive factors for willingness to trade survival time for better quality of life, and for wanting resuscitation if necessary, were evaluated	Hospital (outpatient); Switzerland	S	CHF (severe)	622	77 (8)	41
Casarett, 2006 (77)	To determine whether patient preferences are a barrier to hospice enrolment	Hospital (inpatient & outpatient); USA	lc (f2f)	Seriously ill patients CHF, COPD, CKD or cancer	203	73; 60-93	43
Case, 2013 (150)	To assess older adults' attitudes toward eliciting health outcome priorities	Nursing home; USA	S	≥ 4 chronic conditions (69%), ≥ 1 IADLs (26%) + depression (28%)	356	76 (7)	75
Cosgriff, 2007 (78)	To determine the association of preferences with end-of-life care	Hospital (outpatient); USA	lc (f2f)	Seriously ill patients CHF, COPD, CKD or cancer	118	73 (7)	42
Dunlay, 2014 (80)	To evaluate the resuscitation preferences of patients at study enrolment, to describe changes in resuscitation preferences over time, and to assess how resuscitation preferences relate to survival	Hospital (outpatient); USA	S	CHF (severe)	608	74	45
Efficace, 2014 (52)	To assess preferences for involvement in treatment decisions and requests for prognostic information in newly diagnosed higher-risk MDS patients	Hospital (outpatient); Italy	S	MDS with IPSS risk score of intermediate or high risk	280	70; 32-89	37

Fried, 2006 (162)	To examine changes over time in end-of-life treatment preferences, measured in terms of willingness to undergo treatment based on the health state that would result from the treatment, in a cohort of older persons with advanced chronic illness	Hospital (inpatient & outpatient); USA	Ic (f2f)	Seriously ill patients CHF, COPD, CKD or cancer	226	73 (7)	53
Fried, 2007 a (59)	To determine whether preferences for future life-sustaining treatments change over time in a consistent and predictable manner	Community; USA	Ic (f2f)	Seriously ill patients CHF, COPD, CKD or cancer	189	73 (7)	45
Fried, 2007 b (58)	To examine changes in treatment preferences over time	GP; USA	S	Seriously ill patients CHF, COPD, CKD or cancer	226	73 (7)	43
Hamel, 1999 (60)	To determine the effect of age on decisions to withhold life-sustaining therapies	Hospital (inpatient); USA	Ic (f2f)	Seriously ill patients	9,105	Median: 63	44
Hamel, 2000 (36)*,**	To review previously published findings about how patient age influenced patterns of care for seriously ill patients	Hospital (inpatient); USA	Ic (f2f)	Seriously ill patients	9,105	[older patients]	nr
Janssen, 2012 (61)	To investigate 1-year stability of preferences regarding CPR and mechanical ventilation in outpatients with advanced COPD, CHF, or CKD and to identify predictors of changes in preferences	Hospital (outpatient); The Netherlands	Ic (f2f)	Advanced COPD, CHF or CKD	265	67 (13)	36
Lynn, 2000 (64)	To characterise COPD over patients' last 6 months of life	Hospital (inpatient); USA	Ic (f2f)	COPD + ≥ 3 comorbidities	416	72	75
Ostermann, 2003 (67)	To ascertain the initial views of a haemodialysis cohort in the UK in terms of their CPR status in the event of an in-hospital cardiac arrest unrelated to dialysis	Hospital (outpatient); UK	Ic (f2f)	CKD (Haemodialysis)	11	74 (10); 46-81	50
Parr, 2010 (68)	To understand age differences in advanced cancer patients' end-of-life experiences	Hospital (inpatient); USA	Ic (f2f)	Advanced cancer CCI: 10.0 (2.7)	126	72 (6)	50

Rothman, 2007 (107)	To assess the frequency of, reasons for, factors associated with, and outcomes of treatment refusal among older persons with advanced chronic disease	Hospital (outpatient); UK	Ic (f2f)	Advanced cancer, CHF or COPD	226	74 (7)	43
Suggs, 2017 (118)	To analyse factors associated with selection of the following treatment modalities (breast conservation surgery, mastectomy, and contralateral prophylactic mastectomy) in a rural West Virginia tertiary care hospital	Hospital (outpatient); USA	Chart	Breast Cancer (early stage) CCI mean (SD): BCS 2.2 (0.5); M 2.4 (0.7)	226	74 (7)	43
Tang, 2016 (33)*	To explore longitudinal changes in life sustaining treatment preferences and their associations with accurate prognostic awareness, physician-patient end-of-life care discussions, and depressive symptoms in terminally ill cancer patients' final year	Hospital (inpatient); Taiwan	Ic (f2f)	Advanced cancer	302	>65: 32%	43
Teno, 2000 (74)	To evaluate decision-making and outcomes in seriously ill patients with an intensive care unit stay of at least 14 days	Community; USA	Ic (f2f)	Seriously ill patients	1,264	BCS:62 (12) M: 61 (13)	100
Weeks, 1998 (76)	To test the hypothesis that among terminally ill cancer patients an accurate understanding of prognosis is associated with a preference for therapy that focuses on comfort over attempts at life extension	Hospital (inpatient); USA	Ic (f2f)	Advanced cancer	917	62	38
Wright, 2010 (34)*	To examine whether patients' desire for life extending therapy was associated with their end-of-life care	Hospital (outpatient); USA	S	Advanced cancer	301	60-69: 28% > 70: 21%	47
Zafar, 2013 (35)*	To determine how patient's preferences guide the course of palliative chemotherapy for advanced colorectal cancer	Hospital (outpatient); USA	S	Metastatic colorectal cancer	702	65-74: 25% 75: 27%	38
Zulman, 2010 (90)	To understand patterns of patient-provider concordance in the prioritisation of health conditions in patients with MM	GP; USA	S	Diabetes + hypertension + comorbidities	1,169	65 (11)	nr

Table 3e. Key characteristics – Quantitative study (interventional)

Source	Patient population
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	Study aim	Setting, country	Intervention	Randomisation	Data collection	Def of MM	Sample (number)	Age: Mean (SD) or range	Sex (% females)
Junius-Walker, 2012 (83)	To investigate whether a structured priority-setting consultation reconciles the often-differing doctor-patient views on the importance of problems	GP; Germany	Structured priority-setting consultation	CRT (randomisation unit=GPs)	S	Mean health problems: 11.4	317*** (IG=174; CG=143)	78	67

Table S3f. Key characteristics – Mixed-methods studies

Source	Study aim	Setting, country	Data collection	Patient population			
				Def of MM	Sample (number)	Age: Mean (SD) or range	Sex (% females)
Adams, 2013 (190)	To investigate the ease with which patients of differing functional ability use three types of multi-compartment medication device and whether some types are easier to use than others	Hospital (inpatient); USA	S & I (f2f)	1 - 15 medications (median 5)	50	Median: 85; 77-98	76
Puts, 2017 (121)	To better understand the treatment decision process from all perspectives	Hospital (outpatient); Canada	S & I (f2f)	Advanced cancer	32	63–69: 9% 70–79: 56% 80+: 34%	31
van Summeren, 2016 (157)	To explore an outcome prioritisation tool in eliciting individuals' preferred health outcomes (remaining alive, maintaining independence, reducing pain, reducing other symptoms) in the context of medication review in family practice	GP; The Netherlands	S & I (f2f)	≥ 2 chronic conditions (one cardiovascular disease) + ≥ 5 medications	60	84 (4)	52

CCI=Charlson Comorbidity Index; CHF=Chronic Heart Failure; CKD=Chronic Kidney Disease; CMI=Chronic Medically Ill; COPD=Chronic Obstructive Pulmonary Disease; CPR=CardioPulmonary Resuscitation; CRT=Cluster Randomised Controlled Trial; f2f=face-to-face; FG=Focus Groups; GPs=General Practice; IADL=Instrumental Activity of Daily Living; ICD=Implantable Cardioverter Defibrillator; I=open-ended questions interview; Ic=closed-ended questions

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interview; IPSS=International Prognostic Scoring System; IQR=Interquartile Range; MDS=Myelodysplastic Syndromes; MM=Multimorbidity; n=number; nr=not reported; OARS=Older Americans Resources and Services; S=Survey; SD=Standard Deviation; SPMI=Severe and Persistent Mental Illness; ssl=semi-structured interviews; ssl (tel.) = semi-structured interviews (telephone); UK=United Kingdom; USA=United States of America; 2a=Secondary analysis.

* The study included a larger sample based on different (younger) age groups. In the present evidence map, only data from patients of 60 years of age or older were considered. Studies are included if preferences of older patients are addressed separately in the study, even when they included younger populations.

**The study did not report descriptives of age but mentions the included population are "older patients".

***Number of patients analysed.

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Table S4. Excluded studies and reasons for exclusion.

Source	Reason for exclusion
———. 2014. 'Abstracts of Papers Presented at the Health Services Research and Pharmacy Practice Conference, HSRPP 2014', International Journal of Pharmacy Practice. Conference: Health Services Research and Pharmacy Practice Conference, HSRPP, 22.	Document type: Editorials & reviews
———. 2018. 'Poster Abstracts - Post Acute and Long Term Care Medicine 2018', Journal of the American Medical Directors Association. Conference: Society for Post Acute and Long Term Care Medicine Annual Conference, 19.	Document type: Editorials & reviews
Adams, E. K., R. Houchens, G. E. Wright, and J. Robbins. 1991. 'Predicting hospital choice for rural Medicare beneficiaries: the role of severity of illness', Health Services Research, 26: 583-612.	Population: Not multimorbid
Adeniji, C., C. Kenning, P. A. Coventry, and P. Bower. 2015. 'What are the core predictors of 'hassles' among patients with multimorbidity in primary care? A cross sectional study', BMC Health Services Research, 15: 255.	Outcome: Preferences not addressed
Aikens, J. E., D. E. Nease Jr, and M. S. Klinkman. 2008. 'Explaining patients' beliefs about the necessity and harmfulness of antidepressants', Annals of Family Medicine, 6: 23-29.	Population: Age <60 yrs.
Akpan, A., C. Roberts, G. Turner, and J. Banerjee. 2017. 'Developing an internationally agreed standard set of health outcome measures for older people', Age and Ageing, 46 (Supplement 1): i35.	Outcome: Preferences not addressed
Al Onazi, M., M. Al Jondeby, M. Azeem, and A. Al Sayyari. 2011. 'Factors affecting Saudi hemodialysis patients' perception of healthcare providers' empathy', Arab journal of nephrology and transplantation, 4: 71-76.	Outcome: Preferences not addressed
Alami, S., D. Desjeux, M. M. Lefevre-Colau, A. S. Boisgard, E. Bocard, F. Rannou, and S. Poiraudau. 2011. 'Management of pain induced by exercise and mobilization during physical therapy programs: views of patients and care providers', BMC Musculoskeletal Disorders, 12: 172.	Population: Age <60 yrs.
Albada, A., and M. Triemstra. 2009. 'Patients' priorities for ambulatory hospital care centres. A survey and discrete choice experiment among elderly and chronically ill patients of a Dutch hospital', Health Expect, 12: 92-105.	Population: Age <60 yrs.
Alderman, A. K., S. T. Hawley, J. Waljee, M. Mujahid, M. Morrow, and S. J. Katz. 2008. 'Understanding the impact of breast reconstruction on the surgical decision-making process for breast cancer', Cancer, 112: 489-94.	Population: Age <60 yrs.
Allen, D., V. Badro, L. Denyer-Willis, M. Ellen Macdonald, A. Pare, T. Hutchinson, P. Barre, R. Beauchemin, H. Bocti, A. Broadbent, and S. R. Cohen. 2015. 'Fragmented care and whole-person illness: Decision-making for people with chronic end-stage kidney disease', Chronic Illness, 11: 44-55.	Outcome: Preferences not addressed
AlRuthia, Yazed Sulaiman. 2016. 'The value of online medication rating systems to older adults and their association with self-reported outcomes', 76.	Outcome: Preferences not addressed

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Alsinnawi, M., A. E. Slee, J. S. Banerji, K. L. Dahl, S. Akapame, Iii J. D. Massman, E. M. Wolff, and J. M. Corman. 2016. 'Does a clear understanding of life expectancy increase decisional conflict and anxiety for men with newly diagnosed prostate cancer?', <i>Journal of Urology</i> , 1): e31.	Document type: Conference proceedings
Amblas-Novellas, J., J. Espauella, L. Rexach, B. Fontecha, M. Inzitari, C. Blay, and X. Gomez-Batiste. 2015. 'Frailty, severity, progression and shared decision-making: A pragmatic framework for the challenge of clinical complexity at the end of life', <i>European Geriatric Medicine</i> , 6: 189-94.	Population: Age <60 yrs.
Anonymous. 2013. '2013 CAEP/ACMU Scientific Abstracts, CAEP 2013', <i>Canadian Journal of Emergency Medicine</i> , 15 (Suppl 1): S1.	Document type: Editorials & reviews
Apkarian, A. Vania, Yamaya Sosa, Beth R. Krauss, P. Sebastian Thomas, Bruce E. Fredrickson, Robert E. Levy, R. Norman Harden, and Dante R. Chialvo. 2004. 'Chronic pain patients are impaired on an emotional decision-making task', <i>Pain</i> , 108: 129-36.	Population: Age <60 yrs.
Arain, A., M. Tammaa, F. Chaudhary, S. Gill, S. Yousuf, N. Bangalore-Vittal, P. Singh, S. Jabeen, S. Ali, Y. Song, and N. J. Azar. 2016. 'Communicating the diagnosis of psychogenic nonepileptic seizures: The patient perspective', <i>Journal of Clinical Neuroscience</i> , 28: 67-70.	Population: Age <60 yrs.
Arends, R. Y., C. Bode, E. Taal, and M. A. Van de Laar. 2013. 'The role of goal management for successful adaptation to arthritis', <i>Patient Education & Counseling</i> , 93: 130-8.	Population: Not multimorbid
Arora, N. K., B. B. Reeve, R. D. Hays, S. B. Clauser, and I. Oakley-Girvan. 2011. 'Assessment of quality of cancer-related follow-up care from the cancer survivor's perspective', <i>Journal of Clinical Oncology</i> , 29: 1280-9.	Population: Not multimorbid
Aspinall, P. A., Z. K. Johnson, A. Azuara-Blanco, A. Montarzino, R. Brice, and A. Vickers. 2008. 'Evaluation of quality of life and priorities of patients with glaucoma', <i>Investigative Ophthalmology and Visual Science</i> , 49: 1907-15.	Population: Not multimorbid
Audulv, Å, K. Norbergh, K. Asplund, and Å Hörnsten. 2009. 'An ongoing process of inner negotiation -- a Grounded Theory study of self-management among people living with chronic illness', <i>Journal of Nursing & Healthcare of Chronic Illnesses</i> , 1: 283-93.	Population: Age <60 yrs.
Auerbach, A. D., R. Katz, S. Z. Pantilat, R. Bernacki, J. Schnipper, P. Kaboli, T. Wetterneck, D. Gonzales, V. Arora, J. Zhang, and D. Meltzer. 2008. 'Factors associated with discussion of care plans and code status at the time of hospital admission: Results from the Multicenter Hospitalist Study', <i>Journal of Hospital Medicine</i> , 3: 437-45.	Outcome: Preferences not addressed
Bagge, M., J. Tordoff, P. Norris, and S. Heydon. 2013. 'Older people's attitudes towards their regular medicines', <i>J Prim Health Care</i> , 5: 234-42.	Outcome: Preferences not addressed
Baijal, G., T. Gupta, C. Hotwani, S. G. Laskar, A. Budrukkar, V. Murthy, and J. P. Agarwal. 2012. 'Impact of comorbidity on therapeutic decision-making in head and neck cancer: audit from a comprehensive cancer center in India', <i>Head & Neck</i> , 34: 1251-4.	Population: Age <60 yrs.
Baker, Tamara A., Melissa L. O'Connor, Rosalyn Roker, and Jessica L. Krok. 2013. 'Satisfaction With Pain Treatment in Older Cancer Patients', <i>Journal of Hospice & Palliative Nursing</i> , 15: 455-63.	Outcome: Preferences not addressed

1 2 3 4 5	Ballantyne, P. J., M. A. M. Gignac, and G. A. Hawker. 2007. 'A patient-centered perspective on surgery avoidance for hip or knee arthritis: Lessons for the future', <i>Arthritis Care and Research</i> , 57: 27-34.	Outcome: Preferences not addressed
6 7 8	Bardai, A., S. H. M. Brown, U. Hafeez, and A. H. Abdelhafiz. 2013. 'Survey exploring elderly patients' viewpoints of the multi-compartment compliance aids', <i>Age and Ageing</i> , 2): ii5.	Document type: Conference proceedings
9 10 11	Barron, J., M. Bedra, J. Wood, and J. Finkelstein. 2014. 'Exploring three perspectives on feasibility of a patient portal for older adults', <i>Studies in health technology and informatics</i> , 202: 181-84.	Outcome: Preferences not addressed
12 13 14	Bartlett Ellis, Rebecca J., and Janet L. Welch. 2017. 'Medication-taking behaviours in chronic kidney disease with multiple chronic conditions: a meta-ethnographic synthesis of qualitative studies', <i>Journal of Clinical Nursing</i> , 26: 586-98.	Document type: Editorials & reviews
15 16 17	Bayliss, E. A., J. F. Steiner, D. H. Fernald, L. A. Crane, and D. S. Main. 2003. 'Descriptions of barriers to self-care by persons with comorbid chronic diseases', <i>Ann Fam Med</i> , 1: 15-21.	Outcome: Preferences not addressed
18 19 20	Beaulaurier, R. L., M. J. Mintzer, D. T. D'Amore, and M. Torres. 2016. 'Social factors in non-urgent use of an emergency department by the elderly', <i>Journal of the American Geriatrics Society</i> , 1): S191-S92.	Document type: Conference proceedings
21 22 23	Bell, S. P., and A. Saraf. 2014. 'Risk stratification in very old adults: How to best gauge risk as the basis of management choices for patients aged over 80', <i>Progress in Cardiovascular Diseases</i> , 57: 197-203.	Outcome: Preferences not addressed
24 25 26	Benham-Hutchins, M., N. Staggers, M. Mackert, A. H. Johnson, and D. deBronkart. 2017. "'I want to know everything": a qualitative study of perspectives from patients with chronic diseases on sharing health information during hospitalization', <i>BMC Health Services Research</i> , 17: 529.	Population: Age <60 yrs.
27 28 29	Bennahum, D. A., W. B. Forman, B. Vellas, and I. L. Albaredo. 1997. 'Life expectancy, comorbidity, and quality of life - A framework of reference for medical decisions', <i>Clinics in Geriatric Medicine</i> , 13: 33-&.	Document type: Editorials & reviews
30 31 32	Benson, J., and N. Britten. 2002. 'Patients' decisions about whether or not to take antihypertensive drugs: qualitative study', <i>British Medical Journal</i> , 325: 873-76A.	Population: Not multimorbid
33 34 35	Bergin, R., J. Emery, R. Bollard, and V. White. 2017. 'How rural and urban patients in Australia with colorectal or breast cancer experience choice of treatment provider: A qualitative study', <i>European Journal of Cancer Care</i> , 26: n/a-n/a.	Population: Not multimorbid
36 37 38	Berna, F., A. S. Goritz, P. M. Llorca, P. Vidailhet, G. Fond, and S. Moritz. 2017. 'Would I take antipsychotics, if I had psychotic symptoms? Examining determinants of the decision to take antipsychotics', <i>Progress in Neuro-Psychopharmacology and Biological Psychiatry</i> , 77: 155-63.	Population: Age <60 yrs.
39 40 41	Berner, Y. N. 2018. '[Patient Oriented Care in Chronic Conditions]', <i>Harefuah</i> , 157: 228-31.	Outcome: Preferences not addressed
42 43 44 45 46	Beverly, E. A., L. A. Wray, C. J. Chiu, and C. L. LaCoe. 2014. 'Older Adults' Perceived Challenges With Health Care Providers Treating Their Type 2 Diabetes and Comorbid Conditions', <i>Cd (Clinical Diabetes)</i> , 32: 12-7.	Outcome: Preferences not addressed

1 2 3 4 5	Blackhall, L. J., S. T. Murphy, G. Frank, V. Michel, and S. Azen. 1995. 'ETHNICITY AND ATTITUDES TOWARD PATIENT AUTONOMY', <i>Jama-Journal of the American Medical Association</i> , 274: 820-25.	Population: Not multimorbid
6 7 8	Bleicher, R. J., P. Abrahamse, S. T. Hawley, S. J. Katz, and M. Morrow. 2008. 'The influence of age on the breast surgery decision-making process', <i>Annals of Surgical Oncology</i> , 15: 854-62.	Population: Not multimorbid
9 10 11	Blom, J. W., M. El Azzi, D. M. Wopereis, L. Glynn, C. Muth, and M. L. van Driel. 2015. 'Reporting of patient-centred outcomes in heart failure trials: are patient preferences being ignored?', <i>Heart Failure Reviews</i> , 20: 385-92.	Outcome: Preferences not addressed
12 13 14	Blome, C., A. Costanzo, E. Dauden, C. Ferrandiz, G. Girolomoni, R. Gniadecki, L. Iversen, A. Menter, K. Michaelis-Wittern, A. Morita, H. Nakagawa, K. Reich, and M. Augustin. 2016. 'Patient-relevant needs and treatment goals in nail psoriasis', <i>Quality of Life Research: An International Journal of Quality of Life Aspects of Treatment, Care & Rehabilitation</i> , 25: 1179-88.	Population: Age <60 yrs.
15 16 17	Boehmer, K. R., A. Abu Dabrh, M. R. Gionfriddo, P. Erwin, and V. M. Montori. 2018. 'Does the chronic care model meet the emerging needs of people living with multimorbidity? A systematic review and thematic synthesis', <i>PLoS ONE</i> , 13: 17.	Document type: Editorials & reviews
18 19 20	Boeni, F., K. E. Hersberger, and I. Arnet. 2014. 'Multidrug punch cards in primary care: A mixed methods study on patients' preferences and impact on adherence', <i>Frontiers in Pharmacology</i> , 5 (SEP) (no pagination).	Outcome: Preferences not addressed
21 22	Bokhof, B., and U. Junius-Walker. 2016. 'Reducing Polypharmacy from the Perspectives of General Practitioners and Older Patients: A Synthesis of Qualitative Studies', <i>Drugs and Aging</i> , 33: 249-66.	Document type: Editorials & reviews
23 24 25 26	Bonney, A., S. C. Jones, and D. Iverson. 2012. 'The older patient, the general practitioner and the trainee: patients' attitudes and implications for training', <i>Education for primary care : an official publication of the Association of Course Organisers, National Association of GP Tutors, World Organisation of Family Doctors</i> , 23: 186-95.	Population: Not multimorbid
27 28	Bonney, A., S. C. Jones, L. Phillipson, and D. Iverson. 2010. 'General practice registrars - attitudes of older patients', <i>Australian Family Physician</i> , 39: 419-24.	Population: Not multimorbid
29 30 31 32	Borgsteede, S. D., L. Deliens, C. Graafland-Riedstra, A. L. Francke, G. van der Wal, and D. L. Willems. 2007. 'Communication about euthanasia in general practice: opinions and experiences of patients and their general practitioners', <i>Patient Educ Couns</i> , 66: 156-61.	Outcome: Preferences not addressed
33 34 35	Borum, M. L., J. Lynn, and Z. Zhong. 2000. 'Blood transfusion administration in seriously ill patients: an evaluation of SUPPORT data. Study to Understand Prognoses and Preferences for Outcomes and Risks of Treatments', <i>Journal of the American Geriatrics Society</i> , 48: S39-43.	Population: Not multimorbid
36 37 38	Bove, A. M., A. D. Lynch, C. Ammendolia, and M. Schneider. 2018. 'Patients' experience with nonsurgical treatment for lumbar spinal stenosis: a qualitative study', <i>Spine Journal: Official Journal of the North American Spine Society</i> , 18: 639-47.	Population: Not multimorbid
39 40 41 42	Bower, P. 2013. 'Multimorbidity in patients with arthritis: Experience of care and self-management', <i>Rheumatology (United Kingdom)</i> , 1): i3.	Duplicates

Bower, P., M. Hann, J. Rick, K. Rowe, J. Burt, M. Roland, J. Protheroe, G. Richardson, and D. Reeves. 2013. 'Multimorbidity and delivery of care for long-term conditions in the English National Health Service: baseline data from a cohort study', <i>Journal of health services research & policy</i> , 18: 29-37.	Outcome: Preferences not addressed
Bowling, A., and S. Ebrahim. 2001. 'Measuring patients' preferences for treatment and perceptions of risk', <i>Quality in Health Care</i> , 10: I2-I8.	Document type: Editorials & reviews
Brabers, A. E. M., T. E. M. van Esch, P. P. Groenewegen, K. Hek, P. Mullenders, L. van Dijk, and J. D. de Jong. 2018. 'Is there a conflict between general practitioners applying guidelines for antibiotic prescribing and including their patients' preferences?', <i>Patient Preference and Adherence</i> , 12: 9-19.	Population: Age <60 yrs.
Bratzke, L. C., R. J. Muehrer, K. A. Kehl, K. S. Lee, E. C. Ward, and K. L. Kwekkeboom. 2015. 'Self-management priority setting and decision-making in adults with multimorbidity: A narrative review of literature', <i>International Journal of Nursing Studies</i> , 52: 744-55.	Document type: Editorials & reviews
Brazier, J. E., D. Rowen, I. Mavranouzouli, A. Tsuchiya, T. Young, Y. Yang, M. Barkham, and R. Ibbotson. 2012. 'Developing and testing methods for deriving preference-based measures of health from condition-specific measures (and other patient-based measures of outcome)', <i>Health technology assessment (Winchester, England)</i> , 16: 1-114.	Population: Not multimorbid
Bridges, J., J. Hughes, N. Farrington, and A. Richardson. 2015. 'Cancer treatment decision-making processes for older patients with complex needs: a qualitative study', <i>BMJ Open</i> , 5: e009674.	Population: Age <60 yrs.
Brimblecombe, C., D. Crosbie, W. K. Lim, and B. Hayes. 2014. 'The goals of patient care project: Implementing a proactive approach to patient-centred decision-making', <i>Internal Medicine Journal</i> , 44: 961-66.	Outcome: Preferences not addressed
Burke, J. A., M. Earley, L. D. Dixon, A. Wilke, and S. Puczynski. 2006. 'Patients with diabetes speak: Exploring the implications of patients' perspectives for their diabetes appointments', <i>Health Communication</i> , 19: 103-14.	Population: Age <60 yrs.
Burkiewicz, J. S., K. S. Vesta, and A. L. Hume. 2008. 'Improving effectiveness in communicating risk to patients', <i>Consultant Pharmacist</i> , 23: 37-43.	Outcome: Preferences not addressed
Burton, M., F. Armitage, K. Collins, P. Richards, A. Nettleship, K. Lifford, and L. Wyld. 2016. 'The development of an on-line decision tool for health care professionals to aid collaborative decision making with older women with breast cancer', <i>European Journal of Cancer</i> , 2): S136.	Outcome: Preferences not addressed
Buttery, A., K. Lowton, K. Glaser, and G. Carr-White. 2011. 'Older heart failure patients' preferences for cardiac rehabilitation service models', <i>European Heart Journal</i> , 1): 159.	Document type: Conference proceedings
Calpin, P., A. Imran, and D. Harmon. 2017. 'A Comparison of Expectations of Physicians and Patients with Chronic Pain for Pain Clinic Visits', <i>Pain Practice</i> , 17: 305-11.	Population: Age <60 yrs.
Camacho, D., E. Estrada, I. T. Lagomasino, and J. Green. 2015. 'Depression treatment adherence and preferences among older latinos in a specialty geriatric clinic', <i>American Journal of Geriatric Psychiatry</i> , 1): S136-S37.	Document type: Conference proceedings

Campbell, S. M., C. Gately, and L. Gask. 2007. 'Identifying the patient perspective of the quality of mental healthcare for common chronic problems: A qualitative study', <i>Chronic Illness</i> , 3: 46-65.	Population: Age <60 yrs.
Carlin, C. S., J. B. Christianson, P. Keenan, and M. Finch. 2012. 'Chronic illness and patient satisfaction', <i>Health Services Research</i> , 47: 2250-72.	Population: Age <60 yrs.
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Winter, L., M. P. Lawton, and K. Ruckdeschel. 2003. 'Preferences for prolonging life: A prospect theory approach', <i>International Journal of Aging & Human Development</i> , 56: 155-70.	Population: Not multimorbid
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Xu, Y., L. Sudharshan, M. A. Hsu, A. Koenig, J. C. Cappelleri, W. Liu, T. Smith, and M. Pasquale. 2017. 'Patient preferences associated with the use of treatments for psoriatic arthritis: Results of a conjoint analysis', <i>Arthritis and Rheumatology</i> . Conference: American College of Rheumatology/Association of Rheumatology Health Professionals Annual Scientific Meeting, ACR/ARHP, 69.	Population: Not multimorbid
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Zarrin, S., K. Patel, N. Thompson, I. Maravilla, and C. Ritchie. 2017. 'Can't teach an older dog new tricks? : CComparing goal setting and completion among younger and older adults with multiple chronic conditions', Journal of the American Geriatrics Society, 65 (Supplement 1): S216-S17.	Document type: Conference proceedings
Zijlstra, T. J., S. J. Leenman-Dekker, H. K. E. Oldenhuis, H. E. P. Bosveld, and A. J. Berendsen. 2016. 'Knowledge and preferences regarding cardiopulmonary resuscitation: A survey among older patients', Patient Education and Counseling, 99: 160-63.	Population: Not multimorbid

Table S1. 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
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.	Pages 5-6
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 8-9
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 conceptualise the review questions and/or objectives.	Page 9
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 6
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 10-11
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 9-10
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; Suppl table 2.
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	Page 10-11
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms, or forms that were tested by the team before being used, and whether data charting was done independently or in	Page 10

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
		duplicate) and any processes for obtaining and confirming data from investigators.	
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	Page 11
Critical appraisal of individual sources of evidence	12	If applicable, 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).	Not applicable
Synthesis of results	13	Describe the methods of dealing with and summarising the data that were charted.	Page 11-12
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.	Page 12; Suppl table 3, Figure 1.
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	Page 12; Table 1.
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	Not applicable
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.	Pages 13-16; Tables 2 and 3.
Synthesis of results	18	Summarise and/or present the charting results as they relate to the review questions and objectives.	Pages 13-16; Figure 2
DISCUSSION			
Summary of evidence	19	Summarise the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	Pages 16-18
Limitations	20	Discuss the limitations of the scoping review process.	Page 19
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.	Page 20
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 41

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

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3 * Where *sources of evidence* (see second footnote) come from, such as bibliographic
4 databases, social media platforms, and Web sites.

5 † A more inclusive/heterogeneous term used to account for the different types of evidence or
6 data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy
7 documents) that may be eligible for inclusion in a scoping review as opposed to only studies.
8 This is not to be confused with *information sources* (see first footnote).

9 ‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI
10 guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.

11 § The process of systematically examining research evidence to assess its validity, results, and
12 relevance before using it to inform a decision. This term is used for items 12 and 19 instead of
13 "risk of bias" (which is more applicable to systematic reviews of interventions) to include and
14 acknowledge the various sources of evidence that may be used in a scoping review (e.g.,
15 quantitative and/or qualitative research, expert opinion, and policy document).
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21 *From:* Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension
22 for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. *Ann Intern Med.*169:467–473.
23 doi: 10.7326/M18-0850
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