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Relevant models and elements of integrated care for multi-morbidity: Results of a scoping review☆

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ABSTRACT

Background: In order to provide adequate care for the growing group of persons with multi-morbidity, innovative integrated care programmes are appearing. The aims of the current scoping review were to i) identify relevant models and elements of integrated care for multi-morbidity and ii) to subsequently identify which of these models and elements are applied in integrated care programmes for multi-morbidity.

Methods: A scoping review was conducted in the following scientific databases: Cochrane, Embase, PubMed, PsycInfo, Scopus, Sociological Abstracts, Social Services Abstracts, and Web of Science. A search strategy encompassing a) models, elements and programmes, b) integrated care, and c) multi-morbidity was used to identify both models and elements (aim 1) and implemented programmes of integrated care for multi-morbidity (aim 2). Data extraction was done by two independent reviewers. Besides general information on publications (e.g. publication year, geographical region, study design, and target group), data was extracted on models and elements that publications refer to, as well as which models and elements are applied in recently implemented programmes in the EU and US.

Results: In the review 11,641 articles were identified. After title and abstract screening, 272 articles remained. Full text screening resulted in the inclusion of 92 articles on models and elements, and 50 articles on programmes, of which 16 were unique programmes in the EU ($n = 11$) and US ($n = 5$). Wagner's Chronic Care Model (CCM) and the Guided Care Model (GCM) were most often referred to (CCM $n = 31$; GCM $n = 6$); the majority of the other models found were only referred to once (aim 1). Both the CCM and GCM focus on integrated care in general and do not explicitly focus on multi-morbidity. Identified elements of integrated care were clustered according to the WHO health system building blocks. Most elements pertained to 'service delivery'. Across all components, the five elements referred to most often are person-centred care, holistic or needs assessment, integration and coordination of care services and/or professionals, collaboration, and self-management (aim 1). Most ($n = 10$) of the 16 identified implemented programmes for multi-morbidity referred to the CCM (aim 2). Of all identified programmes, the elements most often included were self-management, comprehensive assessment, interdisciplinary care or collaboration, person-centred care and electronic information system (aim 2).

Conclusion: Most models and elements found in the literature focus on integrated care in general and do not explicitly focus on multi-morbidity. In line with this, most programmes identified in the literature build on the CCM. A comprehensive framework that better accounts for the complexities resulting from multi-morbidity is needed.

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1. Introduction

Due to an ageing society and changing epidemiology, the number of people with chronic diseases is increasing. Consequently the burden of multi-morbidity in European countries is growing [1–4]. Even though the prevalence of multi-morbidity increases with age, the relative majority of persons with multi-morbidity are of working age [2,4–6]. Over the past decades many definitions have evolved explaining what integrated care and multi-morbidity is. So far, there is no single definition existing for integrated care or multi-morbidity. Some studies define multi-morbidity as 'the co-occurrence of two or more chronic or long-term conditions within the same persons' [1,3]. A general definition of integrated care is provided by the World Health Organisation (WHO), which describes integrated care as: "the management and delivery of health services such that people receive a continuum of health promotion, health protection and disease prevention services, as well as diagnosis, treatment, long-term care, rehabilitation, and palliative care services through the different levels and sites of care within the health system and according to their needs" [7].

Multi-morbidity constitutes a challenge for the organisation of health and social care in western countries, because the care for persons with multiple chronic conditions, provided by multiple care providers from different sites and sectors, often lacks alignment. The need to provide person-centred integrated care as opposed to fragmented and single-disease focused care has been well recognised [8]. Consequently, there is an urgent need for integrated care services for multi-morbid persons that are truly person-centred, meaning that services are tailored to the individuals' needs, capabilities and preferences, rather than just to a particular disease [9].

Disease-specific integrated care programmes have in recent years been increasingly implemented in European countries or regions, and the evidence base for their effectiveness is growing [10–17]. However, evidence is lacking on how to best design and organise integrated care specifically for multi-morbid persons. Further research in this respect is therefore needed [8,18–23]. An important precursor to developing and implementing effective integrated care programmes for persons with multiple chronic conditions is to gain more knowledge about single and interrelated elements that contribute to the success of integrated care programmes. For this reason, we performed a scoping review in which we aimed to identify relevant models and elements for integrated care especially for multi-morbidity (aim 1). Models are defined in the current study as existing frameworks or theories while elements are defined as components or concepts that often make up models. Subsequently, we aimed to identify which of these models and elements were used to build integrated care programmes, which are defined as real-world care practices, for persons with multi-morbidity described in the scientific literature (aim 2). This review was performed in the context of the Horizon2020 EU project SELFIE, which is described in Box 1.

Box 1: SELFIE About the SELFIE project. (Sustainable intEgrated chronic care modeLs for multi-morbidity: delivery, FInancing, and performancE) is a Horizon2020 funded EU project that aims to contribute to the improvement of person-centred care for persons with multi-morbidity by proposing evidence-based, economically sustainable, integrated care programmes that stimulate cooperation across health and social care and are supported by appropriate financing and payment schemes. More specifically, SELFIE aims to:

- Develop a taxonomy of promising integrated care programmes for persons with multi-morbidity;
- Provide evidence-based advice on matching financing/payment schemes with adequate incentives to implement integrated care;
- Provide empirical evidence of the impact of promising integrated care on a wide range of outcomes using Multi-Criteria Decision Analysis;
- Develop implementation and change strategies tailored to different care settings and contexts in Europe, especially Central and Eastern Europe.

The SELFIE consortium includes eight countries: the Netherlands (coordinator), Austria, Croatia, Germany, Hungary, Norway, Spain, and the UK. www.selfie2020.eu [Grant Agreement No 634288].

2. Methods

2.1. Study design

A scoping review was conducted to address the two research aims. One overall search strategy was used to find literature pertaining to either or both of the two aims. However, different in- and exclusion criteria and data extraction methods were applied. Data was extracted according to PRISMA guidelines [24].

A scoping review aims to identify relevant literature and key concepts addressing a broader topic, while focusing on more than one research question. It includes different study designs and types of evidence available, and does not involve an assessment of the quality of included publications [25,26]. We followed the methodology of Armstrong et al. [27], which allowed us to review different aspects related to integrated care for multi-morbidity [27].

Definitions were developed for the scoping review:

i.) "Multi-morbidity" refers to multiple (e.g. at least two) chronic conditions, physical or mental, occurring in one person at the same time, where one is not just a known complication of the other.
ii.) "Integrated care" refers to structured efforts to provide coordinated, pro-active, person-centred, multidisciplinary care by two or more communicating and collaborating care providers. Providers may work at the same organisation or different organisations, either within the health care sector or across the health care, social care, or community care sectors (including informal care).
iii.) "Model" refers to any existing framework or theory for integrated care, this pertains to the 'abstract' and intangible.
iv.) "Element" refers to any specific component or concept to provide integrated care, elements can be parts of a model (iii) or a programme (v).
v.) "Programme" refers to any existing care provision, practice or initiative, programmes are thus real-world approaches to provide care for patients or clients. These programmes can range from small-scale case finding, regional, to population health management approaches.

2.2. Search strategy

We searched in the following scientific databases: Cochrane, Embase, PubMed, PsycInfo, Scopus, Social Services Abstracts Sociological Abstracts, and Web of Science in October 2015. A comprehensive search strategy was developed jointly by all authors with the assistance of a librarian to identify English language articles published since 1990. The search algorithm comprised search terms (and their linguistic variations) pertaining to: a) models, elements, and programmes, b) integrated care, and c) multi-morbidity (see Appendix A file 1). We searched predominantly in title and

abstract, but where possible used indexed terms (e.g. MeSH, subject, key). Because using 'comorbidity' as an indexed term led to a large number of results, most of which were not relevant to our research aims, this term was only searched for in title and abstract. However, an additional search that included comorbidity as an indexed term was done in three large databases (Embase, PubMed, and PsycInfo). These results were compared to those from our original search not including comorbidity as an indexed term (a so-called 'NOT' search). This left us with the non-overlapping articles, to which we applied the 'most relevant' functions that these search engines offer to subsequently include the top 25 articles from each into our findings.

2.3. Study selection

First the titles and abstracts were screened for relevance by two independent reviewers (VS, HE) (step 1). Publications considered relevant only by one of the two reviewers were discussed until consensus was reached, then the full text publication was retrieved. Afterwards, the full text publications were reviewed by two other independent reviewers (MR, MK) (step 2). Articles could be included for aim 1 (relevant models and elements), aim 2 (programmes), or both.

Publications were *included* for aim 1, if:

- A model of integrated care for multi-morbidity is described
- Key elements of integrated care for multi-morbidity are described

Publications were *excluded* for aim 1, if:

- There is a single-disease focus
- A biomedical study is described
- They were meta-analyses, conference abstracts, letters to the editor, editorials, or commentaries
- No full text paper was available
- They were not written in English language

Articles could be *included* for aim 2 (programmes), if:

- An integrated care programme for multi-morbid persons is described or (about to be) evaluated

Articles were excluded for aim 2 (programmes), if:

- There is a single-disease focus
- A biomedical study is described
- They were *meta*-analyses, conference abstracts, letters to the editor, editorials, or commentaries
- The target population was exclusively <18 years
- No full text paper was available
- They were not written in English language

For aim 2, an additional study selection took place after the initial in- and exclusion. Publications were excluded if: 1. the integrated care programme is not in the EU or US, 2. the publication is a review of programmes, and 3. the publication is from before 2010 to limit the in-depth analysis to most recently studied and discussed programmes.

2.4. Data extraction and reporting

Data was extracted by six reviewers (VS-AS, FL-MB, MR-MK) who worked in pairs to extract relevant information from the publications according to their assignment to aims 1 and 2. Any disagreement between the six reviewers was resolved by consensus and with the support of two additional member of the project team (MRvM/EvG). Articles were reviewed in December 2015 and January 2016 by designated first reviewers and re-assessed by the second reviewers in January and February 2016.

In a first step, general information on the publication and/or programme was extracted (e.g. publication details, study design, target group, country of origin/geographical region). In a second step, information specifically pertaining to the two research aims was extracted. Data described for aim 1 includes models and elements that the publications refer to. For aim 2, information on the models and elements of the implemented integrated care programmes are described.

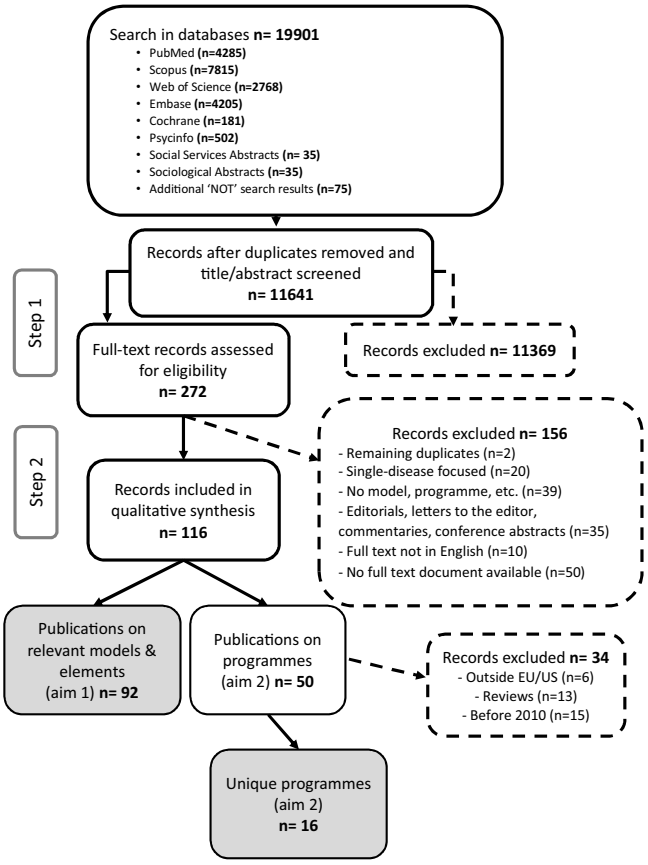

Fig. 1. Flow diagram of scoping review in- and exclusion process.

3. Results

3.1. General description

Our literature search yielded 19,901 potentially relevant publications. After removing duplicates 11,641 publications were screened on the basis of title and abstract (step 1). 272 articles were selected for an in-depth full text screening (step 2). Most articles were excluded between step 1 and 2 because they did not include a model, element, or programme, were not multi-morbidity focused, or a full text was not available. The screening process resulted in 116 unique publications for inclusion in our data extraction: 92 for aim 1 (relevant models and elements) and 50 for aim 2 (programmes) (e.g. 26 publications were included for both aim 1 & 2). 16 programmes from Europe and the US were finally included for aim 2. The in- and exclusion process is depicted in Fig. 1.

4. Aim 1: identify relevant *models* and *elements* for integrated care especially for multi-morbidity

4.1. Study characteristics

Of the 92 publications, 73 were qualitative and 19 were quantitative studies. Among the qualitative studies, reviews were most common ($n = 31$), followed by descriptions or developments of models and frameworks ($n = 14$) and case studies ($n = 9$). Eight of the 20 quantitative publications were randomised clinical trials, six non-randomised trials or quasi-experimental studies and three cross-sectional studies.

The majority ($n = 47$) of the 92 publications focused on multi-morbid persons in general, without any specification of the morbidities. The publication years ranged from 1996 to 2015, and the mean publication year was 2011. The 92 publications were mainly published in Europe ($n = 38$) and the US ($n = 33$).

4.2. Models of integrated care for multi-morbidity

Across the 92 publications, 30 different models were mentioned, applied or recommended. Almost all of these 30 models were only referenced by one publication identified in our review. An overview of the theories and models is presented in the Appendix A (File 2, Table 1).

31 of the 92 publications referred to the Chronic Care Model (CCM) proposed by Wagner et al. (1996) [117,118]. The CCM suggests that comprehensive care programmes for chronically ill patients ideally comprise six key elements. Four of these elements refer to the actual delivery of care by health care providers: [1] *self-management support* that helps patients and their families to obtain skills and confidence to manage their chronic condition (e.g. provision health education programmes that encourage behavioural changes), [2] *delivery system design* that ensures delivery of effective, efficient patient care through e.g. involvement of all members of the multidisciplinary team, clear leadership and regular follow-up, [3] *decision support* based on evidence-based guidelines providing clinical standards for high quality chronic care, and development of [4] *clinical information systems* that supply care teams with feedback, reminders and individual and population-based information for care planning. The two remaining and interlinked elements refer to the context or setting in which chronic care is provided, namely: [5] *the health care system* that provides the organisational context in which chronic care is provided and encompasses the aforementioned components. According to the CCM, a health care system that endorses improvement of the quality of care must be well-organised, motivated and prepared to change and furthermore should be linked to [6] *community resources and policies*. The health care system is embedded in the community, which includes organisations and programmes that may support continuity of care or expand a health care system's care for chronically ill patients .

Six publications referred to the Guided Care Model (GCM) [119]. The GCM is a proactive, comprehensive model of care for people with multiple chronic conditions. The model combines successful innovations in chronic care and elements of the CCM with primary care. Its aim is to improve the quality of care, patients' access to care, and their capacity for selfcare [27]. The model builds on the CCM, and contains eight elements: [1] comprehensive *assessment* and *planning care,* [2] *individual care planning,* [3] *monitoring*, [4] *coaching*, [5] *chronic disease self-management*, [6] *educating and supporting caregivers*, [7] *coordinating transitions between providers and sites of care*, and [8] *access to community services* [119].

Only few models have a focus on integrated care specifically for multi-morbid persons. These include a multidisciplinary, person-centred, integrated and coordinated model of care described by Roughead et al. [52]. The model places the multi-morbid person and their care providers in the inner circle at the centre of care. An integrated primary care network, including the general practitioner, a pharmacist, related health practitioner, home and community care providers, is placed in the middle care circle. A care coordinator is nominated, which can be any of the providers involved in the care provision of the middle care circle. The third and outer circle represents the secondary and tertiary care network, which is integrated into the care process by the providers involved in the middle care circle. Information sharing (e.g. case conferences) among the providers involved across all care circles is an essential part of the model [52].

Muth et al. [33] developed the Ariadne principles, which focus on decision making for multi-morbidity during primary care consultations [34]. According to the Ariadne principles, the primary care process starts with a holistic assessment, followed by a prioritisation of health problems, where patient's preferences are taken into account. At the centre of the Ariadne principles are realistic treatment goals, shared by the physician and multi-morbid patient, referred to as individualised management. The assessment of potential interaction of diseases, treatment and multiple medications is another step in the care process according to the Ariadne principles. As care processes of multi-morbid patients are usually not sequential, and patient's needs and preferences might change over time, a re-assessment of the patient's goal attainment is conducted during planned visits [34].

Sampalli et al. [53] proposed an integrated model of care to improve the health outcomes of individuals with multi-morbidity in a hospital, with integrated and coordinated care modules. The model is based on concepts from the CCM and relevant concepts from other care models (e.g. the salutogenic model, the Canadian model of integrated care). The model proposes that care should be provided by a multidisciplinary team to address the patient's needs with a non-disease-specific approach. The multidisciplinary team can comprises physicians, nurses, occupational therapists, a psychologist, a psychotherapist, and a clinical dietician. The model has four essential phases: (i) intake, (ii) integrated care, (iii) transition, and (iv) discharge from hospital to family physician. During the (i) intake phase, a comprehensive and multidisciplinary assessment is conducted to gain a comprehensive knowledge of the individual with multi-morbidity and his or her environment. The (ii) integrated care phase, consisting of treatment, education and support for integration of the individual patient's needs, can vary in duration depending on the individual patient's condition and needs. During the (iii) transition phase, the patient's discharge readiness is assessed by the multidisciplinary team and a self-management plan is developed together with the multi-morbid patient. The final (iv) discharge phase involves the transition to the responsible care provider (e.g. family physician), considers the community supports available and includes follow-up discharge care [53].

4.3. Elements of integrated care for multi-morbidity

Different elements of integrated care for multi-morbidity can be identified from the literature. To group the elements, we structured the collection into eight components, two pertaining to the multi-morbid person and his/her environment and six corresponding the WHO health system building blocks that are widely used to describe, understand, and compare different health systems (service delivery, leadership & governance, workforce, financing, technology & medical products, information & research). More detailed information on the six WHO health system building blocks, including which elements fit into one component of the framework are provided in Leijten et al. [120]. The elements identified in the literature are presented in Table 2, but only those mentioned in at least 10 publications are described.

Table 1
Study characteristics in papers on relevant models and elements.

	N	Authors
Study design		
Qualitative	73	
Expert discussion paper	1	Bayliss et al. [28].
Focus group	6	Liddy et al. [29]. Smith et al. [30]. Corser and Dontje [31]. Luijks et al. [32]. Lalonde et al. [33]. Muth et al. [34].
Interviews	8	Bayliss et al. [35]. Loeb et al. [36]. Ridgeway et al. [37]. Coventry et al. [38]. Summer Meranius et al. [39]. Knowles et al. [40]. Hjelm et al. [41]. Müller-Staub et al. [42].
Review	33	Piette et al. [43]. Smith et al. [44]. Kodner [45]. Boult et al. [46]. Boyd et al. [47]. Pielawa et al. [48]. Singer et al. [49]. Beland et al. [50]. Calciolari et al. [51]. Roughead et al. [52]. Sampalli et al. [53]. Alfaro Lara et al. [54]. France et al. [19]. Roberts et al. [55]. de Bruin et al. [23]. Smith et al. [21]. American Geriatrics Society Expert Panel on the Care of Older Adults [56]. Dubuc et al. [57]. Zulman et al. [58]. Morello et al. [59]. van Houdt et al. [60]. Yardley et al. [61]. Boyd et al. [62]. Hong et al. [63]. Ivbijaro et al. [64]. Uhlig et al. [65]. Lefevre et al. [66]. Haibach et al. [67]. Yardley et al. [68]. Stokes et al. [69]. Pietrantonio et al. [70]. Kadu et al. [71]. Morgan et al. [72].
Case study	9	Eng et al. [73]. Hébert et al. [74]. Dorr et al. [75]. Silver et al. [76]. Thiem et al. [77]. Berry et al. [78]. Morrin et al. [79]. Oni et al. [80]. Park et al. [81].
Model/framework description or development	14	Lorig [82]. Yarmo-Roberts et al. [83]. Boyd et al. [84]. Soubhi et al. [85]. Parekh et al.[86]. Corser [87]. Kernick et al. [88]. Tanio and Chen [89]. Tracy et al. [90]. Reeve et al. [91]. Grant et al. [92]. Wu et al. [93]. Findley [94]. Amblas-Novellas et al. [95].
Vignettes	2	Hamberger and Hindman [96]. Fortin et al. [97].
Quantitative	19	
Randomised Clinical Trial (RCT)	8	Bernabei et al. [98]. Melis et al. [99]. Muntinga et al. [100]. Allen et al. [101]. Harris et al. [102]. Spoorenberg et al. [103]. Lin et al. [104]. Coventry et al. [105].
Longitudinal study	2	Chan et al. [106]. Martin et al. [107].
Cross-sectional study	4	Landi et al. [108]. Petersen et al. [109]. Doos et al. [110]. Laux et al. [111].
Observational study	1	Roland et al. [112].
Non-randomised trial, quasi experimental	4	Beland et al., [113]. Bird et al. [114]. Boyd et al. [115]. Fortin et al. [116].
Target group		
General multi-morbidity	44	Hamberger and Hindman [96]. Yarmo-Roberts et al. [83]. Smith et al. [21]. Dorr et al. [75]. Bayliss et al. [35]. Laux et al. [111]. Boyd et al. [115]; Soubhi et al. [85]. Corser et al. [87]. Parekh et al. [86]. Corser et al. [87]. Roughead et al. [52]. Sampalli et al. [53]. Singer et al. [49]. Smith et al. [21]. Chan et al. [106]. Bruin et al. [23]. Alfaro Lara et al. [54]. Kernick et al. [88]. Lalonde et al. [33]. Martin et al. [107]. Alfaro Lara et al. [54]. France et al. [19]. Morello et al. [59]. Fortin et al. [116]. Grant et al. [92]. Harris et al. [102]. Reeve et al. [91]. Van Houdt et al. [60]. Yardley et al. [68]. Zulman et al. [58]. Berry et al. [78]. Morrin et al. [79]. Findley [94]. Uhlig et al. [65]. Lefevre et al. [66]. Ridgeway [37]. Muth et al. [34]. Oni et al. [80]. Coventry et al. [105]. Hong et al. [63]. Yardley et al. [68]. Pietrantonio et al. [70]. Kadu et al. [71]. Stokes et al. [69].
Specific combination of morbidities	12	Piette et al. [43]. Fortin et al. [116]. Roberts et al. [83]. Doos et al. [110]. Ivbijaro et al. [64]. Haibach et al. [67]. Lin et al. [114]. Wu et al. [93]. Boyd et al. [115]. Coventry et al. [105]. Knowles et al. [40]. Morgan et al. [72].
Frail elderly	32	Lorig [82]. Eng et al. [73]. Bernabei et al. [98]. Landi et al. [108]. Hebert et al. 2003. Melis et al. [99]. Beland et al. [113]. Kodner [45]. Bird et al. [114]. Boyd et al., 2007. Bayliss et al. 2008. Boyd et al. [115]. Liddy et al. [29]. Boult et al. [46]. Beland et al. [113]. Silver et al. [76]. Thiem et al. [77]. Calciolari et al. [51]. Pielawa et al. [48]. American Geriatrics Society Expert Panel on the Care of Older Adults [56]. Allen et al. [101]. Muntinga et al. [100]. Roland et al. [112]. Dubuc et al. [57]. Spoorenberg et al. [103]. Tanio and Chen [89]. Tracy et al. [90]. Looman et al. 2013. Park et al. [81]. Petersen et al. [109]. Summer Meranius et al. [39]. Amblas-Novellas et al. [95].
Informal carers	1	Hjelm et al. [41].
Health care professionals	3	Smith et al. [21]. Loeb et al. [36]. Luijks et al. [32].

Overall, most elements were identified in the service delivery ($n = 10$), information & research ($n = 4$), and leadership & governance components ($n = 4$). Elements relating to the other components were less frequently mentioned in the literature; this was especially the case regarding financing. More detail on observations for each component is provided below.

4.3.1. Multi-morbid person & his/her environment

The element that is mentioned most frequently ($n = 61$) in our scoping review, is *person-centred care*, e.g. in two-thirds of publications (see Appendix A file 2, Table 2 to identify the 61 publications). Most commonly it pertained to a shift from disease-centred care to a person-centred care approach, which takes individual preferences, perceptions and needs into account. A *holistic assessment* of a patient's needs and preferences to determine which type of care is needed was also often referred to as an essential part of integrated care ($n = 54$). The elements *community- and social resources* (e.g. in form of community health teams or home care services) and *support* (e.g. from family caregivers) of the person with multi-morbidity ($n = 20$) were mentioned much less frequently in the literature.

4.3.2. Service delivery

As many articles described elements relating specifically to the care process, most elements identified belong to the service delivery component. For example *integration and coordination of care* ($n = 52$), across health and social care sectors or among different disciplines of providers is described. *Self-management* ($n = 40$) was often referring to supporting the skills of the patient (e.g. develop-

Table 2
Elements per component.

Relevant elements	Number of times referenced. Total $n = 92$
Multi-morbid person	
Person-centred care	61
Holistic or comprehensive needs assessment	54
Environment	
Community services/community resources, social network/social care	20
Service delivery	
Integration and coordination of care services and/or professionals	52
Self-management (engaging and activating the patient, patient education)	41
Continuity of care	31
Informal caregivers	30
Single point of entry	23
Prioritization of patients and providers preferences	21
Health promotion/preventive actions/proactive prevention activities	21
Avoidance of guideline interaction	19
Polypharmacy management	16
Leadership & governance	
Shared decision making/joint goal setting/participatory approach	29
Case management/case manager/care manager	24
Individual care plan	24
Performance-based assessment/management or care outcomes	20
Workforce	
Collaboration	47
Staff training & education	33
Improve provider-patient relationship/communication	21
Financing	
Financing system/reimbursement/cost effective care/financial incentives	10
Information & research	
Risk stratification	21
Evaluation or additional research	16
Technology & medical products	
Information sharing/interoperable (systems)	27
Monitoring	26

ment of skills to better manage his/her diseases) or the ability of professionals to train self-management. C*ontinuity of care* ($n = 31$) was described as a key to successful integrated care as it facilitates networking among professionals and a good quality of care over time. Several publications considered the involvement of *informal caregivers* ($n = 30$) as relevant in the overall care process or in particular during decision making.

4.3.3. Leadership & governance

The importance of involving patients and other care givers in *shared decision-making* was highlighted in every third publication, e.g. in 31 of the 92 articles. This was often described as a process where the patient gradually becomes more involved as a serious decision-partner in the care process in order to improve care outcomes and experiences with the care process. To optimize the processes of care across different professionals, *case management* was often proposed, as well as the development of an *individual care plan* according to patient's preferences (each $n = 24$). Another element mentioned commonly was the use of *performance-based assessment/management* or the measurement of *care outcomes* ($n = 20$) on all levels.

4.3.4. Workforce

In the workforce component the elements of *collaboration* between health care providers and organisations as well as across sectors ($n = 47$) and *staff training* (e.g. in communication skills, teamwork, and case management) ($n = 33$) were frequently referred to. Another element often mentioned was the *improvement of the provider-patient relationship* ($n = 21$). This can, for example, pertain to further professional development in communication training to improve e.g. the respectful interaction between the patient and care professional, which in turn may be a prerequisite for successful shared decision-making.

4.3.5. Financing

Factors related to the financing component were least frequently *($n = 10$)* found. Ten publications, e.g. only one in nine, referred to the *cost effectiveness of care, financial incentives* for providers or patients or *the reimbursement systems*, which for example considered the additional time professionals spend with a multi-morbid patient.

4.3.6. Technology & medical products

Risk stratification was mentioned in a considerable number of publications ($n = 21$) and often described as an algorithm implemented in an (ICT-) tool to identify persons with multi-morbidity or to stratify them according to their level of disease complexity. Another element described and recommended in the literature was an *evaluation* of or *additional research* on the integrated care approach ($n = 16$).

4.3.7. Information & research

An *information sharing system* or an *interoperable system* with the purpose to exchange information between professionals, patients, and informal caregivers and thereby optimize the care process were described as relevant in several publications ($n = 27$). *Monitoring* was frequently mentioned across the identified publications ($n = 26$), but with different functions, such as monitoring of care plans, clinical indicators, patient satisfaction, or as a tool for performance-based management.

5. Aim 2: *models* and *elements* applied in *integrated care programmes* for multi-morbidity

5.1. Study characteristics and target population

Altogether 50 publications on integrated care programmes for multi-morbidity were found; they described 16 unique US or Euro-

Table 3
Characteristics of implemented programmes ($n = 16$).

Programme name	Author, Year, country	Target population	Study design	Theories, models or programmes referred to	Key elements													
					Elements of CCM						Elements of GCM							
					1.Self-management support	2.Delivery system design	3.Decision support	4.Clinical information systems	5.The health care system	6.Community resources and policies	1.Comprehensive assessment	2.Planing care	3.Monitoring	4.Coaching	5.Chronic disease self- management	6.Educating and supporting caregivers	7.Coordinating transitions	8.Access to community care services
Programmes in the EU ($n = 11$)																		
Multi-disciplinary integrated care intervention	Boorsma et al. [121], NL	Frail elderly	RCT	Disease management model, Model of multi-disciplinary integrated care			x	x		x	x	x	x		x		x	
					No additional elements.													
National Care for the Elderly programme	Fabbricotti et al. [123], NL	Frail elderly	Quasi experimental design	–				x	x	x	x	x						
					Additional elements: single entry point, steering group, task specialization and delegation.													
Frail older Adults: Care in Transition	Muntinga et al. [33], NL	Frail elderly	Cluster RCT	Wagner's chronic care model			x	x			x			x	x		x	
					Additional element: strong management by expert geriatric teams.													
Polypharmacy Intervention Limburg	Muth et al. [33], NL	Frail elderly	Multi method study	Wagner's chronic care model				x		x								
					Additional element: Patient's medication review.													
Primary care practice-based care management for chronically ill patients	Muth et al. [33], DE	General multi-morbidity	Multi method study	Wagner's chronic care model			x	x					x		x			
					Additional elements: single point of entry, prevention of future hospitalizations.													
Sepsis survivors monitoring and coordination in outpatient health care	Muth et al. [33], DE	Specific morbidity combination	Multi method study	Wagner's chronic care model			x	x	x				x	x	x			
					No additional elements.													
Prioritising multi-medication in multimorbid patients	Muth et al. [33], DE	Frail elderly	Multi-method study	Wagner's chronic care model			x	x	x						x			
					Additional element: shared decision making.													
Six case management demonstration sites	Roland et al. [111], UK	Frail elderly	Observational study	Wagner's chronic care model			x	x	x	x					x			
					Additional element: prevention of emergency admissions to hospital.													

Table 3 (*Continued*)

Programme name	Author, Year, country	Target population	Study design	Theories, models or programmes referred to	Key elements: Elements of CCM 1.Self-management support	2.Delivery system design	3.Decision support	4.Clinical information systems	5.The health care system	6.Community resources and policies	Elements of GCM 1.Comprehensive assessment	2.Planing care	3.Monitoring	4.Coaching	5.Chronic disease self- management	6.Educating and supporting caregivers	7.Coordinating transitions	8.Access to community care services
The Collaborative Interventions for Circulation and Depression trial	Coventry et al. [37], Knowles et al. [39], 2015, UK	Specific morbidity combination	RCT, Interview	Collaborative care for patients with moderate to severe depression trial; Collaborative care model, Wagner's chronic care model			x	x			x			x	x	x		
					Additional element: proactive treatment.														
Leben mit mehreren Langzeit-erkrankungen	Müller-Staub et al. [41], CH	General multi-morbidity	Grounded theory and qualitative interviews	–			x	x			x			x	x			
					Additional element: shared decision making.														
Blekinge case management intervention	Hjelm et al. [40], SE	General multi-morbidity	In depth interviews	–		x		x			x	x					x	
					Additional element: involvement of informal care.														
Sum of no. of elements					0	1	8	11	4	4	6	3	3	4	8	1	3	0
Programmes in the USA ($n = 5$)																		
The promoting effective advanced care for Elders	Allen et al. [100]	Frail elderly	Pilot study	PASSPORT, Wagner's chronic care model	x	x	x	x	x	x	x				x			
					No additional elements.														
The programme of All Inclusive care for the Elderly	Bloom et al. Meret-Hanke, 2011, [124,125]	Frail elderly	Programme description	Wagner's chronic care model		x	x	x	x			x	x		x			
					Additional element: preventive care.														
Geriatric Resources for Assessment and Care of Elders	Bielaszka-DuVernay 2011 [126]	Frail elderly	Programme description	–			x	x	x	x	x	x	x		x		x	
					Additional elements: transportation, continuity of care, home visits.														
TEAMcare	Katon et al. [127]. Von Korff et al. [128]. Lin et al. [103]	Specific morbidity combination	Descriptive intervention design; RCT; RCT	Wagner's chronic care model			x	x	x	x	x	x	x	x	x			
					Additional elements: shared goal-setting, proactive patient care.														
ChenMed Model	Tanio and Chen 2013 [88]	Frail elderly	Programme description	-				x	x	x				x		x		
					Additional elements: transportation, more physician-patient time.														
Sum of no. of elements					1	2	4	5	5	4	3	3	3	2	4	1	1	0

Notes: CH = Switzerland, DE = Germany, ES = Spain, IT = Italy, NL = Netherlands, SE = Sweden, UK = United Kingdom.

pean programmes of recent date (published in or after 2010). Of the 16 programmes described in more detail below, eleven are from Europe (the Netherlands-4, Germany-3, UK-2, Switzerland-1, Sweden-1) and five from the US. Three of the programmes target general multi-morbidity, ten frail elderly and three a specific combination of diseases (Table 3).

5.2. Models used in integrated care programmes for multi-morbidity

Of the 16 integrated care programmes for multi-morbidity operable in the EU and the US, the majority referred to the CCM ($n = 10$). A few programmes ($n = 4$) additionally referred to other models ($n = 3$) and/or to previous programmes ($n = 2$). The other models referred to were the Disease Management Model [121,122], the Model of Multidisciplinary Integrated Care [122], and the Collaborative Care Model [40].

The single disease focussed Disease Management Model to improve the health and quality of life of chronically ill persons comprises three key elements: [1] monitoring of disabilities, [2] coordination of care and [3] patient empowerment [122]. The Model of Multidisciplinary Integrated Care is inspired by the Disease Management Model and comprises five elements: [1] continuity of care, [2] patient centeredness, [3] generating multidimensional health data, [4] training of professionals, and [5] a shared disease management plan. This model focusses on persons with multi-morbidity and the identification and monitoring of the functional disabilities caused by chronic diseases [122]. The Collaborative Care Model, which is based on the CCM, is an evidence based approach that aims to integrate mental and physical health care by reorganising treatment and care delivery (e.g. collaboration of different care providers, including mental care services). Furthermore, the model focuses on the importance of monitoring a patient's progress [40].

For five programmes, there was no reference to any model or any other integrated care programme (Table 3).

5.3. Elements used in integrated care programmes for multi-morbidity

The publications about the integrated care programmes for multi-morbidity in the EU and US referred to between 4 and 11 elements. Overall, integrated care programmes most often referred to interdisciplinary care or collaboration ($n = 13$), followed by self-management ($n = 12$), the use of an electronic information system ($n = 10$) and the two elements assessment ($n = 9$) and person-centred care ($n = 9$).

Table 3 lists the elements included in each individual programme. While a range of identified integrated care programmes referred to the CCM, most of these programmes did not apply all six elements of the CCM. To be more specific, among the ten programmes referring to the CCM, 4 used two, 2 three, 3 four, 0 five, and only 1 all six elements (Table 3).

With respect to the CCM, the focus was predominantly on elements referring to the actual delivery of care, as programmes most often included elements related to delivery system design (e.g. case manager, working in multi- or inter-disciplinary teams, care plans), self-management support (e.g. education, coaching, empowerment), and clinical information systems (e.g. electronic information exchange, computerized alerts, web-based information systems). On the other hand, elements related to decision support (e.g. evidence based guidelines, standards) and health care system and community & resources were less often reported on.

None of the identified integrated care programmes referred to the GCM, however elements belonging to the GCM could be identified among the programmes. Integrated care programmes most often included the following five elements that can be related to the GCM: comprehensive assessment, monitoring, planning care, chronic disease self-management, and coordinating between providers and sites of care. The elements prevention or proactive care and shared decision making were reported frequently by the programmes, but neither explicitly belong to the CCM or GCM.

6. Discussion

The current scoping review summarises information, evidence and research about relevant models and elements of integrated care for multi-morbidity. Moreover, an overview is provided on which models and elements are in turn applied in recent integrated care programmes for multi-morbid persons in the EU and the US. Although a wide variety of literature is available on integrated care, this is mostly single-disease focused. In contrast to other thematically related reviews in the current literature (e.g. [10,23,11,122,128–130,134]), our scoping review does not primarily focus on one specific outcome (e.g. cost-effectiveness) or intervention (e.g. case management), but more comprehensively on models and elements relevant in the context of integrated care for multi-morbid persons. Whereas the reviews conducted by de Bruin et al. and Hopman et al. focus on the effectiveness regarding the improvement of specific outcomes and the available evidence, we were instead interested in the elements and models included, thus applied a more qualitative and descriptive approach.

We conducted a scoping review of 92 publications pertaining to models and elements and 50 publications pertaining to programmes. Although the focus of our research question was on multi-morbidity, the majority of included publications described integrated care models that were not specifically developed for, but still applied to, multi-morbidity. With respect to the CCM, the results of this scoping review are comparable to those of de Bruin et al. [23] and Hopman et al. [134] as the programmes we identified also mainly focussed on the CCM elements 'delivery system design' and 'self-management support'. However, unlike de Bruin et al. [23] and Hopman et al. [134] we also found that the majority of the identified programmes focussed on the CCM element 'clinical information systems'. More research is needed to determine the effectiveness for both the CCM and GCM, especially for multi-morbid persons [22–23,131]. Models focussing on multi-morbidity mostly described particular elements of the care process, specific challenges related to multi-morbidity, or an adaptable approach to meet the needs of persons with multi-morbidity [34,52–53,132].

Overall, most elements of integrated care in multi-morbidity identified in the scientific literature pertain to the WHO health systems-components service delivery, information & research, leadership & governance and workforce. Elements relating to the person's environment, financing and technology & medical products components were less frequently found in the scientific literature. This may point to important gaps in scientific literature of elements that may be important for policymakers and those implementing integrated care programmes. For example, information and evidence on financing mechanisms that can strengthen care integration and at the same time control or save cost will be needed if programmes are to be sustainable or to be adopted more widely. Another example is the use of eHealth, which is believed to have great potential to improve integrated care for multi-morbid individuals, but has received only limited attention in scientific literature related to multi-morbidity (cf. [58,133]).

Some elements from theoretical models have been widely applied in the analysed programmes, while others have hardly found their way into practice. This could be explained by the insufficient evidence base for the effectiveness of various methods in the care of persons with multi-morbidity [23,134]. Moreover, there

may be practical reasons to not include additional features. For example, time or budget constraints may prevent the use of special training measures for professionals, which are part of the CCM.

The five elements (person-centred care, holistic assessment, self-management, integration and coordination of services and collaboration) identified most often in the literature seem to be key as they were also among the most frequently mentioned elements of the identified programmes. Moreover, the use of an electronic information system and the training or education of staff was repeatedly reported among the implemented programmes. Elements that are not part of the CCM or GCM, but are frequently mentioned in publications on programmes include prevention or proactive care, shared decision-making, and polypharmacy management. However, drawing firm conclusions on their relative importance is hampered by a low quality of evaluation studies as of yet [23,134].

The elements deemed relevant for integrated care were determined inductively and new elements were added throughout the reviewing process. However, we cannot conclude that this is a complete or finite list of elements. Furthermore, we stress that although some elements appeared more often in the literature than others, these are not necessarily more important – some are simply broader or higher level concepts. For this reason we have refrained from making statements weighing these elements. Moreover, it should be noted that elements from the literature focusing on integrated care in general can be useful for the care specific to multi-morbid persons, but the higher complexity of the latter likely requires adaptation of these elements. An integrated care approach specifically for multi-morbidity requires that integration and coordination of care go beyond the traditional single-disease focus. The scope of such a care approach needs to be sufficiently flexible to, for example, include polypharmacy management and prioritisation of treatment goals. Furthermore, the analysed models mostly focus on the micro and meso-level context and do not discuss the macro environment the programmes operate in. However, supportive macro level policies and financing systems are crucial conditions for the implementation and eventual success of such programmes. Hence, further research in this respect would be needed.

6.1. Limitations

Our search strategy included only publications from scientific databases and thus potentially relevant grey literature was not included in the review. In addition, the search strategy was very broad and targeted for elements described as part of integrated care programmes, but not for research done on individual elements per se. This means that relevant research focusing on individual elements may not have been found. Furthermore, we did not assess the methodological quality of the studies other than extracting their study designs. A quality assessment would not have been possible given the variety of studies, including programme descriptions and reviews. This means that only counting how often an element is mentioned in these papers does not necessarily reflect the quality of research with regard to these elements or their relative importance, only that they are often studied and mentioned in the context of integrated care for people with multi-morbidity.

7. Conclusion

Most models and elements that could be found in the literature focus on integrated care in general and were originally developed and used for a single disease focus. However, a multitude of elements relevant for integrated care for multi-morbid persons were identified both in the literature and in integrated care programmes that are operable in the US or EU. Together, this may provide key insights and priorities for future research in the field. Likewise, the majority of integrated care programmes for multi-morbidity are based on more general models for integrated care for chronic diseases. This leads us to conclude that a comprehensive model that better accounts for the complexities resulting from multi-morbidity is needed. Such a model would have to go beyond a single disease focus and better capture such multi-morbidity-specific elements as dealing with multiple care providers, information sharing, treatment interaction, payments that adequately account for multi-morbidity and flexibility in the application of single disease guidelines. Moreover, elements addressing the experiences, needs and preferences of persons with multi-morbidity should be addressed, while a more person centred care model is co-produced together with the person concerned. Lastly, more attention to the macro-level environment and its policies could improve the effectiveness of newly designed integrated care programmes and better forecast their applicability, feasibility and success in a given setting. Within the context of the SELFIE project described in Box 1, we have used the results of this scoping review to create such a comprehensive conceptual framework of integrated care in multi-morbidity [120].

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Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at http://dx.doi.org/10.1016/j.healthpol.2017.08.008.

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