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Multimorbidity care model: Recommendations from the consensus meeting of the Joint Action on Chronic Diseases and Promoting Healthy Ageing across the Life Cycle (JA-CHRODIS)

Running head: Guidelines for comprehensive clinical care of multimorbid patients in Europe

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HIGHLIGHTS

- Patients with multimorbidity have complex health needs
- There is a lack of evidence-based recommendations specific to multimorbidity patients
- A consensus meeting was held to develop a framework multimorbidity patient care
- The Multimorbidity care model includes sixteen components across five domains
- These include: care delivery, decision and self-management support, technology, and community/social resources.

ABSTRACT

Patients with multimorbidity have complex health needs but, due to the current traditional disease-oriented approach, they face a highly fragmented form of care that leads to, inefficient, ineffective, and possibly harmful clinical interventions. There is limited evidence on available integrated and multidimensional care pathways for multimorbid patients. An expert consensus meeting was held to develop a framework for care of multimorbid patients that can be applied across Europe, within a project funded by the European Commission; the Joint Action on Chronic Diseases and Promoting Healthy Ageing across the Life Cycle (JA-CHRODIS). The experts included a diverse group representing care providers and patients, and included general practitioners, family medicine physicians, neurologists, geriatricians, internists, cardiologists, endocrinologists, diabetologists,

epidemiologists, psychologists, and representatives from patient organizations. Sixteen components across five domains were identified (Delivery of Care; Decision Support; Self Management Support; Information Systems and Technology; and Social and Community Resources). The description and aim of each component are described in these guidelines, along with a summary of key characteristics and relevance to multimorbid patients. Due to the lack of evidence-based recommendations specific to multimorbid patients, this care model needs to be assessed and validated in different European settings to examine specifically how multimorbid patients will benefit from this care model, and whether certain components have more importance than others.

Keywords: multimorbidity, care, case manager, chronic care model, comprehensive assessment, individualized care plans

INTRODUCTION

Recently, chronic, non-communicable health conditions have replaced infectious diseases as the dominant health care burden, as they are now the main causes of morbidity and mortality in many countries. This epidemiological transition creates serious problems for health care systems that are still focused on episodic and acute care. However, health care systems worldwide are currently faced with the growing challenge of multimorbidity, defined as the co-occurrence of multiple chronic diseases or conditions in a single individual. Multimorbidity prevalence is high [1] and increases with age, affecting more than 60% of people aged 65+ [2-5]. Multimorbidity is associated with numerous negative outcomes, including mortality, disability, poor quality of life, and the healthcare costs associated with it are high [6]. Multimorbidity is more prevalent among socially disadvantaged population groups [5], and thus failure to provide appropriate care for multimorbid patients is likely to also have a negative effect on equity in health care.

Multimorbid patients have complex health needs. However, there is still a focus on traditional disease-oriented approaches. Consequently, multimorbid patients often receive a fragmented form of care, leading to inefficient, ineffective, and possibly harmful clinical interventions. They often receive complex drug regimens, which increase the risk of inappropriate prescribing, drug-drug interactions, adverse drug reactions, and poor adherence to medications [7].

Compared to persons with one chronic disease, multimorbid patients more often have problems related to mobility, self-care, and functional activities, quality of life, and more pain and cognitive problems [8], which makes care and treatment challenging. Ideally, care for multimorbid patients should involve numerous healthcare providers and resources. There is limited evidence on available integrated and multidimensional care pathways for multimorbid patients. Although integrated care programs for multimorbidity may currently be in implementation in practice, little is documented in the literature, and are tested in small populations [9-12]. Some interventions have been multidimensional, including different components, but they are poorly standardized, and not suitable for different populations or countries. A systematic review [10] highlighted only nineteen publications describing eighteen comprehensive care models for multimorbidity [13-30], mostly in North America, with only one in Europe [23]. They vary in the type of setting, patients, and interventions, including different components (Table 1), some describing only single features, while others multiple strategies. Although some results suggested that comprehensive care for multimorbidity might increase patient satisfaction, health-related quality of life, and functioning, and possibly reduce depressive symptoms, the evidence concerning the efficacy of these care programs is insufficient, and more studies are needed to reach conclusions. Not only is there a lack of evidence but it is difficult to interpret or generalize the evidence due to a lack also of definitions and concepts [12]. As evidence on the efficacy of care pathways for multimorbidity provide conflicting results, and there are no widely accepted care models [9-11], there is an urgent need to develop a system that works for multimorbidity, to deliver good quality of care [31].

With this challenge in mind, an expert group met to discuss the components of a multimorbidity care model, to discuss their definition, aims, key characteristics, target population, and relevance, to develop a framework for care of multimorbid patients that can be applied across Europe. This was done within a European Commission funded project; the Joint Action on Chronic Diseases and Promoting Healthy Ageing across the Life Cycle (JA-CHRODIS), which focuses on the development of common guidance and methodologies for care pathways for multimorbid patients [6, 32], and includes over 60 European partners from 26 European countries.

METHOD

Multimorbidity was defined as the co-occurrence of multiple chronic diseases or conditions in a single individual. First, we identified five components from the Chronic Care Model [33, 34] and Innovative Care for Chronic Conditions Model [35]: self-management support; delivery system design; decision support; clinical information systems and; interaction with community partners. Both these models are aimed at patients with chronic conditions, who do not necessarily have multiple morbidities. Therefore, although the components may be applicable to multimorbid patients, this population has specific, additional characteristics and needs to be considered. Thus, we evaluated other existing published comprehensive care programs implemented in clinical care of multimorbid patients [10, 11]. A systematic review evaluating the effectiveness of comprehensive care programs for multimorbid patients has been conducted by members of the expert group [10], providing a basis for the discussion. The programs included one or more components that were applied either in isolation or combined with others. Twenty components were identified across five domains (Table 1), and sixteen were selected by the experts after discussion.

Second, a selection of experts met to discuss the relevance of the potential components (see author list). The experts were chosen to ensure a diverse group representing both care providers and

patients, including physicians with different specialties (neurologists, geriatricians, internists, cardiologists, endocrinologists, diabetologists), epidemiologists, psychologists, representatives from patient organizations, and several General Practitioners. The list of components to discuss were sent to all participants before the meeting, for any revisions or additions. The 1st JA-CHRODIS WP6 Expert Meeting, was held on October 28, 2015 in Brussels, Belgium.

Each component was discussed by the experts, focusing on i) deciding a definition and discussing ii) aims, iii) key characteristics, iv) target populations, and v) relevance for multimorbid patients (e.g., rather than single chronic diseases). The experts also discussed which components were relevant, should be removed, or whether further components needed to be added. A qualitative discussion was used, and continued until consensus was reached. In case of non-consensus, we describe in the document which elements, further information, or further research is needed before recommendations can be made. This report outlines an ideal clinical scenario to be applied within different health care systems in Europe, with room for interpretation applicable to different systems.

RESULTS

DELIVERY OF CARE

Component-1: Regular comprehensive assessment of patients

Description/aims: Regular comprehensive assessment of patients should be conducted, including, i) assessment of type, complexity, and clustering of disorders, ii) assessment of treatment burden and drug interactions, and iii) evaluation of patients' preferences and personal resources (e.g. coping skills, health literacy), and social resources (e.g., social network). Comprehensive assessment is a diagnostic process that should be used to determine the medical, psychological, social, and functional capabilities of multimorbid patients to develop a coordinated, integrated care plan for multidisciplinary treatment and long-term follow-up. This multidisciplinary assessment should assess specific diseases as well as patterns of illnesses, examine the burden of treatment and needs, and evaluate desires and opinions of patients and relatives, social support, and resources available

to patients to achieve an agreement on the patient's individualized care plan (see Component-4). Patient risk stratification should be done during assessment, to identify the risk of complications and level of care needs (e.g., a low risk patient might have few co-morbid conditions requiring little self-management and no home-help care needs, whereas a high risk patient may have multiple comorbidities requiring numerous pharmaceutical drugs, or other forms of medical interventions, daily self-management, and significant care needs to cope with functional limitations). One important motivation for comprehensively assessing multimorbid patients is the heterogeneity of persons affected by multiple diseases and different trajectories of evolution over time. For example, there is an association between multimorbidity and disability in old age, but specific disease pairs (e.g. arthritis and visual impairment) are synergistically associated with different types and severity of disability [36]. Thus, persons with the same number of chronic diseases but different aggregations of diseases may have very different functionality and, thus, different care needs. Similarly, cognitive impairment or depression has an independent or additive effect on disability in persons with multimorbidity [37]. Thus, identifying depression may be as important for preventing disability as treating the other chronic diseases. Given the complexity and heterogeneity of multimorbidity, no single measure would serve all clinical purposes, and the basic principle of comprehensive assessment is the use of different measures to capture them.

Key Characteristics: Regular comprehensive assessment by the multidisciplinary team (Component-2) should be done using standardized assessment tools where possible, along with a clinical interview. It should preferably take into account all current and previous information from other resources, e.g., clinical records and other physician assessments, and assess the complexity of conditions, including treatment burden, drug interactions, and disease patterns. It should identify key aspects which will be used in risk stratification, and any consequent care planning steps, including patient empowerment and allocating resources, through the construction of an individualized care plan, which is reviewed and updated during the regular subsequent assessments and shared between care providers, patients, and families (see Component-4).

Relevance to multimorbidity: Due to complexity of multimorbid patients, adverse outcomes related to the presence of multiple diseases, and polypharmacy-related risks, multimorbid patients need comprehensive, extensive assessment and risk stratification. Regular reassessment is of particular importance, due to changing symptoms and severity of ongoing multiple chronic conditions and their treatments.

Component-2: Multidisciplinary, coordinated team

Description/aims: A multidisciplinary team and network is needed to evaluate and deliver treatment and care relating to the patient's functioning, impairments, and social support. Using a multidisciplinary team aims to address disease-specific needs, avoiding fragmentation and ensuring continuity of care. The objectives are to increase efficiency and accessibility of care by providing multidisciplinary care both in terms of different professionals' roles (nurses, physicians, physiotherapists, social workers etc), different levels of care (i.e., primary care, outpatient specialist care, hospitals), and different disease specializations.

Key Characteristics: Teams should be composed of a clinician with a generalist approach (e.g., geriatrician, internist, general practitioner), and specialists in the relevant diseases, nurses, and other healthcare professionals addressing pharmacological needs, social care, and psychological aspects. One designated clinician responsible for overseeing care and making clinical decisions about treatment is essential to reduce care fragmentation, ensuring continuity of care. Where necessary, the provision of a case manager to act as the primary contact for the patient and coordinate their care plan should be considered (Component-3). Involvement of the patient's General Practitioner should be emphasized, and coordination between all relevant team members must be maximized (supported by the information systems described later).

Relevance to multimorbidity: Multimorbid patients have multiple comorbid conditions requiring care and treatment from different medical specialists, and might also have functional and social care needs requiring access to multiple care service providers. Providing patients with a coordinated and

integrated team to manage their overall care aims to maximize outcomes and increase continuity of care, while decreasing fragmentation and optimizing access to care and services.

Component-3: Professional appointed as coordinator of the individualized care plan and contact person for patient and family (“case manager”)

Description/aims: Patients who have been identified during the comprehensive assessment as having complex care needs (e.g., either clinically or in terms of social and socio-economic aspects, or both) should be appointed a case manager, who is the primary contact point for the patient and family, representing a single entry point into the system. The case manager should act as coordinator between the patient and members of the multidisciplinary team to manage care, actively linking the patient to providers, medical services, residential, social, behavioral, and other support services in the most effective way. They should also monitor continuity of care, follow-ups, and documentation. This aims to increase accessibility to healthcare, and improve continuity and effectiveness of following the individualized care plan.

Key Characteristics: A named contact person, acting as a single access point to the system for communication between the patient and the team. As described in Component-2, patients should also have a named responsible clinician, who is responsible for overseeing care and treatment.

Relevance to multimorbidity: A case manager is necessary for multimorbid patients with complex care needs, who need a coordinated level of care that integrates various levels of healthcare and support.

Component-4: Individualized care plans

Description/aims: Individualized, coordinated, and integrated plans for the treatment and long-term follow-up of patients should be developed based on the comprehensive assessment by the multidisciplinary team, including a patient-centered approach that considers the preferences of the patients, and the prioritization of a cross-disease, holistic approach, which includes targeting

symptoms, functional ability, quality of life, desired patient outcomes etc. It should be noted that although some recommendations have been made concerning the measurement of universal outcomes for multimorbid patients [38], there is a need for more research to define appropriate and specific outcomes for multimorbid patients, and to achieve consensus on their use.

Key Characteristics: The written plan should be patient-centered, and focus on multiple outcomes, agreed with the patient (or family/caregiver in the case of patients with, e.g., severe cognitive impairment) and shared with the multidisciplinary team, including the responsible clinician, case manager, general practitioner, and families (with permission of the patient). Individualized care plans should be reviewed and modified at each reassessment of the patient, and any changes shared with the team. It should include a risk assessment of the patient, identifying those with a high risk of adverse negative outcomes, and a case manager should be appointed if appropriate (see Component-3). The plan should specify the responsible clinician in charge of the patients overall care decisions (see Component-2).

Relevance to multimorbidity: Individualized care plans are of particular relevance to multimorbid patients because their care needs reflect their differences in term of severity of diseases, and their functional and cognitive status, as well as social support. The individualized care plan incorporates information from different physicians and health care providers, and is integrated and coordinated, focusing on patient outcomes rather than disease-specific outcomes.

DECISION SUPPORT

Component-5: Implementation of evidence-based practice

Description/aims: Flexible application of disease-specific evidence based guidelines, with consideration of polypharmacy, disease interactions, and drug-drug interactions should be implemented. Healthcare providers should promote clinical care that is consistent both with available scientific evidence and patient preferences. As specific disease guidelines do not represent the evidence base for multimorbidity, caution is needed, and the team should apply a critical

appraisal of the evidence. Applying evidence-based medicine does not mean simply doing what has been proven to have efficacy in clinical trials and systematic reviews, particularly in multimorbid patients, where the potential for medication interactions, unwanted or unanticipated effects, or contraindications to interventions are greatly increased [39].

Key Characteristics: Assessment, treatment, and care should be consistent with scientific evidence. The use of guidelines is encouraged, but must be multimorbidity-centered, with focus on drug-drug and disease interactions, while also considering patient preferences.

Relevance to multimorbidity: Current evidence specific to multimorbidity is relatively scarce, and future research needs to focus on this, moving away from disease-specific guidelines especially when the expected benefit/risk ratio is low. Further, multimorbid patients are often excluded from clinical trials, but more research into the effects of treatments in multimorbid patients is needed.

Component-6: Training members of the multidisciplinary team

Description/aims: Training of the members of the team aims to improve knowledge and skills, and should focus on the following themes: comprehensive assessment, multimorbidity and its consequences, health outcomes, adverse effects and interactions of drugs, use of technologies, implementation of individualized care plans, goal setting, working effectively as a team, communication, training in the critical appraisal of knowledge and evidence-based knowledge, patient-centeredness, patient empowerment, and self-management (see Component-8). Key team members should receive training, as well as to some degree, as appropriate, external experts who provide treatment or care to the patient on specific occasions.

Key Characteristics. Training should focus specifically on multimorbidity despite the lack of current evidence-based guidelines, and be targeted mainly towards case managers, core team members, and preferably specialists who supply regular, significant care or treatment to the patient.

Relevance to multimorbidity: As the care of multimorbid patients requires a more comprehensive and integrated care approach than patients with less complex clinical needs, training on effective

teamwork and how to integrate care and treatment should aim to help to improve outcomes, increase motivation, and build care plans, among others.

Component-7: Developing a consultation system to consult professional experts outside of the core team

Description/aims: A consultation system should be developed, to discuss patient care and treatment with other professional experts and specialists outside the core team (e.g. highly specialized medical specialists, and/or clinical psychologists with specific expertise, e.g. cognition, frailty). These professionals should be trained for the care of multimorbid patients (see Component-6). This aims to provide decision support in situations where further clinical support or knowledge is needed outside of the core team. Providing the multidisciplinary team with access to highly competent professionals in cases that are particular and delicate, or when a sufficient expertise is not available within the core team, will provide significant value.

Key Characteristics: Providing more simple access to expertise that is not part of the core multimorbidity team, e.g., via creation of a web-based official expert list at a national level.

Relevance to multimorbidity: This is of particular relevance to multimorbid patients, who may present for treatment to a specialist who does not have expertise in the other comorbid conditions. Sharing of expert knowledge, and assessing and treating the patient's multimorbid condition rather than focusing on specific morbidities aims to increase treatment outcomes and improve quality of care. Involving external experts will enable continuity of the individualized care plan, while allowing a high level of professional input.

SELF MANAGEMENT SUPPORT

Component-8: Training of care providers to tailor self-management support based on patient preferences and competencies

Description/aims: Staff should be trained to support self-management among patients and their caregivers, via comprehensive training of health care professionals (e.g., courses, online training, educational materials). This should include encouraging and supporting patients to increase their health literacy, as well as tailored health promotion and prevention strategies.

Key characteristics: Focusing on communicating to patients using lay language, listening actively, apply human rights approaches [40], and encouraging adherence to treatment [41] and enhancing patient empowerment.

Relevance to multimorbidity: This is relevant to multimorbid patients as they have complex care needs, constantly changing severity of diseases, a higher need for self-management, and a greater risk of polypharmacy and related outcomes (e.g., adverse drug reactions, drug-drug interactions). Many conditions often need to be managed outside the clinical setting, frequently including non-pharmaceutical interventions such as lifestyle changes, including diet and exercise.

Component-9: Providing options for patients and families to improve self-management

Description/aims: Patients, families, and caregivers should be provided options and support to improve self-management of conditions, including patient training and support tailored to patients' preferences and competencies. This includes offering approaches (e.g. online courses, group-based courses, individual counseling; dependent on patients' preferences and competencies) to strengthen patients' self-management and self-efficacy, including explaining their diagnoses and medical conditions, providing information on medication use, and training patients to use medical devices, supportive aids, and health monitoring tools correctly (e.g., blood pressure, glucose monitoring tools). Family members (or when applicable other caregivers) should be included, and family education should be encouraged where appropriate, with patient consent. The aims are to improve self-management, promote healthy lifestyles, and encourage patients to actively participate in decision making, while supporting them in coping with chronic conditions in daily life.

Key Characteristics: Education should be personalized to patients, consistent with their individualized care plans, taking into account knowledge, educational level, health literacy, and functional aspects (e.g., whether they have visual problems or cognitive impairment possibly affecting comprehension). It aims to empower patients, enable shared decision-making and encourage self-monitoring of outcomes, improving communication between patients and care providers, and increasing treatment adherence. Care should be taken regarding confidentiality issues, according to privacy policies and patient preferences.

Relevance to multimorbidity: Self-management is often more complicated in multimorbid patients, as they have numerous conditions to monitor simultaneously, many of which affect the other comorbidities. Increasing self-management is crucial for chronic, multimorbid conditions to improve outcomes without resulting in excessive healthcare costs.

Component-10: Shared decision making (among care providers and patients)

Description/aims: Health care professionals should include the patient (and, where relevant, family and other informal caregivers) in making decisions about their care and treatment, including identifying their individual needs and deciding future goals and outcomes. Individualized care plans (Component-4) should be constructed including these decisions, and shared with patient and relevant care providers.

Key Characteristics: The involvement of family members and caregivers should carefully consider confidentiality issues, and be done according to privacy policies and patient preferences.

Relevance to multimorbidity: Multimorbid patients often have complex care needs that require careful consideration of potential negative outcomes, including loss of functioning, depression, and reduced quality of life. Treatment side effects and lifestyle changes affecting these patients are not simple, and need active involvement of the patient where necessary.

INFORMATION SYSTEMS AND TECHNOLOGY

Component-11: Electronic patient records and computerized clinical charts

Description/aims: Electronic patient records and computerized clinical charts should be utilized, including any electronic technology used to enter data and manage patients' care, to keep track of medical history, diagnoses, symptoms, hospital visits, health care utilization, care needs, medications etc. This will allow different care providers to share information about a single patient, preferably using standardized tools and similar diagnostic systems (see Component-13).

Key Characteristics: Preferably there should be a level of standardization of what is included within electronic records, with a minimum basic data set that includes, e.g., comprehensive assessment results, individualized care plans, patient preferences.

Relevance to multimorbidity: As multimorbid patients often have multiple care providers and attend numerous health clinics, electronic records provide valuable tools allowing physicians to access important information that might otherwise be missed, e.g., potential drug-drug interactions, additional medical diagnoses. Allowing healthcare providers to view the patient's individualized care plan, comprehensive assessment, and medical history electronically will increase efficiency, allowing new team members, for example, to view the whole case and clinical history more efficiently, therefore providing improved care and treatment.

Component-12: Exchange of patient information (with permission of patient) between care providers and sectors by compatible clinical information systems.

Description/aims: Different care providers should share information about a single patient, preferably using standardized tools and similar diagnostic systems (see Components 11 and 13). Electronic patient records and computerized clinical charts should be used to allow exchange of patient information (with permission of patient) between the multimorbidity team and other care providers and sectors by compatible clinical information systems. It is important to have a comprehensive set of information available for all care providers because, without it, updating individualized care plans might be too slow, and therefore acute care or management of patients

may be compromised. Benefits include increased speed of care and decision-making and improved comprehensiveness.

Key Characteristics: Patient confidentiality must always be paramount, and patients must give their permission for information exchange.

Relevance to multimorbidity: Multimorbid patients frequently have multiple care providers, and information sharing may help to decrease adverse events related to their care and treatment, e.g., drug-drug interactions, etc. Exchanging patient information between the multimorbidity team and other care providers and sectors allows the team to view the patient as a person with comorbid conditions, rather than treating individual diagnoses.

Component-13: Uniform coding of patients' health problems where possible.

Description/aims: The same classification system should be used to evaluate and record symptoms, diagnoses, medication, patient-reported outcomes, individualized care plans, and aspects of health care utilization between nurses, physicians, and other care providers.

Key Characteristics: International Classification of Functioning, Disability, and Health (ICF) codes, or International Classification of Disease (ICD) codes, or standardized patient reported outcomes, healthcare usage, and other factors relevant to the care plan, as well open, non-coded fields, e.g., patient preferences should preferably be standardized between different organizations, using inter-organizational communication forms or common software.

Relevance to multimorbidity: Patients with multimorbidity often have multiple physicians and numerous diagnoses, and a uniform system for coding diagnoses and other information relating to their treatment is essential for ensuring continuity of care and sharing of information between care providers. Additional benefits of components 11, 12 and 13 are that having standardized and shared electronic records across all providers allows for automated processes that assist professionals in identifying patients, targeting interventions, and providing appropriate treatment (e.g. screening for high-risk patients, automatic flagging of possible drug interactions, etc.).

Component-14: Patient-operated technology allowing patients to send information to their healthcare providers.

Description/aims: Patient-operated technology allowing patients to send information (e.g., health monitoring data) to healthcare providers to complement face-to-face visits (with consent/desire of the patient) should be implemented where appropriate. This should include technology tailored to the patient's needs which allows healthcare professionals to view, monitor, and react to information directly from patients via the technology (e.g., glucose levels, blood pressure etc), to compliment face-to-face meetings. This aims to reduce health care utilization and improve clinical outcomes. Potential target populations include patients who live remotely, or those with low social support or reduced mobility. Telemedicine (telemonitoring) may provide a bridge between patients' self-management and healthcare providers, enabling faster and timely access to healthcare providers.

Key Characteristics: This technology should be provided to patients who have the motivation and capacity to utilize the technology effectively. Numerous systems already exist, such as the "telehealth" systems, but current evidence on their efficacy is limited, and caution is needed until more research is available.

Relevance to multimorbidity: These systems may be useful if used to support timely and appropriate healthcare usage. They may also empower the patients and increases self-management while enabling faster and timely access to healthcare providers.

SOCIAL AND COMMUNITY RESOURCES

The experts highlighted that access to social and community resources are relevant aspects of the care of multimorbid patients. However, as these are not included in the formal care process, and the availability of these services is extremely variable, components 15 and 16 are difficult to standardize and only a general description is provided.

Component-15: Supporting access to community- and social-resources

Description/aims: Improving and supporting patient access to formal community-based resources, e.g., formal social care patient associations, peer-support groups, and resources providing psychosocial support (e.g., home help, transportation), and supporting access to such services.

Key Characteristics: The comprehensive assessment should identify needs and help support access to necessary resources.

Relevance to multimorbidity: Multimorbid patients often have very comprehensive and extensive needs, requiring access to more services. There is a need for integration between social and clinical health service providers.

Component-16: Involvement of the informal social network

Description/aims: Building, supporting, and involving the patient's informal social network, including family, friends, patient associations, neighbours with their treatment or care, and finding ways to increase their social support network.

Key Characteristics: Relevant member of the social network can be identified during the comprehensive assessment. Care should be taken regarding confidentiality issues, according to privacy policies and patient preferences.

Relevance to multimorbidity: This aims to improve the provision of care in multimorbid patients with very high care demands.

DISCUSSION

This article describes sixteen components important in the treatment and care of multimorbid patients, and provides guidelines for treatment within European health systems. One limitation is that multimorbidity, by definition, is ambiguous. Patients differ considerably depending on which set of disorders are present, and their prognosis, care needs, and outcomes vary. In these guidelines, our aim was to develop a framework for the care and treatment of multimorbid patients regardless

of which combination of disorders they are suffering from. Obviously, the specific care, treatment, and therapeutic plans of individual patients will differ depending on their needs. A second limitation is that our guidelines focus on services rather than systems, yet service delivery is only one of the health system functions (other functions include governance, financing, resources etc) [42]. Further, our report outlines an ideal clinical scenario to be applied within different health care systems in Europe, but cannot provide specific suggestions due to the different structure of health and care systems in different European countries. Therefore, the guidelines of the report need to be interpreted and applied according to the specific setting. Another limitation is that the expert group did not include certain medical specialties that may be relevant to multimorbidity, such as pneumologists, gastroenterologists, or hepatologists. By definition, multimorbidity can include any combination of disorders, and therefore any medical specialty might be relevant to the treatment of a multimorbid patient. It is impossible to include experts from every specialty in a consensus process. Therefore, we included a diverse group of specialties, including those that are common in disease clusters, for example multimorbidity is greater in patients with type 2 diabetes [43]. The experts also included several General Practitioners who are key to the management and treatment of multimorbid patients.

It is important to discuss the applicability of these guidelines. As discussed before, the applicability of the model depends on type of health and care service system in the specific country. The model may be relevant to national policy makers when considering the needs and services related to the increasing population of multimorbid patients, and could also be referred to when rethinking and reshaping the integration between social and health care. Alternatively the guidelines might also be relevant at the service/clinical level, such as when designing and organizing providers and settings. The model includes quite broad components and principles that need to be developed more specifically depending on the country and setting. A report from JA-CHRODIS has already developed and described how this model might be applied in a study case, based on the opinion of a panel of experts [44], and other work is ongoing with partners of the JA-CHRODIS to implement

the model in a practical setting, which will provide interesting future results that might help to further develop specific aspects of the care model.

Conclusions

We aimed to describe a framework for the treatment and care of multimorbid patients that can be applied across Europe. The components described were proposed and discussed via a consensus meeting including experts in the field of multimorbidity, based on their knowledge of the literature and experience in the field. However, this care model needs to be assessed and validated in a real life setting to determine specifically how and to what extent multimorbid patients will benefit. Specific research questions of interest may focus on how this model can be applied across different settings in various European countries, and whether specific components have more importance than others. Costs, benefits to the patients and families, and practical application of the model within care and medical settings should be considered. It should also be emphasized that the suggested framework is mainly based on expert opinion and may require revisions as evidence emerges.

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Table 1. Original list of components discussed during the 1st JA-CHRODIS WP6 Expert Meeting, identified by systematic review [10].

Type of component	Components
<i>Delivery of system design</i>	<ul style="list-style-type: none"> - Regular comprehensive assessment - Multidisciplinary team - Individualized care plans - Appointment of a case manager
<i>Decision support</i>	<ul style="list-style-type: none"> - Implementation of evidence-based medicine - Team training - Developing a consultation system to consult professional experts outside of the core team¹
<i>Self management support</i>	<ul style="list-style-type: none"> - Training of care providers to tailor self-management support for patients - Providing options for patients to improve their health literacy² - Patient education² - Involving family members and family education² - Offering approaches to strengthen patients' self-management and self-efficacy - Involving patients in decision-making - Training patients to use medical devices, supportive aids and health monitoring tools correctly²
<i>Clinical information system</i>	<ul style="list-style-type: none"> - Electronic patient records and computerized clinical charts - Exchange of patient information - Uniform coding of patients' health problems - Patient platforms allowing patients to exchange information with their care providers
<i>Community resources</i>	<ul style="list-style-type: none"> - Access to community resources - Involvement of social network - Psychosocial support³

¹ This component was added after discussion at the expert meeting

² These components were merged into others, as it was thought that they were not mutually exclusive

³ This component was removed