

Application of JA-CHRODIS Multimorbidity Care Model to a case study of diabetes and mental health

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Authors

Maria João Forjaz^{1*}, Carmen Rodriguez-Blazquez^{2*}, Alexandra Prados-Torres³, Alba Ayala¹, Josip Čulig⁴, Elena Jureviciene⁵, Marina Maggini⁶, Peggy Maguire⁷, Federica Mammarella⁸, Vanessa Moor⁷, Koldo Piñera Elorriaga⁹, Mieke Rijken¹⁰, Ulrike Rothe¹¹, François Schellevis¹⁰, Jelka Zaletel¹², Rokas Navickas⁵, Graziano Onder⁸, Carlos Segovia¹³

* Equal contributors

¹ Department of Epidemiology and Biostatistics, National School of Public Health and REDISSEC. Carlos III Institute of Health. Madrid, Spain.

² National Centre of Epidemiology and CIBERNED. Carlos III Institute of Health. Madrid, Spain.

³ EpiChron Research Group, Aragon Health Sciences Institute (IACS), IIS Aragón, University of Zaragoza and REDISSEC. Zaragoza, Spain.

⁴ Department of Pharmacoepidemiology, Andrija Stampar Teaching Institute of Public Health. Zagreb, Croatia.

⁵ Faculty of Medicine, Vilnius University, Vilnius, Lithuania; Vilnius University Hospital Santariskių Klinikos. Vilnius, Lithuania.

⁶ National Centre of Epidemiology. National Institute of Health. Rome, Italy.

⁷ European Institute of Women's Health. EuroHealthNet. Dublin, Ireland

⁸ Department of Geriatrics, Università Cattolica del Sacro Cuore. Rome, Italy

⁹ Basque Foundation for Health Innovation and Research. Bilbao, Spain.

¹⁰ NIVEL (Netherlands Institute for Health Services Research). Utrecht, The Netherlands

¹¹ Health Sciences/Public Health, Faculty of Medicine, TU Dresden (TUD). Dresden, Germany.

¹² National Institute of Public Health. Ljubljana, Slovenia

¹³ JA-CHRODIS Coordinator. Carlos III Institute of Health. Madrid, Spain.

Executive summary

The Multimorbidity Care Model (MCM) has been developed by the Joint Action on Chronic Diseases and Promoting Healthy Ageing across the Life Cycle (JA-CHRODIS) as a set of components to improve the care for patients with multimorbidity in Europe. The coordinators of this report have gathered a group of experts from JA-CHRODIS Work Packages 6 and 7. This publication summarizes the views of these experts on the potential applicability and usefulness of the MCM to a realistic study case of a patient with diabetes, and mental health and psychosocial problems.

Experts have highlighted the need for patient-centred, integrated and tailored care for patients with multimorbidity and complex needs due. They have identified which members should compose the multidisciplinary team, how it must be coordinated and how the care should be provided. The experts have acknowledged several tools, instruments and technologies, and health and social services as crucial resources to implement and help in the care process. Several gaps and difficulties that may hamper the care delivery have to be also taken into account by healthcare providers.

INTRODUCTION

Multimorbidity is defined as the presence of two or more chronic diseases in the same person according to the World Health Organization (1), and it is actually a major public health challenge worldwide, with increasing prevalence and economic impact for the health systems. Today, multimorbidity constitutes the most common chronic condition experienced by older adults (2).

Multimorbidity is an important challenge for health systems, and has shown to be associated with negative outcomes for the patient, as increased risk of lower quality of life, higher mortality, polypharmacy, treatment burden, adverse drug events, and inappropriate health services use, including unplanned and emergency care (3).

The design of care models for people with multimorbidity is becoming a priority for most health care systems, which are still mostly oriented toward acute instead of chronic diseases. Although no widely accepted care models for multimorbidity exist so far (4), a recent review published by the British Medical Journal (BMJ) identified a set of aspects related with the health care organization which are at the same time feasible and based on scientific evidence as a way to follow when designing care model for this population group (5).

The Joint Action on Chronic Diseases and Promoting Healthy Ageing across the Life Cycle (JA-CHRODIS) brings together 72 partners from 23 EU Member States with the ambition of reducing the burden of chronic disease through better use of existing knowledge. Recently, JA-CHRODIS has developed the Multimorbidity Care Model (MCM) with the overall aim of identifying the components of a pathway to be implemented in the care for patients with multimorbidity in Europe (<http://chrodis.eu/our-work/06-multimorbidity/wp06-activities/multimorbiditycaremodel/>). The model is composed of 16 components, grouped in five sections: delivery of the care model system, decision support, self-management support, information systems and technology, and social and community resources. For

each component, description, aims, key characteristics and relevance for multimorbidity patients are described.

With the goal of evaluating the potential applicability of the MCM, we designed a case study based on empirical data from real health registries.

METHODS

The study included (1) the development and description of a realistic patient with multimorbidity (“the study case”) and (2) collecting expert opinions about the potential application of the MCM components to this case.

The study case

The case described was based on empirical data of multimorbidity studies containing population information (6,7). In addition, the SHARE database, wave 5 (8), was consulted to gather information about the sociodemographic (age, gender, marital status, education level, wealth, urban/rural setting, employment, number of children, caregiving of grandchildren) and clinical (chronic health conditions, mobility, sleep, obesity, health care service utilization, quality of life, self-rated health and activity level) characteristics of patients with diabetes and mental health problems. The case is about a fictional female patient, named Maria, with multimorbidity problems. The case description presented detailed clinical, sociodemographic, social, psychological, family information, as well as resources and barriers (Appendix 1).

Collection of expert opinions

A questionnaire was developed for each MCM component (Appendix 2), inquiring about how MCM components should ideally be applied to the case of Maria:

“Maria is a hypothetical woman that presents multimorbidity (i.e., several chronic diseases), including diabetes, osteoarthritis, and mental health problems. The JA-CHRODIS Multimorbidity Care Model is a set of specific recommendations to be followed when

treating patients with multimorbidity. The Multimorbidity Care Model, including all its components, is available at: <http://www.chrodis.eu/our-work/06-multimorbidity/wp06-activities/multimorbiditycaremodel/> (pages 83-100). The objective of this study is to gather the opinion of chronic diseases experts about how the model's components could be applied to a hypothetical patient. Thinking of Maria, and after reading the Multimorbidity Care Model components, please answer the questions below for components X and Y. You should think of how the Multimorbidity Care Model components should be ideally applied to the case of Maria. First, the case of Maria is described. Second, the Multimorbidity Care Model components are followed by some questions that you should answer in the corresponding boxes."

This questionnaire was based on the description of the MCM components, and asked for detailed information. Both the questionnaire and the case were revised by a core team (MJF, CRB, APT, MM, FM, RN, GO), formed by JA-CHRODIS WP 6 and WP7 members.

A group of nine JA-CHRODIS members (JC, FS, JZ, UR, MR, VM, PM, KPE) from W6 (Multimorbidity) and WP7 (Diabetes) identified experts who could answer the questionnaire. Experts had the following roles: patient with diabetes, family or professional caregiver, health professional (general practitioner/primary care doctor, medical specialist, nurse, social worker, and psychologist), health manager, and/or researcher (epidemiologist, health scientist, psychologist). Questions for each component were answered by experts from two different countries (Table 1). Expert answers were summarized and revised by the JA-CHRODIS participants, focusing especially on the common information provided by more than one expert.

Table 1: Participation of country experts in each Multimorbidity Care Model component.

Components	1-2	3-4	5-7	8-10	11-12	13-14	15-16
Country							
Croatia		X					
Italy	X					X	
Germany			X		X		
Lithuania	X						
Netherlands		X		X			X
Slovenia			X				
Spain							X
Ireland				X	X	X	

RESULTS

Regular comprehensive assessment of patients (Component 1). Maria's case requires an integrated intervention of several professionals in order to assess her medical and psychological condition. All experts but one agreed that the geriatrician would play an important role, but other professionals were also frequently identified: GP, psychologist, physiotherapist, endocrinologist, neurologist. However, the experts expressed that Maria may at best be assessed at the primary care centre and only if needed at the specialist office, though this may largely differ by country and health care system. The main assessment tools to evaluate the complexity of conditions /treatment might be the electronic medical record or the chart review, and the clinical interview. To assess the patient's preferences and resources, experts agreed on the importance of interviewing the patient and relatives. Some tools and questionnaires identified by experts were: InterRAI contact assessment, CGA tools, assessment of cognitive functions (Cognitive Behavioural Assessment 2.0, Mini Mental State Examination, Mental Deterioration Battery), cardiovascular risk chart, risk of falling (Conley /Hendrich II/MORSE); screening for peripheral artery disease; University of Texas Diabetic Foot Screen; Short Physical Performance Battery (SPPB); Geriatric Depression Scale and Epworth Somnolence Scale (9–18). To assess daily functioning and guide health as well as social care, the Barthel or Katz indices (19,20), among others, could be very useful. In general, the assessment tools may

provide information about medical, psychological (mood) and functional conditions, as well as personal and social resources, including cognitive status, risk status, living habits, and patient's personal and social needs and resources. The onset, the course, and duration of the diseases, treatment and its effectiveness should be also recorded. Concerning the person who should be responsible for providing an individualized care plan, the most frequent response was geriatrician, followed by case manager (nurse). The patient may be assessed at least every three months after the first assessment and every six months after stabilization.

Multidisciplinary coordinated team (Component 2). Most experts agree that Maria's GP, with a geriatrician, a nurse, and a social worker should compose the team, at least. Other specialists such as endocrinologist, pulmonologist, cardiologist, clinical pharmacologist/pharmacist, psychiatrist, and psychologist could also integrate the team. Clinical sessions and meetings, at a regular basis, and a common electronic chart should be the main communication tools between the members of the multidisciplinary team. The geriatrician was the preferred figure to lead the team, followed by the nurse and the physician.

Professional appointed as coordinator of the individualized care plan and contact person (Component 3). According to the experts, it is very important to have a named contact person acting as the primary contact point and for coordinating communication between Maria and the team, because Maria not only has medical problems, but also social and emotional problems. All members of the care team must know who the coordinating person is and who acts as the final responsible care provider. The contact person should have good communication and organizational skills, familiarity with Maria's medical and psychological situation, and knowledge on long-term care of physical and mental health conditions and on community resources. This professional has to be easy to reach, and have frequent contact/visits with Maria and her family, with a focus on daily activities and day structuring. Among other tasks, the contact person should monitor whether the care provided is in line with the wishes and needs of the patient and should support communication between

patient and professionals, and between the various professionals involved. He or she has to be in contact with Maria and her family with fixed appointments to follow-up, collaborating with the clinicians frequently, should have an overview of treatments and should have the time to discuss possible side effects and adherence with the patient. Most of the experts think that the clinician and the contact person should be different professionals. The clinician is responsible for the somatic and physical problems and the contact person is responsible for the total follow-up. The clinician and the contact person should have frequently contact about the case. An alternative response obtained was that if a highly educated nurse has sufficient medical knowledge and is in the position to consult the physician without any delay; such a nurse could also be the coordinating person. Specific skills of the coordinating/contact person have been defined in a document produced by the JA-CHRODIS (to be published online shortly).

Individualized care plans (Component 4). The person responsible for writing Maria's care plan should be the clinician who has the overall responsibility for care, with the collaboration of other professionals. Maria's care plan should include, among its goals, diabetes control, diagnosis and treatment of mental disorders, improvement of Maria's functional status (relieve back pain, accessibility issues), and good care arrangements for Maria and her husband. The care plan should be revised when necessary, depending on whether the desired goals and outcomes are obtained or not. The care plan should be checked and evaluated at every visit in conversation with Maria and her close relatives. However, one expert warned that writing such a plan would be a considerable administrative burden.

Implementation of evidence-based practice (Component 5). Specific clinical guidelines do represent the "best available knowledge" for certain aspects of the problems that Maria has (diabetes, hypertension, depression, back pain). The existent guidelines may be written in a patient-friendly tone, underlying at all points the importance of inviting the patient (and/or caregivers) to decision making, and supporting them during their life, and respecting the circumstances in their personal life. In this context, cited guidelines may include for example

the complex practice guidelines that address also multimorbidity patients (“Metabolic Vascular Syndrome” of the Saxonian Chamber of Physicians (SLÄK), Germany) (21) and Slovenian type 2 diabetes guidelines (22), or single disease-oriented guidelines such as the depression, multimедication and back pain guidelines (of the German Association of General Practice (DEGAM), Germany) (23–25).

Training members of the multidisciplinary team (Component 6). Experts did not identify any specific training program for the care team in order to assess Maria’s health needs. However, if there were, the following persons should attend the training: GPs and nurses (and other members of the core healthcare team); the regional diabetes specialists (diabetologists) and clinical psychologists. The content of specific programs on health needs should include information and training on how to manage comprehensive care for multimorbidity patients, to prioritize care, to practice risk stratification, to get the patient’s needs and preferences, drug-drug-interactions, how to avoid polypharmacy, the gate-keepers role of GPs: the competences and limits of GPs care and criteria for timely referral to specialists. Other contents should be: understanding the roles and capacities of other healthcare team members, understanding the importance of the patient’s personal circumstances, values and beliefs, ability to work in team and to achieve common agreement on care plan with other health care professionals as well as with patient/caregivers, and training in communication and in understanding of “human nature” (sociology, psychology, philosophy). Training programs should be continuous, at the beginning, and later on, periodical.

Developing a consultation system to consult professional experts (Component 7). The GP/family medicine specialist with a registered nurse (or nurses) working in the team should constitute the “core team” (primary care team). In experts’ opinion, other specialists (diabetologists, cardiologists, physiotherapeutic and orthopaedic specialists) may be consulted under special circumstances, but only if the competencies of the primary care team do not cover these issues (and this depends on the country, too). Depressive reaction or depression may be undiagnosed, so the consultation with psychologist/psychiatrist

(depending on the healthcare system) may be of great relief to her. Still, a capable primary care team may well serve these needs, too. Ideally, patient support groups/peer-supporters/local patients' associations may provide psychological support and aid in daily activities to patient and caregiver. Experts should be consulted if primary care team would feel insufficient or when therapeutic targets and patient's needs and preferences not have been reached, and if criteria for in time refer to specialists have been met. Frequency of consultations should be in adherence to existing practice guidelines, and based on the patient's needs. Several ways of providing access to experts were cited: by phone call or even e-mail, by referral via face to face meeting, per a written consultation between GP and specialist or between the physicians, or through patients associations.

Training of care providers to tailor self-management support based on patient preferences and competencies (Component 8). Experts cited several existing training programs to help professional care providers improve their communication and self-management supportive skills. In the Netherlands, the Dutch Diabetes Federation is evaluating a program named "Personalised Diabetes Care: from diabetes monitoring to putting diabetes into the patient's context". The goal of the program is to help care providers in transforming their "disease oriented" approach into a more person-centred and personalized approach in their consultations with diabetes patients. The program has been developed for supporting diabetes care providers and, as such, it focuses on supporting diabetes patients (with comorbidities) rather than on multimorbidity patients in general.

Experts also emphasized the role that others care providers could play in providing tailored self-management support to Maria. Which care providers should be involved depends on the nature of the self-management challenges or problems of Maria. For diabetes management (e.g. self-monitoring and making lifestyle changes), it could be a diabetes nurse; for safety arrangements in her home, homecare staff could provide advice and help, and for her back problems, the physiotherapist could provide support to help her with physical activities. All care providers involved in Maria's care need to be trained to provide tailored self-management support.

Providing options for patients and families to improve their self-management (Component 9). In experts' view, the decision on which aspects of Maria's health care can be self-managed should be shared between the patient and care staff. When discussing patients' options for self-management, experts emphasized the need to take the patient's life related factors (age, education level/health literacy, social circumstances and social network, ethnicity, lifestyle, patient's preferences) into account, and not only health-related characteristics (e.g. diagnoses, medication). In addition, the decision has to take into account all possible barriers and situations that might limit or hamper the patient's self-management. Aspects that may be self-managed in Maria's case are medication, diabetes monitoring, nutrition, pain relief, psychological or social support (e.g. housing), making appointments with healthcare professionals and caring for her husband health problems. A thorough and empathic conversation should reveal her values, wishes, preferences, expectations, needs, possibilities and ultimately result in a stepwise plan for achievable self-management activities. Besides, providing information on diabetes, making adaptations at home and making it more accessible, and designing an activation scheme, planning activities that Maria enjoys, would be of help.

In addition, Maria may be referred to a patient self-management support program to help her develop her self-management skills. Such programs exist in many countries, for instance the Chronic Disease Self-Management Program (CDSMP), a non-disease specific program that aims to improve patients' self-efficacy (26). This program was developed at Stanford University and has been implemented in many countries worldwide. Another example is the course "Beyond Good Intentions" developed in The Netherlands, which aims to improve diabetes patients' self-care and proactive coping skills, and is provided by several diabetes care groups in the Netherlands (27). In this course, a GP and a communication specialist provide training sessions on diabetes self-care; a psychologist provides training on proactive coping. Experts agree that Maria's daughter could also attend such a training program (together with her mother), although it is up to Maria and her daughter to decide.

Shared decision-making (care provider and patients) (Component 10). To implement this component, Maria (together with her daughter or even her husband) needs to be invited to actively participate in decisions about her care, by providing input on her actual problems, what she thinks on her situation, what she worries about, and by thinking about possible solutions that would be most helpful to her. Preparing a short list of questions (what is her health problem or what matters most to her, what she expects from the visit, etc.) before visiting her general practitioner or other coordinating care provider would be helpful for Maria. Maria should decide what family members she wants to be involved. It can be done in regular visiting hours, where the care staff can interview the relatives, investing time and empathy and paying attention to the worries of the family members as well. The professionals could emphasize that Maria's problems are a family issue and define how each of the family members can be of her help. Experts agreed that Maria's care manager (GP or nurse) or the professional she most trusts, and maybe in combination with her daughter, should be the person who inform and share decisions with her.

Electronic patient records and computerized clinical charts (Component 11). Experts think the information required for clinical purposes should include a synopsis from each of the various medical team with regular updates to the treatment and medications and any reactions from these being administered to this patient. However, health care means more than the provision and reaction to a drug administration regime. Responsibility for updating information will depend on the health issue and the physician and or care team member present who will update. The record, to be most effective, should provide a holistic and continuous view of the patients' health as well as the details of treatment history and their social support network. Any additional local supports should be known to at least one person adding to the record so that benefit can be identified and enlisted to support the health-based interventions. This could include respite support for the caregivers, meal delivery or community dining as well as days out, local club activities etc.

Exchange of patient information between care providers and sectors by compatible clinical information systems (Component 12). Experts suggested the health care team,

including the patient's GP as well as the patient, should have access to the health record. The patient should also be able to suggest that an appropriate family member may also have access to their record to aid familial support as well as decision-making. This would also potentially increase patient and caregiver support for the acceptance of this type of record. Maria should also have the potential, depending on her capacity, of restricting access to her record to any appointed family member e.g. her mental health condition etc. should this be too sensitive an issue for her to share. A system may have "access control" tools like passwords and PIN numbers, to limit access to patient information to authorized individuals, e.g. the patient's medical team. Stored information should be encrypted so information cannot be read or understood except by someone who can decrypt it, using a key made available only to authorized individuals people. As an example, the HIPAA Privacy Rule assists in avoiding common security gaps that lead to cyber-attack or data loss that can help protect the people, information, technology, and practices. Using a Security Risk Assessment Tool (SRA) to assist in the assessment process is also helpful. Finally, as a conceptual issue, experts distinguished between confidentiality (the privileged communication between two parties in a professional relationship) and privacy (the right of the individual patient to be let alone and to make decisions on how personal information is shared) (28). Both should be guaranteed by any system.

Uniform coding of patients' health problems where possible (Component 13). Experts agreed that the health care staff should use uniform coding and/or classification to improve the management and collaboration among all the members of the team. It would provide them with an overall precise description of each additional condition which makes up the patient multimorbidity care plan. The clustering of patients based on clinical and organizational complexity maximizes efficacy and cost effectiveness of interventions, and ensures greater safety for patients. Adaptation and implementation of risks stratification tools to tailor practices to the specific context and patients' needs could be also helpful.

Several coding and/or classification systems could be used here: International Classification of Primary Care (ICPC), International Classification of Functioning, Disability and Health (ICF),

etc. Systems should be simple and designed so that all information on patient illnesses is available for the care team.

Patient-operated technology allowing patients to send information to their care providers

(Component 14). Experts consider it is likely that Maria would be able to use technology if adequately motivated. Staff should actively promote the empowerment and motivation of Maria and her caregivers, by using appropriate mechanisms, such as self-management support, shared decision making, education/information or value clarification, taking into account her social and economic situation. It requires a periodic re-evaluation program for the maintenance of the proper use of technology. Additionally, it would be useful having frequent contacts with her and using very simplified, automatized, non-invasive technologies. For diabetes, there are new developments in diabetes monitoring wearable devices as patches, pre-loaded prescription packs with dosage control of medications, self-monitoring of blood glucose and blood pressure, and specific mobile applications for diet, blood pressure and glucose diaries. It could be also be useful for Maria to adopt a platform (through normal TV) to exchange information with care providers by video and/or audio tools. For insomnia, activity trackers monitor sleep very effectively. There is also the availability of remote monitoring technologies such as webcam, telephone to submit data and receive telephone consultation, SMS sent text and receive prompt replies, patient platforms that allow patients to exchange information with care providers by video and/or audio tools.

Supporting access to community- and social-resources (Component 15). To facilitate Maria's access to community and social resources, several activities could be implemented: connect her with relevant activities in the community and workers from the municipality, better housing (or an elevator or a stairs lift in the building) and nutritional support are main priorities, as well as enhancing social contacts. Primary care staff (GP and/or nurse) should advise Maria to get in contact with the social worker at the city/town council. The GP at the primary care centre has an important initial role as he keeps a frequent contact with Maria due to her consultations, so he can easily have a perception of Maria's personal situation.

Experts agreed in the important role that the case manager (GP, nurse) and the social workers play at this point, working as a coordinated, multidisciplinary team: the health professional (nurses, physicians, etc.), detecting the care need; and the social worker, informing Maria about the range of services suitable for her case. There are several structured initiatives in this sense: in the Basque Country, for instance, primary health and social care teams are set up by the regional health care and the local social care services. The social worker is the team member that guides, advises and helps the patient throughout the community and social services management. Several community and social resources should be made available to Maria: home support for activities of daily living (housework, shopping, personal and husband's hygiene, and other needs), telecare service, dependency assessment, financial support to restore Maria's house, day care centre for her husband, and other social and leisure resources for elderly people.

Involvement of social network (informal), including friends, patient associations, family, neighbours (Component 16). Maria's daughter could be the main candidate to get more involved in her care, but we should know more about the current map of family and social relationships. Neighbours can always be helpful in concrete situations and "raise the alarm" in the case they notice something is wrong. Local organizations (such as her parish or a charity) can also give support. Each person should get involved according to his or her desires, possibilities and capacities, through a conversation by invitation from the GP, social worker or care coordinator. The case manager (GP, nurse) and the social worker are the professionals that should be responsible for involving Maria's social network in her care.

CONCLUSIONS

Patients with multimorbidity have complex needs and their care involves a variety of healthcare providers and resources. The MCM proposes a multidimensional approach for the care of persons with multimorbidity. This model was developed based on consensus involving European experts representing a wide range of health care professionals, including GP, geriatricians, diabetologists, patients representatives, epidemiologists and public health researchers.

This report, based on experts' opinion on the applicability of the MCM components to a potentially real multimorbidity patient, suggests that the MCM is feasible and applicable to a complex case type as it is a patient with diabetes, mental health and several psychosocial problems.

The studied case requires an integrated intervention of diverse professionals and the use of a wide array of rating scales and tools to assess her needs in a comprehensive and regular way. These instruments could be helpful not only for comprehensive assessment, but also for coordination between health and social services.

It is crucial to focus Maria's care from an integrated care point of view, including both the health and the social approaches. Some of Maria's health problems are directly linked to social needs, and therefore must be attended in an integrated way together by health services and social services. This is especially relevant when supporting Maria's access to social and community services.

Depending on the country or region, this integrated care is performed in a way or another, and the scale of development of the integration itself is variable (single or various care providers, common budgets, or procedures coordination among others). Currently, many experiences throughout Europe show two main ideal features when attending cases like Maria's: a multidisciplinary team built around health primary care and hospital professionals, social workers and engaged family or social support; and a "case manager" role performed by a professional (that could usually be the GP, nurse or social worker) that should be accepted as a need. These features should guarantee the needed coordination among patients, professionals and community support to offer the best possible care.

The clustering of patients based on clinical and organizational complexity maximizes efficacy and cost effectiveness of interventions, and ensures greater safety for patients. Moreover, adaptation and implementation of risks stratification tools allow to tailoring practices to the specific context and patients' needs. Allowing people with multimorbidity to use patient-

operated technologies requires promoting patient empowerment, motivation and user-friendly technologies.

Clinical guidelines, even if they are single disease oriented, may focus as well also on patients wishes, attitudes and needs, and may include also chapters on concordant diseases (for example, diabetes guidelines typically include chapters on lipid and blood pressure management). Members of the healthcare team, however, are perceived not to be trained in the skills how to work in teams and how to address a variety of the needs multimorbid patients or their caregivers may have. Training in skills and competences should be drawn on a wide European perspective.

A consultation system to consult professionals with expertise that healthcare professionals of the core healthcare team do not possess, would have to be flexible with respect to methodology, timely and with appropriate exchange of information (taking into account data protection issues).

In conclusion, according to experts with different background, the MCM components provide a meaningful and useful framework and tools to deliver individually tailored care for multimorbidity patients.

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Appendix 1: Maria's case study

Maria is a 71 year-old woman, married, with two children, a son and a daughter. She has completed primary studies and now she is retired (she was a secretary). Maria lives with her husband, 5 years older than her, who is overweighted and suffers from chronic obstructive pulmonary disease (COPD) and mild dementia. Lately, he is increasingly forgetful, and last week he got lost on his way back from the supermarket.

She usually takes care of two small grandchildren and takes them to school. She also takes care of housework when she feels well (on "good days"), while she rests for long time on "bad days", when she feels tired, sad and her back pain increases. However, she makes sure that her husband goes to the doctor and takes his medication. She is able to take care of herself, but she has frequently some difficulties in walking due to her back pain.

Maria has type II diabetes diagnosed 20 years ago and treated with metphormin. She also suffers from hypertension, mild-moderate obesity (body mass index, BMI=32), and chronic low back pain. She is actually taking six different medicines, five times a day. Two years ago her sister died, and since then she had been teary, she avoids going out with her female friends, and her back pain increased. She has insomnia and sometimes she feels restless during daytime. Now Maria tends to worry about her grandchildren and her husband, and her daughter complains from her pessimistic view of things. She used to enjoy cooking, but now she mostly buys precooked food. Before, she was a vital, cheerful woman, known by her good sense of humour.

She lives in a small flat with her husband, in the second floor with no elevator and several flights of stairs to access the street. Due to her low back pain, she has some problems walking, doing housework and going outside for shopping. She likes going to church and meeting friends for playing cards and knitting, but lately she has reduced her activity and hobbies.

In the last year, Maria has visited her GP or nurse almost every month, sometimes twice a month, due to several complains: shortness of breath, insomnia, fatigue, back pain,

dizziness, diabetes, etc. She has been also referred to a specialized care in five occasions, visiting two different specialists, the ophthalmologist and the orthopaedic surgeon. Maria had also one admission to hospital due to diabetes complications. She had to visit emergency care once after a short panic attack. Her daughter is very worried about her.

Appendix 2: Questionnaire for Multimorbidity Care Model components

Component 1: Regular comprehensive assessment of patients

1. Which professional/s should perform the assessment of Maria?
2. Where should Maria be assessed (primary care centre, specialist office, patient's home, etc)?
3. What assessment tools could be used to evaluate complexity of conditions/treatment (interview, questionnaires, chart review, electronic medical record, etc)? Please be specific.
4. What assessment tools would be appropriate and necessary to evaluate Maria's preferences/resources (interview, questionnaires, chart review, electronic medical record, etc)? Please, be specific.
5. What kind of information should be obtained by the use of the assessment tool?
6. Who should be responsible for providing an individualized care plan for Maria? How frequently should Maria be comprehensively assessed?

Component 2: Multidisciplinary, coordinated team

1. Who should be part of the multidisciplinary team for the case of Maria? Please list the multidisciplinary healthcare team members that, at minimum, should be involved.
2. What kind of communication tools and ways (common electronic chart, ad hoc meetings, clinical sessions, etc) among those forming the team should there be to ensure a coordinated care of Maria's health?
3. Who should lead the discussion in the team?

Component 3: Professional appointed as coordinator of the individualized care plan and contact person (case manager).

1. How important it is to have a named contact person and/or clinician acting as the primary contact point and coordinating communication between Maria and the team?
2. Which competencies should the contact person have?
3. Which tasks should he/she perform?
4. Should the clinician and the contact person be the same individual?

Component 4: Individualized care plans

1. Who should be responsible for writing Maria's care plan?
2. What main health outcomes or goals should include Maria's care plan?
3. How frequently should be Maria's care plan revised?

4. How should Maria's care plan be assessed to ensure that the desired outcomes are being met?

Component 5: Implementation of evidence based practice

1. Which specific guidelines should be used in Maria's case? Please specify. If there is none available, please indicate.

Component 6. Training members of the multidisciplinary team

1. Do you know of any specific training programs for the care team in order to assess Maria's health needs? Please specify.
2. Who should attend this kind of training?
3. Which specific components should have these programs?
4. Should these training programs be continuous or periodical?

Component 7. Developing a consultation system to consult professional experts

1. Which professional experts should be consulted to provide an adequate care to Maria's?
2. When and how frequently should professional experts be consulted?
3. How should the access to experts be provided? Please give examples.

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

1. Are there specific training for staff on self-management for Maria's case? Please specify.
2. Who should provide the training?
3. Which staff member(s) should attend the staff self-management training?

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

1. Which aspects of Maria's health care may be self-managed?
2. Which self-management training format would be more appropriate for Maria?
3. Which family member of Maria should attend training?

Component 10. Shared decision making (care provider and patients)

1. How should care providers facilitate Maria's involvement in shared decision making?
2. How should care providers facilitate the involvement of Maria's family members in shared decision making?
3. Who should inform Maria about her health conditions and share decisions with her?

Component 11. Electronic patient records and computerized clinical charts

1. Which kind of information should be registered in Maria's electronic chart to be available for all providers?

2. Who should be responsible for updating information in Maria's electronic patient record?

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

1. Who should have access to Maria's information?
2. How should confidentiality be protected in Maria's case?
3. Should any information about Maria's history not be shared, for confidentiality issues? Please, specify.

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

1. Should the health care staff use uniform coding and/or classification systems?
2. Which coding and/or classification systems may be used in Maria's case for grouping her diagnoses and other information relating to their treatment and care?

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

1. Has Maria the capacity to utilize technology?
2. How should staff facilitate her use of technology?
3. Please give some examples of patient-operated technology that Maria could use.

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

1. How should staff facilitate Maria's access to community and social resources?
2. Which team member should be responsible for facilitating Maria's access to community and social resources?
3. Which community and social resources would be most helpful for Maria?

Component 16. Involvement of social network (informal), including friends, patient associations, family, neighbours

1. Which members of Maria's social network should be involved in her care?
2. How should they be involved?
3. Which team member should be responsible for involving Maria's social network in her care?