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Original article

Competences of internal medicine specialists for the management of patients with multimorbidity. EFIM multimorbidity working group position paper



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ABSTRACT

Patients with multimorbidity increasingly impact healthcare systems, both in primary care and in hospitals. This is particularly true in Internal Medicine. This population associates with higher mortality rates, polypharmacy, hospital readmissions, post-discharge syndrome, anxiety, depression, accelerated age-related functional decline, and development of geriatric syndromes, amongst others. Internists and Hospitalists, in one of their roles as Generalists, are increasingly asked to attend to these patients, both in their own Departments as well as in surgical areas. The management of polypathology and multimorbidity, however, is often complex, and requires specific clinical skills and corresponding experience. In addition, patients' needs, health-care environment, and routines have changed, so emerging and re-emerging specific competences and approaches are required to offer the best coordinated, continuous, and comprehensive integrated care to these populations, to achieve optimal health outcomes and satisfaction of patients, their relatives, and staff. This position paper proposes a set of emerging and re-emerging competences for internal medicine specialists, which are needed to optimally address multimorbidity now and in the future.

1. The impact of multimorbidity on our health-care systems, hospitals, and different fields of internal medicine

By 2060, the number of Europeans above age 65 is projected to increase from 88 to 153 million [1]. In consequence, the true challenge for European health care systems is to prepare for this monumental change in demography. Aging is closely related to the development of chronic diseases, which cumulate during life. This relatively recent phenomenon has given rise to the term multimorbidity (MM), defined as the presence of two or more chronic diseases at the same time in the same patient or a more recent and restricted definition the complex interactions of several co-existing diseases (<https://www.ncbi.nlm.nih.gov/mesh/?term=Multimorbidity>). The increasing presence of aging citizens

suffering from multiple chronic conditions requires an extensive reorganization of health care delivery systems, which ought to adapt their services to the real needs of patients: from a disease-oriented to a person-oriented approach. This is the most important and fundamental idea, that must underly all initiatives oriented towards chronic care [2, 3].

Multimorbidity is associated with a decline in many aspects of health and in consequence with an increase in hospital admissions, psychological, familial, and social distress, polypharmacy, and use of health care and social resources [3–8]. The management of patients with MM has given emphasis to the continuity of care, teamwork, holistic integral and integrated coordinated care, with the involvement of patients, families, caregivers, and social networks [9–12]. A new set of emerging

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tasks and interventions are currently on the table like self-care, patient empowerment and patient activation, drug-prescription optimization, deprescribing, shared decision-making, or personalized care plans [13–17]. Many institutions have also proposed new models of care to address this social and health paradigm change [18]. Nevertheless, despite this idea, studies show, that multimorbid patients are less likely to receive necessary coordinated, comprehensive, and continuous care. Research, clinical guidelines, and health-care services must shift focus from single conditions to the requirements of increasingly complex patient populations [19]. Fortunately, in recent years MM has drawn increasing attention of many international organizations. A good example is the European Commission's large collaborative project named Joint Action on Chronic Diseases and Promoting Healthy Ageing across the Life Cycle (CHRODIS) in the context of the 2nd EU Health Programme 2008–2013 [20].

Patients with MM are increasingly present in most hospital areas, especially in IM. As a matter of fact, their prevalence in IM wards and outpatient clinics may be up to 50% depending on the hospital and IM department characteristics [21–25]. This epidemiological pattern urgently necessitates adapting protocols, interventions, and clinical routines to current needs. Nevertheless, changes enter most centres slowly because they require deep changes in the knowledge, vision, and style of professional practice at all levels. This includes management, physicians, nurses, and other health care staff. In consequence this gap between patients' requirements on the one side and faulty inertia of hospital care on the other side increases the so called posthospital syndrome and hospital readmissions. Both issues have surfaced as internationally recognised potential indicators of healthcare quality because they impact patients, families, and healthcare system [26, 27]. Nearly a third of patients with MM develop a posthospital geriatric syndrome with one or more manifestations (functional decline, malnutrition, hospital-acquired infections, sarcopenia, sphincter problems, dysphagia, sleep disorders or delirium), raising mortality rates after discharging up to 16% [28]. Some studies found that most of the causes of readmission to be different from the first diagnosis of original admission, suggesting consequences of underlying comorbidities, health-care related complications, and deconditioning syndrome [29, 30].

As mentioned above, there has been a notable social and epidemiological change lately, with the increasing prevalence and proportion of MM populations in most areas of health care. Health care systems, primary care, hospitals, and especially IM departments must adapt to this change and offer alternatives for optimal care. For this, internists need to acquire and demand new skills, in addition to current ones, to successfully face the challenge of MM.

2. Aging and multimorbidity. The emergence of mixed clinical phenotypes

Aging is associated with chronic diseases and is, by far, the main risk factor for developing MM; slowing down the aging process is an effective approach to prevent chronic diseases and therefore MM [31, 32]. During life, several biological deficiencies accumulate, disturbing the body's homeostasis progressively. The accumulation of chronic diseases over time results from the interaction between genetic predisposition, life-long exposure to the environment and behavior. In addition, medical and social advances have achieved substantial increases in survival from previously deadly conditions, for the price of converting them into chronic diseases [32–35].

Classical cardiovascular risk factors such as unhealthy lifestyles and sedentarism induce many chronic conditions which merge into MM [34–36]. In addition, lower socioeconomic status and lower education are well-known risk factors for MM. This is evident in the development and outcomes of many diseases and conditions and particularly marked in mental health disorders [37, 38]. Different combinations of determinants induce a variety of MM patterns and sometimes very typical clusters, which have been recently evaluated in different studies,

identifying models of associative MM [39–43]. Understanding disease clusters is extremely important, as MM models can improve health and cost in a major way through relatively simple changes in health care delivery. A recent study of older primary care patients from 2 different European countries identified 3 major patterns of MM clustering (the first one comprised a combination of cardiovascular and metabolic diseases, the second one was related with mental health problems, and the third one with musculoskeletal disorders) [43].

The epidemiology and clinical phenotypes of non-communicable diseases change in parallel with social and behavioural changes, in the same way as communicable diseases do. These changes have been evident in the last 30 years, with a significant switch in the clinical profile of patients with MM compared to descriptions of the last decades in 20th century. The increased age, and the generalized preventive measures implemented in last 20–30 years, have delayed the onset and extent of the most common chronic diseases [21, 44, 45]. Thus, the impact of chronic diseases now intertwines with the impact of aging such as frailty, sarcopenia, and other geriatric conditions in most patients with MM, leading to mixed phenotypes as detailed in Fig. 1 [46–48, 37, 49].

3. Multimorbidity, society and health care research

Multimorbidity affects our societies doubly: In high-income countries and in the most economically affluent sectors of the population, it clearly decreases longevity and hinders healthy and disease-free aging. In low- and middle-income countries and in the most economically vulnerable sectors of the population, MM appears at younger ages, impacts life expectancy, leads to catastrophic health expenditures in many families, and consequently pushes them into the spiral of greater impoverishment [50].

Despite the high prevalence of MM, current medical practice and research is still largely based on single disease models, without considering the coexistence of several diseases [46–48, 37, 49]. Dealing appropriately with this emergent and changing arena of MM also requires the acquisition of new, and re-emergent competences. However, we face a substantial lack of adequate scientific evidence, guidelines, and guidance for patients with MM, because patients with relevant comorbidities have been excluded from studies. Thus, evidence on the feasibility and effectiveness of interventions is scarce in MM, and consensus on appropriate care is difficult [31, 51–54]. For all these reasons it is important to ensure, that internists now and in the future acquire necessary skills to cope with the important challenges associated with MM.

4. European Board of Internal Medicine curriculum and its implications to manage patients with multimorbidity

The practice of IM in Europe is highly variable. In most countries IM is a hospital-based specialty with outpatient activity. Nevertheless, the profile of patients seen by European internists is very similar. However, there are essentially two models of clinical practice delivery: In some countries most internists are dedicated to general IM, whereas in others a high percentage of internists are dedicated to one of the many more specialized fields of IM such as cardiology, gastroenterology, endocrinology etc., including palliative and geriatric medicine. These distinctions between countries leads to the additional variability in the internists' performance of diagnostic and therapeutic procedures [55].

Aware of this reality, and with the aim of homogenizing missions, values, and competences for the performance of the specialty in Europe, the *Union Européenne des Médecins Spécialistes* together with the European Federation of Internal Medicine has created the European Board of Internal Medicine (EBIM) as a collaborative group committed to advancing postgraduate education in IM in Europe. The EBIM generated in 2016 a curriculum to guide postgraduate education in the specialty of IM. This curriculum presents the minimum training requirements for the

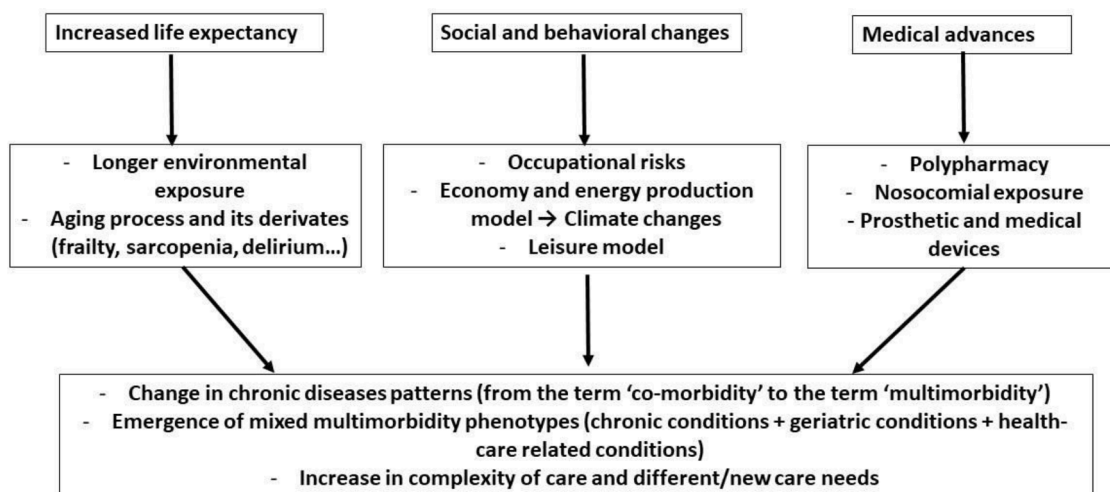


Fig. 1. Development of mixed clinical phenotypes in patients with multimorbidity, due to the interaction of aging processes with chronic conditions and health-care related issues.

qualification as a specialist in IM across Europe, to provide consistency in the practice across Europe [56, 57].

Already in the definition of the specialty, the EBIM curriculum emphasized the increasing prevalence of the chronic and complex diseases in European societies. Furthermore, it emphasised the substantial role of internists as health advocates in the field of MM, and patients with co-morbidities and polypharmacy. In the field of specific areas of expertise, authors proposed ‘multimorbidity and ageing’ as the first one of nine; in addition, they also proposed three more areas directly related to MM management (shared decision-making, transition of care, and vulnerable adults). In the evaluation of patients with common clinical presentations, authors included the end-of-life care, and geriatric issues. In addition, they listed clinical pharmacology, thereby underlining the importance of managing polypharmacy in MM [57]. Thus, the EBIM curriculum establishes a framework in which the approach to MM is very relevant. The main motivation of this current document is to further develop these principles and to propose new emerging and re-emerging competencies that have arisen in recent years in the field of MM.

The most important somatic conditions in the elderly are cardiovascular and lung diseases, arthrosis, loss of sight and hearing and neurological disorders. These conditions, most often in combination, lead to loss of autonomy, functional decline, and progressive disability and poor quality of life [58]. The frequent coexistence of somatic, mental, and social conditions in patients with MM require integral and frequent assessments. For this purpose, the comprehensive geriatric assessment (CGA) is very useful and has demonstrated benefits in health outcomes [59–63].

Placing vulnerable patients and their care givers at the center of treatment plans, providing realistic lifestyle management, customised and personalised care for each patient, involving patients in treatment choices, and offering an optimal end-of-life care are additional emergent competencies in managing MM. This requires a personalised approach, and a knowledge of the global situation, as well as the goals, preferences, and possibilities of the patient.

Finally, patients with MM benefit from coordinated care networks, in which care professionals work together to shape optimal care with the needs of the patient as the starting point. Keeping an overview of the various treatment plans can be a challenge for the patient, given the patients often limited medical knowledge and health literacy [64]. Also, contradictory advice from different health care professionals can make it difficult for the patient to keep a cohesive overview of the treatment policy and the choices to be made therein. Coordinated care can be initiated from the hospital but will increasingly be given in the context

of the patient’s milieu. It is essential to reinforce Primary Care-IM co-management programs for patients with MM, to ensure continuity of care. Caring for MM in the future will require a specialised generalist approach beyond the current specialist approach. This places the internist in a prominent, specialised and coordinating role.

All these previously outlined emergent and re-emergent tasks are detailed in Table 1, and the related competences will be discussed in the following sections.

5. The importance of prognostication and comprehensive geriatric assessment

Establishing a prognosis is an essential medical task, which becomes even more important in vulnerable and high-risk populations. Its relevance is obvious for clinical management, as it avoids possible nihilistic deviations from clinical practice (denying opportunities to patients with

Table 1
Emergent and re-emergent tasks and targets for the optimal management of patients and populations with multimorbidity.

TASK	PRIMARY TARGET
Leading multimorbid patients from symptom to diagnosis and triage	Patient, potential referral to other health care givers
Prognostication: Functional decline risk, and death risk stratification	Patient
Comprehensive geriatric assessment	Patient and close environment
Establishing personalized care plans and propose patient itineraries	Patient and close environment
Shared Decision Making	Patient together with caregiver
Self-care promotion and guidance in lifestyle improvement	Patient, other health care givers such as physiotherapists, nurses, nutritional advisors, etc.
Managing polypharmacy	Patient, other health care givers such as home nurses and pharmacists
Multidisciplinary and teamwork	Patient, close environment and other professionals
Coordination and continuity of care, including guidance for patient itineraries	Patient, and other professionals
Co-management with Primary Care and all other involved Physicians	Patient, and other professionals
Integral end-of-life care	Patient and close environment
Management of new technologies and digital health tools	Patient, close environment and other professionals
Advising on health decisions regarding multimorbidity	Health authorities and society
Raising awareness of the importance of multimorbidity in the population	Health authorities and society

a good life expectancy), but also futile and aggressive actions (with little benefit and a high risk of iatrogenesis for patients in their end-of-life trajectory). It is also very relevant for patients and their families, in terms of life planning. Closely related to prognostication is the term ‘time to benefit’, which can be defined as an estimate of the time needed until an intervention/treatment becomes significantly effective in a group of patients. This concept is seldom mentioned in trial results, although the time to benefit from an intervention may exceed life expectancy. When examining the balance of desired and undesired effects, benefits and risks of interventions, medicine interactions, treatment burden, and patient capacity, prognostication is crucial.

Nowadays we have several reliable prognostic tools, which can be of great help in making decisions [65]. Among them, there are some very recent tools adapted for patients with MM [66–70]. However, despite recognizing their importance, many European internists do not apply them in their usual clinical practice due to a lack of time and probably learned inertias [71]. An important effort should be made by our collective to incorporate this task in the routine evaluation of patients with MM, as a first cornerstone for the global care planning.

Multimorbidity and its consequences have progressively had a large impact on patients’ physical and psychosocial functioning, leading to a gradual overall deterioration, and the development of functional decline, immobility, frailty, sarcopenia, cognitive and mood disorders, among others, as pointed in Table 2. Hence, frail patients with MM are at risk for all kinds of negative health care outcomes like disability and dependency, institutionalization, falls and hospitalizations [72]. recognizing this cascade at early stages can help in precise prognostication as well as in offering appropriate multicomponent interventions. For this task the CGA is the gold standard, since it systematically examines,

detects, describes, and explains the multiple problems of an older person and examines the person’s capabilities and care needs. The CGA has shown to have positive effects in different settings (clinic, co-treatment, outpatient department, emergency department) [59–63]. The adoption of CGA, classically performed in Geriatric Medicine, for patients with MM should be one of the cornerstones in the optimal management of these populations. A proposal of CGA for internists dealing with MM is detailed in Table 3.

6. Competences in developing personalised care plans and shared decision-making with patients and families

The ethical principle of autonomy has become increasingly important in medical practice in recent years. Citizens are better educated and informed, and as a natural consequence, their role in dealing with their illnesses should be proactive. During the past years, patients’ values, preferences, and experiences have been given a central role in clinical interactions to promote patient-centered care. Patient-centered care resulted in improving patient satisfaction and therapy adherence, and some studies have found evidence for improved clinical outcomes [73, 74]. Nevertheless, data from surveys and observational research show that clinicians often do not really consider patients’ preferences and values during the decision-making process, probably due to a shortage of time, combined with a paternalistic approach, and inertia [75, 15, 76]. In the management of MM, personalised care is an emergent and probably a future central key task.

The dialog should consider a description of the patient and his family context, and be assisted to recording conversations, decisions and agreed outcomes. Patients should be incited to focus on what matters to

Table 2
Multidimensional framework proposal (biological, clinical, and interventional) of multimorbidity and its natural evolution.

MULTIMORBIDITY STAGE		CLINICAL AND CARE FEATURES	PATHOPHYSIOLOGICAL SUBSTRATE	CURRENT OPTIMAL APPROACH	FUTURE INTERVENTION TARGETS
Pre-clinical	Genetic predisposition	Type 2 diabetes, hypertension, dyslipidaemia, neoplastic disorders, neurodegenerative diseases, other	Gerontogenes, oncogenes, HLA, monogenic and polygenic determinants, telomer length	Genetic counselling (only in some of them)	Genetic therapy, stem cell therapy
	Environment lifestyles	Environmental pollution, occupational exposure, sedentarism	Oxidative stress, mitochondrial damage, nuclear DNA damage, imbalances in cellular metabolic pathways	Healthy lifestyles promotion, Primary prevention, Institutions and community partnerships	Global change in productive, energetic, agrifood industry and leisure models; environmental preservation, geroprotectors, antioxidants,
Clinical	Multimorbidity	Cardiovascular, lung, gastrointestinal, and osteoarticular diseases, among others	Inflammasome activation, necrosis, apoptosis, telomer shortening	Secondary prevention, etiological approach, treatment intensification, patient empowerment	Slowing progression/reversion of multimorbidity, organ replacement, artificial devices, telomer preservation
	Severe multimorbidity, polyopathy	Gradual organ failure, recurrent decompensations, admissions, functional decline, frailty, geriatric syndromes	Progression of multiorganic and multisystemic dysfunction, progressive failure of compensatory mechanisms	Tertiary prevention, pathogenic approach, case management, care coordination, functional status preservation	Adapting the environment to disability, using advanced technology to improve functionality and quality of life.
	Terminal multimorbidity	Refractory symptoms, severe dependence, death	Exhaustion and depletion of biological reserve	Quaternary prevention Palliative care, symptomatic approach, integral management, spiritual care,	Promoting patient’s home as the center of all health, community and social care actions

HLA: human leukocyte antigens; DNA: desoxyribonucleic acid.

Table 3

Areas, dimensions and useful tools of a comprehensive geriatric assessment applied to patients with multimorbidity.

AREA	DIMENSION	USEFUL TOOLS
Clinical (mainly somatic)	Standard Internal Medicine evaluation	Accordingly to detected diseases and conditions
Functional	Nutritional	MNA ^a
	Basic and Instrumental activities of daily living evaluation	Barthel index ^b
	Mobility	Lawton-Brody index
Mental	Fall risk	
	Cognitive assessment	Pfeiffer and mini-Pfeiffer test ^d
Social and Familial	Affective and emotional assessment	Yesavage GDS ^e
	Social network and social frailty assessment	Different Social assessment tools adapted to local-regional-national environments
	Caregiver assessment	Caregiver Strain Index ^f
Pharmacological	Prescription adequation	STOPP-START criteria (ref #105)
	Polypharmacy and interactions management	Morisky Medication Adherence Scale ^g
	Deprescribing	LESS-CHRON criteria (ref #113)
	Deprescribing	STOPP-Frail criteria ^h
Prognostic	Death-risk assessment	PROFUND index (ref #67), PROFUNCTION index ⁱ , Carey index (ref #63), Lee index (ref #68)
	Functional decline risk assessment	
Values and preferences (when end-of-life trajectory is detected)	Spiritual assessment	HOPE questions ^j
	Advanced care planning	FICA spiritual assessment tool ^k Outcome prioritization tool (ref#96)

^a Mini Nutritional Assessment (Guigoz Y, et al. *Nutr Rev* 1996; 54: 59–65).

^b Barthel index (Mahoney FI, Barthel DW. *State Med J* 1965; 4:61–65)

^c Lawton-Brody index (Lawton MP, Brody EM. *Gerontologist* 1969; 9:179–186).

^d Pfeiffer test (Pfeiffer EA. *J Am Geriatr Soc* 1975; 22:433), Mini-Pfeiffer test (Bernabeu-Wittel M, et al. *Rev Clin Esp* 2017; 217:320–324).

^e Yesavage Geriatric Depression Scale (Hoyl MT, et al. *J Am Geriatr Soc* 1999; 47:873–878).

^f Caregiver Strain Index (Robinson, B. *Journal of Gerontology* 1983; 38:344–348).

^g Morisky Medication Adherence Scale (Morisky DE, et al. *Medical Care* 1986; 24:67–74).

^h STOPP-Frail criteria (Lavan AH, et al. *Age Ageing* 2017; 46:600–607).

ⁱ PROFUNCTION index (Bernabeu-Wittel M, et al. *Int J Gerontol* 2012; 6:68–74).

^j HOPE questions (Spiritual assessment: HOPE questions. IAHPCC Pallipedia. <https://pallipedia.org/spiritual-assessment-hope-questions/>).

^k FICA spiritual assessment tool (Borneman T, et al. *J Pain Symptom Manage* 2010; 40:163–73).

them, paying attention to their needs and health. In an efficient personalised care planning process, the patient should have enough time to develop one's plan in a reflective space with a clear access to all information and perspectives. They should also know what to expect, be supported by one designated coordinator, who in turn, should be able to discuss the patient's health status and further treatment with appropriate health and social care professionals [77–82]. A detailed description of the whole framework for personalized care planning is detailed in Fig. 2.

Another important emergent dimension of personalized care is shared decision-making (SDM), which provides a practical method of tailoring interventions in scenarios where there is no clear evidence, and the most appropriate step depends on the patient's preferences [83–85]. In this approach, the clinicians' role is to help patients become well-informed, help them develop their personal preferences for available options, and provide professional guidance. The principles of

shared decision making (SDM) are well documented, and there is an increasing number of papers, with proposals to implement them in routine clinical practice [86–91]. Besides, SDM is supported by evidence from 86 randomized trials showing knowledge gain by patients, more confidence in decisions, more active patient involvement, and, in many situations, informed patients elect to go for more conservative treatment options [88, 91]. There are different models of how to implement SDM in clinical practice, but all of them are based on three key steps, the first is a “Choice talk” (which illustrates the need of working as a team to make a decision that suits one's best); the second is an “Option talk” (which discusses alternatives in a more detailed, its benefits and risks, possible alternatives, and the possible consequences of ‘not doing anything’); and third is a “Decision talk” (which allows to take a patient-preference-based decision) [84, 92].

It is important to emphasize that in order to offer real and optimal patient-centered care, several enablers that are lacking in many of our healthcare systems, are needed: committed health authorities that support, invest in and promote coordinated care; a healthcare system in which the health record is digital and shared between different medical experts; a well-established culture of teamwork; and professionals with advanced digital competences, engaged and motivated, and with enough time [90–93]. The best way for training all these competences is to use simulations, either with colleagues or with actors and the use of brief personalized care plans and SDM tools. The main current threats to implementing these changes are, the scarce of time, and most current decision aids are focused on individual diseases [88–91, 94, 95].

Although it may seem to us yet distant and perhaps a bit utopian reality, probably in the near future patient-centered care, personalized care plans and SDM will surface as milestones of daily clinical practice, especially in the management of complex patients with MM, and internists will play a substantial role in their implementation.

7. The management of drugs: appropriateness, reconciliation, adherence and deprescribing

Patients with MM are usually older adults with a complex drug regimen, multiple diagnoses, and the resulting polypharmacy, as multiple medications are prescribed. Although it is necessary for one condition, some drugs may adversely affect others. The prevalence of adults taking chronically five or more medications rounds 15–20%, increasing to 25–30% for those aged 60–69, to a whopping 51.8% for those over 80, and to an outrageous 85% in the case of patients with MM [96–100]. Evidence-based clinical guidelines for individual diseases should consider the emergent epidemiology of MM in their recommendations, and physicians, nurses, caregivers, and researchers should be aware and carefully evaluate each new medication, to avoid the deleterious effects of the ‘prescription cascade’ in these populations. In addition, populations with MM have been often excluded from clinical trials, and even though this situation is improving, external validity of many trials should be taken carefully in patients with MM; the recruitment and retention of these patients in clinical trials, which include both drugs and management models should be actively encouraged [101, 102]. For all these reasons we can affirm that, managing MM inherently involves addressing polypharmacy wisely. This requires specific competences, new approaches and tasks that are making their way in recent years in the field of MM.

The first one is prescription appropriateness. These patients are prone to over-prescription of drugs of questionable benefit and/or potential risks; but also, to under-prescription of drugs of demonstrated benefit. When prescribing medicine to patients with MM, all the risks and benefits, as well as possible interactions should be carefully considered, discussed with the patient, his/her wishes considered. The prescription appropriateness can be assessed by validated tools like STOPP-START criteria [103]. Closely related to prescription appropriateness is the drug reconciliation process, which identifies and resolves unintentional discrepancies between patients' medication lists across

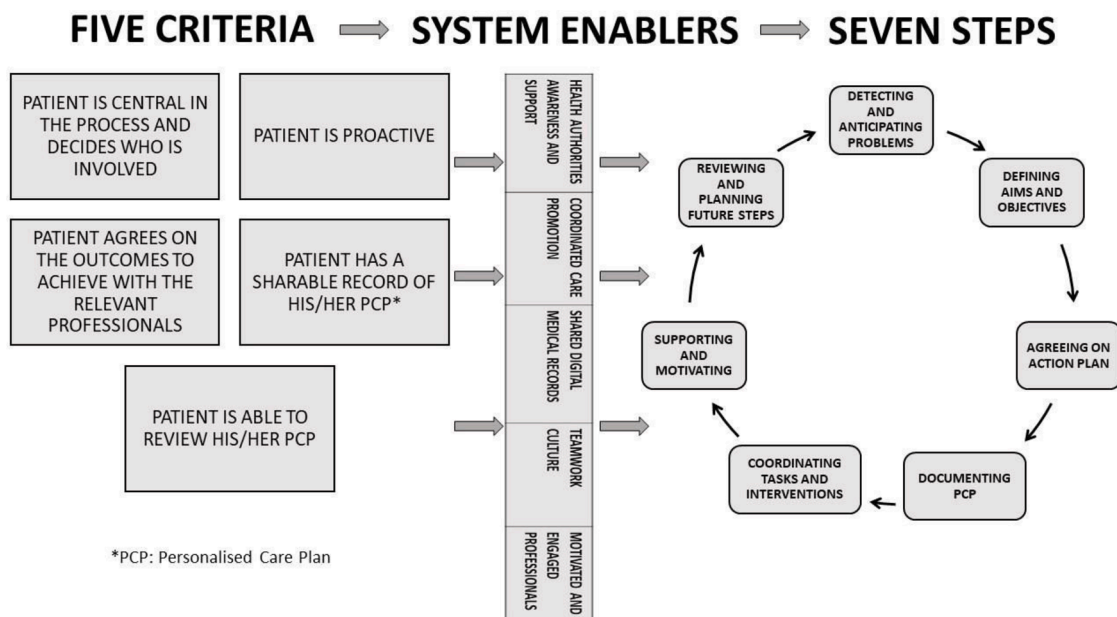


Fig. 2. Description of a framework to incorporate personalized care planning to patients with multimorbidity (adapted from NHS England (ref # 79), Coulter et al. (ref # 80), and Ollero-Baturone M. et al. (ref # 95).

transitions in care, which are very frequent in patients with MM [104, 105]. This process is an opportunity to review patients' prescriptions and is of direct relevance to internists as professionals who usually care for patients with MM in hospital admissions. There is already increasing evidence of benefits of reconciliation programs in terms of patient's safety and avoidance the risk of hospital readmission [104, 105].

The second one is the adherence assessment and reinforcement. There are many factors that influence adherence: some depend on the patient and his/her environment (educational and economic level, family and social network, among others); and others depend directly on the professional and the healthcare system (number of drugs, dosage route and intervals, doctor-patient relationship, among others). The main skills needed to promote adherence are a trusting doctor-patient relationship, an adequate and adjusted prescription avoiding drugs with potential adverse effects, a comfortable dosage (ideally 'once a day'), as well as coaching and counselling techniques (remembering therapeutic achievements, not blaming for forgetfulness, and resolving doubts by dedicating enough time to this) [106–109].

At last, deprescribing has emerged as a new and interesting task for the optimal management of drug management in MM populations. Patients with MM often take medications that on paper are correctly prescribed, but for specific circumstances or clinical characteristics are no longer useful, or the risk-benefit ratio makes their use less desirable. Deprescribing is the planned and supervised process of dose reduction or withdrawal of medications that might be causing harm or are no longer of benefit. Deprescribing is part of good prescribing – backing off when doses are too high or stopping medications that are no longer needed in the circumstances of the patient [110]. Currently intense research is being performed in this area, and some tools have been already developed to guide clinicians in the process [111, 112].

8. Competences in managing and caring for the end-of-life trajectory

The natural evolution of chronic diseases is usually progressive, and this worsening may accelerate if several diseases occur in the same patient, as deleterious and cascading interactions develop. This cascade leads to organic and functional deterioration, and gradually increases the risk of death (Table 2). In fact, in many countries, deaths from chronic diseases have nowadays outnumbered deaths from cancer

[113]. Therefore, the supportive care approach, advanced planning of decisions, and early and progressive application of palliative care is a key element in the management of advanced MM [114]. Professionals dealing with MM need to acquire and maintain advanced competences in palliative- and end-of-life care.

Table 4
Core competences in managing end-of-life situations and spiritual-care.

AREA	COMPETENCE
Knowledges	Management of most frequent symptoms
	dyspnea
	Pain
	Gastrointestinal symptoms (nausea, vomiting, constipation)
	Anxiety and Depressive disorders
	Terminal delirium
	Other symptoms (skin ulcers, nutritional issues...)
	Advanced use of opioids, sedatives, and adjuvant drugs
	Advanced care planning for patients and their carers/family
	Identification of agony process
	Integral management of palliative sedation
	Bereavement care and managing
	Legal issues
	Treatment rejection
Limitation of therapeutic effort	
Skills	Palliative sedation
	Euthanasia and physician assisted suicide
	Manipulation/Insertion of subcutaneous devices
	Ascites and pleural effusion draining
Attitudes	Oxygen therapy- and non-invasive respiratory support devices management
	Basic point of care ultrasonography
	Empathy
	Tolerance
	Compassion
	Authenticity
	Support vocation
	Resilience and psychological self-care
	Respect to diversity, individual's beliefs, customs and faith
	Advanced communication techniques
Counselling skills	
Working in partnership with other professionals and social agents	
Assessing and promoting spiritual wellness	
- Advanced skills in spiritual conversations	
- Surfacing life achievements and legacy	
- Helping and accompanying the spiritual preparation for life passage	

The core competences needed to deal with end-of-life situations are detailed in Table 4. It is crucial to perform them in an optimal balance that wisely combines knowledge, skills, and attitudes [115]. The final stage of life is a particularly important and transcendent time in everyone’s life, so having this package of competences will undoubtedly contribute to providing the highest quality of care to patients and their families. In the field of knowledges, it is essential to be familiarized with the advanced management of most frequent syndromes and symptoms of these stages of life, and the different therapeutic alternatives that have demonstrated greater efficacy with fewer side effects; it is also very important to identify situations of agony, and the indications, and protocols for palliative sedation, to have skills in family bereavement care, and to know the involved regulatory and legal aspects. It would be very useful for internists to know how to insert and manage subcutaneous lines, and to have skills in performing point-of-care ultrasound in most common modalities. At last, it is essential to be well trained and display the exquisite attitudes of optimal palliative care, which are so important to achieve the best benefits for patients and their families in this sensitive and transcendental context of life.

9. Tips and timing for their implementation in internal medicine training programs

Competences for optimal management of MM should start to be acquired in medical schools. Despite the huge impact of chronic diseases, MM is still rarely taught in the curricula of many universities. They can be incorporated transversally throughout the clinical subjects in theoretical and practical activities, or specifically in a particular subject [116].

This first education layer should be completed and reinforced during the IM program training [117, 118]. During the residency period, the internist in training will deepen his/her knowledge of clinical characterization of MM, prognostication tools, comprehensive approach, the adequation of health objectives, the building of individualized plans, the approach to polypharmacy, deprescription, coordination of care both home-based and institutionalized, personalized care and taking shared-decision, and palliative care. This further acquisition of competences should be based on clinical rotation periods, clinical rounds, programmed case discussions, and problem-based learning methods.

All IM specialists, independently of the area in which they develop

their profession, should build these competences because they will need them in their daily clinical practice now and increasingly in the future [119-121]. For this aim, specific advanced training actions, focusing on aspects of MM management (communication techniques, drug prescription, prognostication...) are recommended.

Finally, we would like to highlight the important role of clinical and translational research in MM, which should be promoted at all levels. Research in MM will create opportunities for further innovation in approaching MM, will attract the talent and vocation of young colleagues in the future, and hence will improve the health outcomes of this vulnerable population.

A representation of all these recommendations is detailed in Fig. 3.

10. Conclusions

In this position paper we have outlined the main necessary competences in the approach and management of patients with MM for current and future clinical practice. In addition to the already well rooted competences in the specialty of IM, additional emerging or re-emerging competencies are necessary, such as the use of prognostic tools and comprehensive geriatric assessment, the management of personalized care plans, the shared decision making, the expertise in the management of drug prescription, the wise approach to polypharmacy, and competences in a comprehensive end-of-life care. It is also particularly important to promote clinical research on MM and to adapt clinical practice guidelines to this emergent population.

Authorship

All authors have contributed substantially to the work, approve the content and form of the present manuscript, and represent all EFIM MMWG Members.

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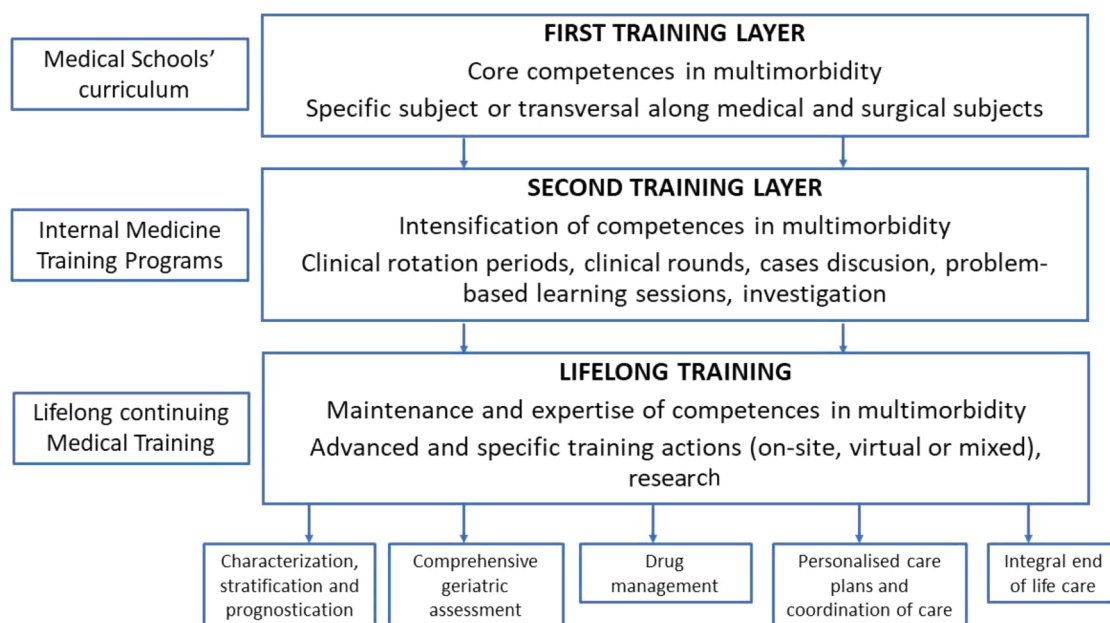


Fig. 3. Description of recommended actions and their timing in the multimorbidity training process.

Declaration of Competing Interest

All authors declare that they have no financial relationships with any organizations that might have an interest in the submitted work in the previous three years, and they declare no other relationships or activities that could appear to have influenced the submitted work.

References

- [1] Janssen F, Bardoutsos A, Gewily SE, De Beer J. Future life expectancy in Europe taking into account the impact of smoking, obesity and alcohol. *Elife* 2021;10:e66590.
- [2] Coleman K, Austin B.T., Brach C., Wagner E.H. Evidence on the Chronic Care Model in the new millennium. *Health Aff (Millwood)*. 2009 Jan-Feb;28(1):75–85. doi: 10.1377/hlthaff.28.1.75. PMID: 19124857; PMCID: PMC5091929.
- [3] Ho IS, Azcoaga-Lorenzo A, Akbari A, Black C, Davies J, Hodgins P, Khunti K, Kadam U, Lyons RA, McCowan C, Mercer S, Nirantharakumar K, Guthrie B. Examining variation in the measurement of multimorbidity in research: a systematic review of 566 studies. *Lancet Public Health* Aug 2021;6(8):e587–97. [https://doi.org/10.1016/S2468-2667\(21\)00107-9](https://doi.org/10.1016/S2468-2667(21)00107-9). Epub 2021 Jun 22. PMID: 34166630.
- [4] Mangin D, Parascandolo J, Khudoyarova O, Agarwal G, Bismah V, Multimorbidity Orr S. eHealth and implications for equity: a cross-sectional survey of patient perspectives on eHealth. *BMJ Open* 2019 Feb 12;9(2):e023731. <https://doi.org/10.1136/bmjopen-2018-023731>. PMID: 30760515; PMCID: PMC6377536.
- [5] Bernabeu-Wittel M, Jadad A, Moreno-Gaviño L, Hernández-Quiles C, Toscano F, Cassani M, Ramírez N, Ollero-Baturone M. Peeking through the cracks: an assessment of the prevalence, clinical characteristics and health-related quality of life (HRQoL) of people with polypathology in a hospital setting. *Arch Gerontol Geriatr* 2010;51:185–91.
- [6] Bernabeu-Wittel M, Barón-Franco B, Murcia-Zaragoza J, Fuertes-Martín A, Ramos-Cantos C, Fernández-Moyano A, Galindo J, Ollero-Baturone M. A multi-institutional, hospital-based assessment of clinical, functional, sociofamilial and health-care characteristics of polypathological patients. *Arch Gerontol Geriatr* 2011;53:284–91.
- [7] Bernabeu-Wittel M, Ollero-Baturone M, Ruiz-Cantero A, Moreno-Gaviño L, Barón-Franco B, Fuertes A, Murcia-Zaragoza J, Ramos-Cantos C, Alemán A. on behalf of PROFUND RESEARCHERS. Functional decline over one-year follow up in a multicenter cohort of polypathological patients: a new approach to functional prognostication. *Int J Gerontol* 2012;6:68–74.
- [8] Koné Pefoyo AJ, Bronskill SE, Gruneir A, et al. The increasing burden and complexity of multimorbidity. *BMC Public Health* 2015;15:415. <https://doi.org/10.1186/s12889-015-1733-2>.
- [9] Galindo-Ocaña J, Gil-Navarro MV, García-Morillo JS, Bernabeu-Wittel M, Ollero-Baturone M, Ortiz-Camuñez MA. [Drug-drug interactions in multicentre polypathological polymedicated patients]. *Rev Clin Esp* 2010;210:270–8. <https://doi.org/10.1016/j.rce.2009.12.008>. SpanishPMID: 20434722.
- [10] Foguet-Boreu Q, Violan C, Roso-Llorach A, Rodríguez-Blanco T, Pons-Vigués M, Muñoz-Pérez MA, Pujol-Ribera E, Valderas JM. Impact of multimorbidity: acute morbidity, area of residency and use of health services across the life span in a region of south Europe. *BMC Fam Pract* 2014;15:55. <https://doi.org/10.1186/1471-2296-15-55>. PMID: 24666526; PMCID: PMC3987684.
- [11] Schiøtz ML, Høst D, Frølich A. Involving patients with multimorbidity in service planning: perspectives on continuity and care coordination. *J Comorb* 2016;6:95–102. <https://doi.org/10.15256/joc.2016.6.81>. PMID: 29090180; PMCID: PMC556451.
- [12] Kuipers SJ, Nieboer AP, Cramm JM. Easier said than done: healthcare professionals' barriers to the provision of patient-centered primary care to patients with multimorbidity. *Int J Environ Res Public Health* 2021;18:6057. <https://doi.org/10.3390/ijerph18116057>. PMID: 34199866; PMCID: PMC8200113.
- [13] Elwyn G, Frosch D, Thomson R, et al. Shared decision making: a model for clinical practice. *J Gen Intern Med* 2012;27:1361. <https://doi.org/10.1007/s11606-012-2077-6>. –1367.
- [14] Rathert C, Wyrwich MD, Boren SA. Patient-centered care and outcomes: a systematic review of the literature. *Med Care Res Rev* 2012. <http://mcr.sagepub.com/content/early/2012/11/18/107755871>. 2465774.abstract.
- [15] Braddock III CH, Edwards KA, Hasenberg NM, Laidley TL, Levinson W. Informed decision making in outpatient practice: time to get back to basics. *JAMA* 1999; 282:2313–20.
- [16] Melchiorre MG, Papa R, Quattrini S, Lamura G, Barbabella F. Integrated care programs for people with multimorbidity in European countries: ehealth adoption in health systems. *Biomed Res Int* 2020;2020:9025326. <https://doi.org/10.1155/2020/9025326>. PMID: 32337283; PMCID: PMC7168691.
- [17] Molist-Brunet N, Sevilla-Sánchez D, Puigoriol-Juvenaty E, Barneto-Soto M, González-Bueno J, Espauella-Panicot J. Improving individualized prescription in patients with multimorbidity through medication review. *BMC Geriatr* 2022;22:417. <https://doi.org/10.1186/s12877-022-03107-2>. PMID: 35549672; PMCID: PMC9096338.
- [18] Savitz LA, Bayliss EA. Emerging models of care for individuals with multiple chronic conditions. *Health Serv Res* 2021;56(Suppl 1):980–9. <https://doi.org/10.1111/1475-6773.13774>. Epub 2021 Aug 13PMID: 34387358; PMCID: PMC8515217.
- [19] Hanlon P, Nicholl BI, Jani BD, Lee D, McQueenie R, Mair FS. Frailty and pre-frailty in middle-aged and older adults and its association with multimorbidity and mortality: a prospective analysis of 493737 UK Biobank participants. *Lancet Public Health* 2018;3:e323–32. [https://doi.org/10.1016/S2468-2667\(18\)30091-4](https://doi.org/10.1016/S2468-2667(18)30091-4). Epub 2018 Jun 14PMID: 29908859; PMCID: PMC6028743.
- [20] Onder G, Palmer K, Navickas R, Jurevičienė E, Mammarella F, Strandzheva M, Mannucci P, Pecorelli S, Marengoni A. Time to face the challenge of multimorbidity. A European perspective from the joint action on chronic diseases and promoting healthy ageing across the life cycle (JA-CHRODIS). *Eur J Intern Med* 2015;26:157–9.
- [21] Bernabeu-Wittel M, García-Romero L, Murcia-Zaragoza J, Gámez-Mancera R, Aparicio-Santos R, Díez-Manglano J, López de la Fuente M, Vogt-Sánchez EA, Villarino-Marzo M, Aquilino-Tarí A, Herranz-Martínez S, Díaz-Jiménez P, Ollero-Baturone M, Rosich-Peris MP. Characterization of patients with chronic diseases and complex care needs: a new high-risk emergent population. *J Biom Res Environ Sci* 2022;3:1321–36. <https://doi.org/10.37871/jbres1601>.
- [22] Nobili A, Garattini S, Mannucci PM. Multiple diseases and polypharmacy in the elderly: challenges for the internist of the third millennium. *J Comorb* 2011;1:28–44. <https://doi.org/10.15256/joc.2011.1.4>. PMID: 29090134; PMCID: PMC556419.
- [23] Bernabeu-Wittel M, Ollero-Baturone M, Nieto-Martín D, García-Morillo S, Goicoechea-Salazar J. Patient-centered care for older adults with multiple chronic conditions: these are the polypathological patients! *J Am Geriatr Soc* 2013;61:475–6.
- [24] Schneider F, Kaplan V, Rodak R, Battagay E, Holzer B. Prevalence of multimorbidity in medical inpatients. *Swiss Med Wkly* 2012;142:w13533. <https://doi.org/10.4414/smww.2012.13533>. PMID: 22407848.
- [25] Markun S, Holzer BM, Rodak R, Kaplan V, Wagner CC, Battagay E, Zimmerli L. Therapeutic conflicts in emergency department patients with multimorbidity: a cross-sectional study. *PLoS One* 2014;9:e110309. <https://doi.org/10.1371/journal.pone.0110309>. PMID: 25310005; PMCID: PMC4195608.OJO.
- [26] Krumholz HM. Post-hospital syndrome—an acquired, transient condition of generalized risk. *N Engl J Med* 2013;368:100–2. <https://doi.org/10.1056/NEJMp1212324>.
- [27] Donzé J, Lipsitz S., Bates D.W., Schnipper J.L. Causes and patterns of readmissions in patients with common comorbidities: retrospective cohort study. *BMJ*. 2013347:f7171. doi: 10.1136/bmj.f7171.
- [28] van Seben R, Covinsky KE, Reichardt LA, Aarden JJ, van der Schaaf M, van der Esch M, Engelbert RHH, Twisk JWR, Bosch JA, Buurman BM. Insight into the posthospital syndrome: a 3-month longitudinal follow up on geriatric syndromes and their association with functional decline, readmission, and mortality. *J Gerontol A Biol Sci Med Sci* 2020;75:1403–10. <https://doi.org/10.1093/gerona/glaa039>. PMID: 32072168; PMCID: PMC7302165.
- [29] Fatima S, Shamim S, Raffat S, Tariq M. Hospital readmissions in internal medicine specialty: frequency, associated factors and outcomes. *Pak J Med Sci* 2021;37:2008–13. <https://doi.org/10.12669/pjms.37.7.3575>. PMID: 34912435; PMCID: PMC8613017.
- [30] Dharmarajan K, Hsieh AF, Lin Z, Bueno H, Ross JS, Horwitz LI, et al. Diagnoses and timing of 30-day readmissions after hospitalization for heart failure, acute myocardial infarction, or pneumonia. *JAMA* 2013;309:355–63.
- [31] Muth C, Blom JW, Smith SM, Johnell K, Gonzalez-Gonzalez AI, Nguyen TS, Brueckle MS, Cesari M, Tinetti ME, Valderas JM. Evidence supporting the best clinical management of patients with multimorbidity and polypharmacy: a systematic guideline review and expert consensus. *J Intern Med* 2019;285:272–88. <https://doi.org/10.1111/joim.12842>. Epub 2018 Dec 10. Erratum in: *J Intern Med*. 2019 Oct;286(4):487. PMID: 30357955.
- [32] Barnett K, Mercer SW, Norbury M, et al. Epidemiology of multimorbidity and implications for health care, research, and medical education: a cross-sectional study. *Lancet* 2012;380:37–43.
- [33] Santoro A, Bientinesi E, Monti D. Immunosenescence and inflammation in the aging process: age-related diseases or longevity? *Ageing Res Rev* 2021;71:101422. <https://doi.org/10.1016/j.arr.2021.101422>. Epub 2021 Aug 13. PMID: 34391943.
- [34] Prados-Torres A, Calderon-Larranaga A, Hanco-Saavedra J, Poblador-Plou B, Van den Akker M. Multimorbidity patterns: a systematic review. *J Clin Epidemiol* 2014;67:254–66.
- [35] Marengoni A, Anglemán S, Melis R. Aging with multimorbidity: a systematic review of the literature. *Ageing Res Rev* 2011;10:430–9.
- [36] DuGoff EH, Canudas-Romo V, Buttorff C, et al. Multiple chronic conditions and life expectancy: a life table analysis. *Med Care* 2014;52:688–94.
- [37] Nagel G, Peter R, Braig S, et al. The impact of education on risk factors and the occurrence of multimorbidity in the EPIC Heidelberg cohort. *BMC Public Health* 2008;8:384.
- [38] Afshar S, Roderick PJ, Kowal P, Dimitrov BD, Hill AG. Multimorbidity and the inequalities of global ageing: a cross-sectional study of 28 countries using the world health surveys. *BMC Public Health* 2015;15:776.
- [39] Hajat C, Stein E. The global burden of multiple chronic conditions: a narrative review. *Prev Med Rep* 2018;12:284–93. <https://doi.org/10.1016/j.pmedr.2018.10.008>. Published 2018 Oct 19.
- [40] Schneider KM, O'Donnell BE, Dean D. Prevalence of multiple chronic conditions in the United States' Medicare population. *Health Qual Life Outcomes* 2009;7:82.
- [41] Van den Akker M, Buntinx F, Metsemakers JF, et al. Multimorbidity in general practice: prevalence, incidence, and determinants of co-occurring chronic and recurrent diseases. *J Clin Epidemiol* 1998;51:367–75.

- [42] Prados-Torres A, Calderon-Larranaga A, Hanco-Saavedra J, Poblador-Plou B, van den Akker M. Multimorbidity patterns: a systematic review. *J Clin Epidemiol* 2014;67:254–66.
- [43] Poblador-Plou B, van den Akker M, Vos R, et al. Similar multimorbidity patterns in primary care patients from two European regions: results of a factor analysis. *PLoS One* 2014;9:e100375.
- [44] Di Angelantonio E, Kaptoge S, Wormser D, Willeit P, Butterworth AS, Bansal N, et al. Association of cardiometabolic multimorbidity with mortality. *JAMA* 2015; 314:52–60.
- [45] Zissimopoulos JM, Tysinger BC, St Clair PA, Crimmins EM. The impact of changes in population health and mortality on future prevalence of Alzheimer's disease and other dementias in the United States. *J Gerontol B Psychol Sci Soc Sci* 2018; 73(suppl.1):S38–47. <https://doi.org/10.1093/geronb/gbx147>.
- [46] Zhou P, Hughes AK, Grady SC, Fang L. Physical activity and chronic diseases among older people in a mid-size city in China: a longitudinal investigation of bipolar effects. *BMC Public Health* 2018;18:486. <https://doi.org/10.1186/s12889-018-5408-7>.
- [47] Silina V, Kalda R. Challenges for clinical practice and research in family medicine in reducing the risk of chronic diseases. Notes on the EGPRN Spring Conference 2017 in Riga. *Eur J Gen Pract* 2018;24:112–7. <https://doi.org/10.1080/13814788.2018.1429594>.
- [48] Marengoni A, Winblad B, Karp A, Fratiglioni L. Prevalence of chronic diseases and multimorbidity among the elderly population in Sweden. *Am J Public Health* 2008;98:1198–200.
- [49] Johnston MC, Crilly M, Black C, Prescott GJ, Mercer SW. Defining and measuring multimorbidity: a systematic review of systematic reviews. *Eur J Public Health* 2019;29:182–9. <https://doi.org/10.1093/eurpub/cky098>. PMID: 29878097.
- [50] Hanlon P, Nicholl B.I., Jani B.D., Lee D., McQueenie R., Mair F.S. Frailty and pre-frailty in middle-aged and older adults and its association with multimorbidity and mortality: a prospective analysis of 493 737 UK Biobank participants. *Lancet Public Health*. 2018;3:e323–32. doi: 10.1016/S2468-2667(18)30091-4. Epub 2018 Jun 14. PMID: 29908859; PMCID: PMC6028743.
- [51] Thienemann F, Ntusi NAB, Battagay E, Mueller BU, Cheatham M. Multimorbidity and cardiovascular disease: a perspective on low- and middle-income countries. *Cardiovasc Diagn Ther* 2020;10:376–85. <https://doi.org/10.21037/cdt.2019.09.09>. PMID: 32420119; PMCID: PMC7225439.
- [52] Xu X, Mishra GD, Jones M. Evidence on multimorbidity from definition to intervention: an overview of systematic reviews. *Ageing Res Rev* 2017;37:53–68. <https://doi.org/10.1016/j.arr.2017.05.003>. Epub 2017 May 13. PMID: 28511964.
- [53] Willadsen TG, Bebe A, Køster-Rasmussen R, Jarbøl DE, Guassora AD, Waldorff FB, Reventlow S, Olivarius Nde F. The role of diseases, risk factors and symptoms in the definition of multimorbidity - a systematic review. *Scand J Prim Health Care* 2016;34:112–21. <https://doi.org/10.3109/02813432.2016.1153242>.
- [54] Kernick D, Chew-Graham CA, O'Flynn N. Clinical assessment and management of multimorbidity: NICE guideline. *Br J Gen Pract* 2017;67:235–6. <https://doi.org/10.3399/bjgp17X690857>. PMID: 28450343; PMCID: PMC5409424.
- [55] van Munster BC, Portielje JEA, Maier AB, Arends AJ, de Beer JJA. Methodology for senior-proof guidelines: a practice example from the Netherlands. *J Eval Clin Pract* 2018;24:254–7. <https://doi.org/10.1111/jep.12738>. Epub 2017 Mar 21. PMID: 28322487.
- [56] Cranston M, Semple C, Duckitt R, Vardi M, Lindgren S, Davidson C, Palsson R. European board of internal medicine competencies working group. The practice of internal medicine in Europe: organisation, clinical conditions and procedures. *Eur J Intern Med* 2013;24:627–32. <https://doi.org/10.1016/j.ejim.2013.08.005>. Epub 2013 Sep 10. PMID: 24028929.
- [57] European Board of Internal Medicine. <https://www.ebim-online.org>. (last accessed 27th September 2022).
- [58] European Board of Internal Medicine. European Curriculum of Internal Medicine 2016. <https://www.ebim-online.org/european-curriculum-of-internal-medicine/>. (last accessed 27th September 2022).
- [59] Makovski TT, Schmitz S, Zeegers MP, Stranges S, van den Akker M. Multimorbidity and quality of life: systematic literature review and meta-analysis. *Ageing Res Rev* 2019;53:100903. <https://doi.org/10.1016/j.arr.2019.04.005>. Epub 2019 Apr 30. PMID: 31048032.
- [60] Ellis G, Gardner M, Tsiachristas A, Langhorne P, Burke O, Harwood RH, Conroy SP, Kircher T, Somme D, Saltvedt I, Wald H, O'Neill D, Robinson D, Shepperd S. Comprehensive geriatric assessment for older adults admitted to hospital. *Cochrane Database Syst Rev* 2017;9:CD006211. <https://doi.org/10.1002/14651858.CD006211.pub3>. PMID: 28898390.
- [61] Eamer G, Taheri A, Chen SS, Daviduck Q, Chambers T, Shi X, Khadaroo RG. Comprehensive geriatric assessment for older people admitted to a surgical service. *Cochrane Database Syst Rev* 2018 Jan 31;1(1):CD012485. <https://doi.org/10.1002/14651858.CD012485.pub2>. PMID: 29385235.
- [62] Van Grootven B, Flamaing J, Dierckx de Casterlé B. Effectiveness of in-hospital geriatric co-management: a systematic review and meta-analysis. *Age Ageing* 2017;46:903–10. <https://doi.org/10.1093/ageing/afx051>. PMID: 28444116.
- [63] Vallejo Maroto I, Cubo Romano P, Mafé Noguerols MC, Matesanz-Fernández M, Pérez-Belmonte LM, I Said Criado, Gómez-Huelgas R, J; Díez Manglano. Focus group on aging of the Spanish society of internal medicine and the working group on polypathology and advanced age. Recommendations on the comprehensive, multidimensional assessment of hospitalized elderly people. Position of the Spanish society of internal medicine. *Rev Clin Esp (Barc)* 2021;221:347–58.
- [64] Pilotto A, Cella A, Pilotto A, Daragjati J, Veronese N, Musacchio C, Mello AM, Logroscino G, Padovani A, Prete C, Panza FJ. Three decades of comprehensive geriatric assessment: evidence coming from different healthcare settings and specific clinical conditions. *Am Med Dir Assoc* 2017;18. <https://doi.org/10.1016/j.jamda.2016.11.004>. 192.e1-192.e11 Epub 2016 Dec 31 PMID: 28049616.
- [65] N'Goran AA, Pasquier J, Deruaz-Luyet A, Burnand B, Haller DM, Neuner-Jehle S, Zeller A, Streit S, Herzog L, Bodenmann P. Factors associated with health literacy in multimorbid patients in primary care: a cross-sectional study in Switzerland. *BMJ Open* 2018;8:e018281. <https://doi.org/10.1136/bmjopen-2017-018281>. PMID: 29440210.
- [66] Stirland LE, González-Saavedra L, Mullin DS, Ritchie CW, Muniz-Terrera G, Russ TC. Measuring multimorbidity beyond counting diseases: systematic review of community and population studies and guide to index choice. *BMJ* 2020;368: m160. <https://doi.org/10.1136/bmj.m160>. Erratum in: *BMJ*. 2020 Sep 30;370: m3668 PMID: 32071114; PMCID: PMC7190061.
- [67] Bernabeu-Wittel M, Ollero-Baturone M, Moreno-Gaviño L, Barón-Franco B, Fuertes A, Murcia-Zaragoza J, Ramos-Cantos C, Alemán A, Fernández-Moyano A. Development of a new predictive model for polypathological patients. The PROFUND index. *Eur J Intern Med* 2011;22:311–7. <https://doi.org/10.1016/j.ejim.2010.11.012>. Epub 2010 Dec 22. PMID: 21570654.
- [68] Lee SJ, Lindquist K, Segal MR, Covinsky KE. Development and validation of a prognostic index for 4-year mortality in older adults. *JAMA* 2006;295:801–8. <https://doi.org/10.1001/jama.295.7.801>. Erratum in: *JAMA*. 2006 Apr 26;295(16):1900. PMID: 16478903.
- [69] Carey IM, Shah SM, Harris T, DeWilde S, Cook DG. A new simple primary care morbidity score predicted mortality and better explains between practice variations than the Charlson index. *J Clin Epidemiol* 2013;66:436–44. <https://doi.org/10.1016/j.jclinepi.2012.10.012>. Epub 2013 Feb 8. PMID: 23395517.
- [70] Corrao G, Rea F, Di Martino M, De Palma R, Scondotto S, Fusco D, Lallo A, Belotti LMB, Ferrante M, Pollina Addario S, Merlino L, Mancía G, Carle F. Developing and validating a novel multisource comorbidity score from administrative data: a large population-based cohort study from Italy. *BMJ Open* 2017;7:e019503. <https://doi.org/10.1136/bmjopen-2017-019503>. PMID: 29282274; PMCID: PMC5770918.
- [71] Bernabeu-Wittel M, Murcia-Zaragoza J, Hernández-Quiles C, Escolano-Fernández B, Jarava-Rol G, Oliver M, Díez-Manglano J, Ruiz-Cantero A, Ollero-Baturone M, Researchers PALLAR. Development of a six-month prognostic index in patients with advanced chronic medical conditions: the PALLAR score. *J Pain Symptom Manage* 2014;47:551–65. <https://doi.org/10.1016/j.jpainsymman.2013.04.011>. Epub 2013 Aug 30. PMID: 23998780.
- [72] Bernabeu-Wittel M, Holecki M, Tuttolomondo A, Chudek J, Battagay E, EFIM Multimorbidity Working Group. Perspectives of European internists on multimorbidity. A multinational survey. *Eur J Intern Med* 2022;100:130–2. <https://doi.org/10.1016/j.ejim.2022.02.008>. Epub 2022 Feb 11. PMID: 35164996.
- [73] Hanlon P, MacDonald S, Wood K, Allan L, Cooper SA. Long-term condition management in adults with intellectual disability in primary care: a systematic review. *BJGP Open* 2018;2. <https://doi.org/10.3399/bjgpopen18X101445>. *bjgpopen18x101445* PMID: 30564710; PMCID: PMC6181081.
- [74] Elwyn G, Frosch D, Thomson R, et al. Shared decision making: a model for clinical practice. *J Gen Intern Med* 2012;27. <https://doi.org/10.1007/s11606-012-2077-6>. 1361–136.
- [75] Rathert C, Wyrwich MD, Boren SA. Patient-centered care and outcomes: a systematic review of the literature. *Med Care Res Rev* 2012. <http://mcr.sagepub.com/content/early/2012/11/18/1077558712465774.abstract>. Accessed Jun 15, 2013.
- [76] Dellasega C, Añel-Tiangco RM, Gabbay RA. How patients with type 2 diabetes mellitus respond to motivational interviewing. *Diabetes Res Clin Pract* 2012;95: 37–41. <http://www.ncbi.nlm.nih.gov/pubmed/21899911>. Accessed Jun 5, 2013.
- [77] Sheridan NF, Kenealy TW, Kidd JD, et al. Patients' engagement in primary care: powerlessness and compounding jeopardy. A qualitative study. *Health Expect* 2012. <http://www.ncbi.nlm.nih.gov/pubmed/23033910>. Accessed Jun 15, 2013.
- [78] Anonymous. Personalised care. Available at: <https://www.england.nhs.uk/personalisedcare/>. Last accessed 6 October 2022.
- [79] Coulter A, Entwistle V.A., Eccles A., Ryan S., Shepperd S., Perera R. Personalised care planning for adults with chronic or long-term health conditions. *Cochrane Database of Systematic Reviews* 2015, 3. Art. No.: CD010523. DOI:10.1002/14651858.CD010523.pub2.
- [80] Bernabeu-Wittel M, Barón-Franco B, Nieto-Martín D, Moreno-Gaviño L, Ramírez-Duque N, Ollero-Baturone M. Prognostic stratification and healthcare approach in patients with multiple pathologies. *Rev Clin Esp (Barc)* 2017;217:410–9. <https://doi.org/10.1016/j.rce.2017.01.011>. Epub 2017 Mar 16. PMID: 28318522.
- [81] Barbato A, D'Avanzo B, Cinquini M, Fittipaldo AV, Nobili A, Amato L, Vecchi S, Onder G. Effects of goal-oriented care for adults with multimorbidity: a systematic review and meta-analysis. *J Eval Clin Pract* 2022;28:371–81. <https://doi.org/10.1111/jep.13674>. Epub 2022 Mar 30. PMID: 35355381; PMCID: PMC9314986.
- [82] Piñeiro-Fernández JC, Fernández-Rial Á, Suárez-Gil R, Martínez-García M, García-Trincado B, Suárez-Piñera A, Pértega-Díaz S, Casariego-Vales E. Evaluation of a patient-centered integrated care program for individuals with frequent hospital readmissions and multimorbidity. *Intern Emerg Med* 2022;17: 789–97. <https://doi.org/10.1007/s11739-021-02876-9>. Epub 2021 Oct 29. PMID: 34714486.
- [83] Fernández-Moyano A, Machín Lázaro JM, Martín Escalante MD, Aller Hernandez MB, Vallejo Maroto I. Care models for polypathological patients. *Rev Clin Esp (Barc)* 2017;217:351–8.
- [84] Braddock III CH, Fihr SD, Levinson W, Jonsen AR, Pearlman RA. How doctors and patients discuss routine clinical decisions. *Informed decision making in the outpatient setting. J Gen Intern Med* 1997;12:339–45.

- [85] Elwyn G, Coulter A, Laitner S, Walker E, Watson P, Thomson R. Implementing shared decision making in the NHS. *BMJ* 2010;341:e5146.
- [86] Albarqouni L, Hoffmann T, Straus S, et al. Core Competencies in evidence-based practice for health professionals: consensus statement based on a systematic review and delphi survey. *JAMA Netw Open* 2018;1(2):e180281. <https://doi.org/10.1001/jamanetworkopen.2018.0281>.
- [87] Mauksch LB, Dugdale DC, Dodson S, Epstein R. Relationship, communication, and efficiency in the medical encounter: creating a clinical model from a literature review. *Arch Intern Med* 2008;168:1387–95. <https://doi.org/10.1001/archinte.168.13.138>.
- [88] Glyn Elwyn, Christine Dehlendorf, Ronald, M. Epstein, Katy Marrin, James White, Dominick L. Frosch Shared Decision Making and Motivational Interviewing: achieving Patient-Centered Care Across the Spectrum of Health Care Problems *The Annals of Fam Med* 2014;12:270–5; DOI: 10.1370/afm.1615.
- [89] Stacey D., Bennett C., Barry M., Col N., Eden K., Holmes-Rovner M., Llewellyn-Thomas, H. Lyddiatt A., et al. Decision aids for people facing health treatment or screening decisions. *Cochrane Database of Systematic Reviews*. 2011; as well as (10):CD001431.
- [90] MEDMDMLS Mauksch Larry B, Dugdale David C, Dodson Sherry, Epstein Ronald. Relationship, communication, and efficiency in the medical encounter creating a clinical model from a literature review MD. *Arch Intern Med* 2008;168:1387–95.
- [91] Tonelli MR, Sullivan MD. Person-centred shared decision making. *J Eval Clin Pract* 2019;25:1057–62. <https://doi.org/10.1111/jep.13260>. Epub 2019 Aug 12. PMID: 31407417.
- [92] Bunn F, Goodman C, Russell B, Wilson P, Manthorpe J, Rait G, Hodkinson I, Durand MA. Supporting shared decision making for older people with multiple health and social care needs: a realist synthesis. *BMC Geriatr* 2018;18:165. <https://doi.org/10.1186/s12877-018-0853-9>. PMID: 30021527; PMCID: PMC6052575.
- [93] Anonymous. Shared Decision Making. Accessible at: <https://www.england.nhs.uk/personalisedcare/shared-decision-making/>. Last accessed 4 October 2022.
- [94] Ollero-Baturone M., Lafuente-Robles N., Bernabeu-Wittel M., et al. Personalized action plan in patients with multimorbidity and complex health needs: recommendations for its elaboration. Available at: https://www.sspa.juntadeandalucia.es/servicioandaluzdesalud/sites/default/files/sincfiles/wsas-media-med/iafile_sasdocumento/2019/plan_accion_personalizado_ed_2016.pdf. Last accessed 6 October 2022.
- [95] Stegmann ME, Festen S, Brandenbarg D, Schuling J, van Leeuwen B, de Graeff P, Berendsen AJ. Using the outcome prioritization tool (OPT) to assess the preferences of older patients in clinical decision-making: a review. *Maturitas* 2019;128:49–52. <https://doi.org/10.1016/j.maturitas.2019.07.022>. Epub 2019 Jul 30. PMID: 31561823.
- [96] van Weert JC, van Munster BC, Sanders R, Spijker R, Hoof L, Jansen J. Decision aids to help older people make health decisions: a systematic review and meta-analysis. *BMC Med Inform Decis Mak* 2016;16:45. <https://doi.org/10.1186/s12911-016-0281-8>. PMID: 27098100; PMCID: PMC4839148.
- [97] Fulton MM, Riley Allen E. Polypharmacy in the elderly: a literature review. *J Am Acad Nurse Pract* 2005;17:123–32.
- [98] Qato DM, Wilder J, Schumm LP, et al. Changes in prescription and over-the-counter medication and dietary supplement use among older adults in the United States, 2005 vs 2011. *JAMA* 2016;176:473–82.
- [99] Payne RA, Avery AJ, Duerden M, et al. Prevalence of polypharmacy in a Scottish primary care population. *Eur J Clin Pharmacol* 2014;70:575–81.
- [100] Bernabeu-Wittel M, Barón-Franco B, Murcia-Zaragoza J, Fuertes-Martín A, Ramos-Cantos C, Fernández-Moyano A, Galindo FJ, Ollero-Baturone M. A multi-institutional, hospital-based assessment of clinical, functional, sociofamilial and health-care characteristics of polypathological patients (PP). *Arch Gerontol Geriatr* 2011;53:284–91. <https://doi.org/10.1016/j.archger.2010.12.006>. Epub 2011 Jan 7. PMID: 21215467.
- [101] Pazan F, Wehling M. Polypharmacy in older adults: a narrative review of definitions, epidemiology, and consequences. *Eur Geriatr Med* 2021;12:443–52.
- [102] van de Glind EM, Rhodius-Meester HF, Reitsma JB, Hoof L, van Munster BC. Reviews of individual patient data (IPD) are useful for geriatrics: an overview of available IPD reviews. *J Am Geriatr Soc* 2014;62:1133–8. <https://doi.org/10.1111/jgs.12830>. Epub 2014 May 6. PMID: 24802290.
- [103] de Jonghe A, van de Glind EM, van Munster BC, de Rooij SE. Underrepresentation of patients with pre-existing cognitive impairment in pharmaceutical trials on prophylactic or therapeutic treatments for delirium: a systematic review. *J Psychosom Res* 2014;76:193–9. <https://doi.org/10.1016/j.jpsychores.2013.12.007>. Epub 2013 Dec 31. PMID: 24529037.
- [104] O'Mahony D, O'Sullivan D, Byrne S, et al. STOPP/START criteria for potentially inappropriate prescribing in older people: version 2. *Age Ageing* 2015;44:213–8.
- [105] McNab D, Bowie P, Ross A, MacWalter G, Ryan M, Morrison J. Systematic review and meta-analysis of the effectiveness of pharmacist-led medication reconciliation in the community after hospital discharge. *BMJ Qual Saf* 2018;27:308–20. <https://doi.org/10.1136/bmjqs-2017-007087>. Epub 2017 Dec 16. PMID: 29248878; PMCID: PMC5867444.
- [106] Kwan JL, Lo L, Sampson M, Shojania KG. Medication reconciliation during transitions of care as a patient safety strategy: a systematic review. *Ann Intern Med* 2013 Mar 5;158(5 Pt 2):397–403. <https://doi.org/10.7326/0003-4819-158-5-201303051-00006>. PMID: 23460096.
- [107] Conn VS, Ruppert TM. Medication adherence outcomes of 771 intervention trials: systematic review and meta-analysis. *Prev Med* 2017;99:269–76.
- [108] Brown MT, Bussell J, Dutta S, Davis K, Strong S, Mathew S. Medication adherence: truth and consequences. *Am J Med Sci* 2016;351:387–99.
- [109] Franchi C, Ludergrani M, Merlino L, Nobili A, Fortino I, Leoni O, Ardoino I. Multiple medication adherence and related outcomes in community-dwelling older people on chronic polypharmacy: a retrospective cohort study on administrative claims data. *Int J Environ Res Public Health* 2022;19:5692. <https://doi.org/10.3390/ijerph19095692>. PMID: 35565087; PMCID: PMC9099923.
- [110] Huibers CJA, Sallevelt BTGM, Heij JMJO, O'Mahony D, Rodondi N, Dalleur O, van Marum RJ, Egberts ACG, Wilting I, Knol W. Hospital physicians' and older patients' agreement with individualised STOPP/START-based medication optimisation recommendations in a clinical trial setting. *Eur Geriatr Med* 2022;13:541–52. <https://doi.org/10.1007/s41999-022-00633-5>. Epub 2022 Mar 15. PMID: 35291025; PMCID: PMC9151543.
- [111] Anonymous. Reducing medications safely to meet life's changes. Available at: <https://deprescribing.org>. Last accessed 7 October 2022.
- [112] Rodríguez-Pérez A, Alfaro-Lara ER, Sierra-Torres MI, Villalba-Moreno Á, Nieto-Martín MD, Galván-Banqueri M, Santos-Ramos B. Validation of the LESS-CHRON criteria: reliability study of a tool for deprescribing in patients with multimorbidity. *Eur J Hosp Pharm* 2019;26:334–8. <https://doi.org/10.1136/ejhpharm-2017-001476>. Epub 2018 May 30. PMID: 31798857.
- [113] Rodríguez-Pérez A, Alfaro-Lara ER, Albinana-Perez S, Nieto-Martín MD, Díez-Manglano J, Pérez-Guerrero C, Santos-Ramos B. Novel tool for deprescribing in chronic patients with multimorbidity: list of evidence-based deprescribing for chronic patients criteria. *Geriatr Gerontol Int* 2017;17:2200–7. <https://doi.org/10.1111/ggi.13062>. Epub 2017 May 21.
- [114] Tziraki C, Grimes C, Ventura F, O'Caomh R, Santana S, Zavagli V, Varani S, Tramontano D, Apóstolo J, Geurden B, De Luca V, Tramontano G, Romano MR, Anastasaki M, Lionis C, Rodríguez-Acuña R, Capelas ML, Dos Santos Afonso T, Molloy DW, Liotta G, Iaccarino G, Triassi M, Eklund P, Roller-Wirnsberger R, Illario M. Rethinking palliative care in a public health context: addressing the needs of persons with non-communicable chronic diseases. *Prim Health Care Res Dev* 2020;21:e32. <https://doi.org/10.1017/S1463423620000328>.
- [115] Quinn KL, Shurrab M, Gitau K, Kavalieratos D, Isenberg SR, Stall NM, Stukel TA, Goldman R, Horn D, Cram P, Detsky AS, Bell CM. Association of receipt of palliative care interventions with health care use, quality of life, and symptom burden among adults with chronic noncancer illness: a systematic review and meta-analysis. *JAMA* 2020;324:1439–50. <https://doi.org/10.1001/jama.2020.14205>.
- [116] von Gunten CF, Ferris FD, Emanuel LL. The patient-physician relationship. Ensuring competency in end-of-life care: communication and relational skills. *JAMA* 2000;284:3051–7. <https://doi.org/10.1001/jama.284.23.3051>.
- [117] Leiva-Fernández F, Prados-Torres JD, Prados-Torres A, Del-Cura-González I, Castillo-Jimena M, López-Rodríguez JA, Rogero-Blanco ME, Lozano-Hernández CM, López-Verde F, Bujalance-Zafra MJ, Pico-Soler MV, Gimeno-Feliu LA, Poblador-Plou B, Martínez-Cañavate MT, Muth C. Training primary care professionals in multimorbidity management: educational assessment of the eMULTIPAP course. *Mech Ageing Dev* 2020;192:111354. <https://doi.org/10.1016/j.mad.2020.111354>.
- [118] Gibbins J, McCoubrie R, Maher J, Wee B, Forbes K. Recognizing that it is part and parcel of what they do: teaching palliative care to medical students in the UK. *Palliat Med* 2010;24:299–305. <https://doi.org/10.1177/0269216309356029>.
- [119] Turrillas P, Teixeira MJ, Maddocks M. A systematic review of training in symptom management in palliative care within postgraduate medical curricula. *J Pain Symptom Manage* 2019;57. <https://doi.org/10.1016/j.jpainsymman.2018.09.020>. 156-170.e4.
- [120] Lavan AH, Gallagher PF, O'Mahony D. Epidemiology of multimorbidity and implications for health care, research, and medical education: a cross-sectional study. *Lancet* 2012;380:37–43. [https://doi.org/10.1016/S0140-6736\(12\)60240-2](https://doi.org/10.1016/S0140-6736(12)60240-2).
- [121] Maguire S, Hanley K, Quinn K, Sheeran J, Stewart P. Teaching multimorbidity management to GP trainees: a pilot workshop. *Educ Prim Care* 2015;26:410–5. <https://doi.org/10.1080/14739879.2015.1101848>.