UNIVERSIDADE DA BEIRA INTERIOR
Ciências da Saúde

MM-PT study: Multimorbidity in primary care

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Tese para obtenção do Grau de Doutor em
Medicina
(3º ciclo de estudos)

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Dedication

"The pursuit of PhD is an enduring daring adventure"
— Lailah Gifty Akita

Dedicated to: *My sister.*

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I gratefully thank to:

My PhD supervisor Prof. Doutor Luiz Miguel Santiago for his help and guidance over this "daring adventure".

My family that always have given me more that I can ask for.

My sister for reading and re-reading my writings ad nauseam. Therefore, whether willing or not you are now an expert in multimorbidity.

My love – Inês – for understanding the concept of lack of time. And still be by my side through the hard times.

My friends for not letting me quit. You know who you are.

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Resumo Alargado

As doenças crónicas assumem inegável importância como causa de morbilidade e mortalidade. Aos Cuidados de Saúde Primários é comum recorrerem doentes que apresentam múltiplas doenças crónicas (ou problemas crónicos) – multimorbilidade. O impacto negativo da multimorbilidade é sentido a nível do doente (e dos seus cuidadores), do médico e do sistema de saúde. A multimorbilidade acarreta crescente complexidade aos cuidados de saúde (p. ex. acessibilidade e organização da consulta). A literatura internacional demonstra que é comum a pessoa com multimorbilidade apresentar fracos resultados em saúde, diminuição da qualidade de vida, sofrimento psicológico, maior utilização dos serviços de saúde, maior número de complicações dos tratamentos médicos e maior despesa em saúde.

Esta tese teve como objetivo o estudo da multimorbilidade no contexto dos Cuidados de Saúde Primários em Portugal, a partir de várias perspetivas (epidemiológica global, do doente e do médico de família) e a exploração da sua relevância. Para alcançar este objetivo geral, a investigação foi dividida em três Fases, foram definidos objetivos mais específicos (PAPER I) e resultou em quatro manuscritos publicados em revistas científicas internacionais:

1. Estimar a prevalência da multimorbilidade na população adulta observada nos Cuidados de Saúde Primários em Portugal, identificar os fatores sociodemográficos associados, e caracterizar as combinações de problemas crónicos de saúde (PAPER II).

2. Analisar a relação entre a multimorbilidade, a qualidade de vida relacionada com a saúde, o apoio familiar percecionado, e as necessidades não satisfeitas em saúde, em doentes adultos observados nos Cuidados de Saúde Primários (PAPER III).

3. Traduzir a definição de multimorbilidade da European General Practice Research Network (EGPRN), de acordo com as características culturais e linguísticas portuguesas (PAPER IV).

4. Avaliar o conhecimento, a compreensão e as práticas percecionadas pelos médicos de família em relação à multimorbilidade e ao seu controlo. Avaliar a clareza e a utilidade da definição de multimorbilidade da EGPRN traduzida para português. Analisar se ao ser fornecido material informativo descrevendo os resultados dos estudos anteriores sobre multimorbilidade, este mudaria as opiniões dos médicos de família sobre o assunto (PAPER V).

O primeiro estudo da tese (PAPER II), transversal e analítico, realizado no período compreendido entre outubro de 2013 e dezembro de 2014, nas cinco Administrações Regionais de Saúde de Portugal Continental, englobou 1993 indivíduos com 18 anos ou mais (1279 mulheres e 714 homens), convidados a participar pelos seus médicos de família (taxa de participação de 98.3%). Através de uma entrevista presencial aos utentes, da consulta dos seus processos clínicos e do conhecimento que cada médico de família tem da história clínica dos utentes, foram recolhidas informações sobre a história individual de doença e as características sociodemográficas. Na ausência de uma definição consensual de multimorbilidade, foram utilizadas duas definições: presença de dois ou mais problemas crónicos de saúde no mesmo indivíduo e também de três ou mais problemas crónicos (de uma lista de 147 problemas crónicos de saúde possíveis). Nesta amostra de utentes dos Cuidados de Saúde Primários, com uma média etária de 56.3 anos, 69.5% eram casados/coabitantes, 41.5% eram pensionistas/reformados, 48.7% tinham escolaridade baixa e 54.4% tinham rendimentos médios. A multimorbilidade estava presente em 72.7% (≥2 problemas crónicos) e 57.2% (≥3 problemas crónicos) dos indivíduos. A multimorbilidade aumentou significativamente com a idade. Os pensionistas/reformados e os indivíduos com escolaridade baixa apresentaram maior probabilidade de sofrer de multimorbilidade. As patologias cardiometabólica e mental foram as mais comuns. Foram identificadas seis combinações de problemas crónicos de saúde.

O segundo estudo da tese (PAPER III), também transversal, realizado no período compreendido entre janeiro de 2014 e janeiro de 2015, na Região Centro de Portugal, englobou 521 doentes (334 mulheres e 187 homens) dos Cuidados de Saúde Primários com 18 anos ou mais e com multimorbilidade (≥2 problemas crónicos de saúde e em que pelo menos um teria de ser hipertensão, diabetes, asma ou osteoartrose). Através de uma entrevista presencial aos doentes, foram recolhidas informações sobre as características sociodemográficas, a história individual de doença, a qualidade de vida relacionada com a saúde (questionário de estado de saúde SF-12), o apoio familiar (questionário APGAR familiar), e as necessidades não satisfeitas em saúde (cuidados médicos generalistas, cirúrgicos e dentários; receitas/renovação de receituário; psiquiatra/aconselhamento em saúde mental; óculos ou outras ajudas técnicas). Nesta amostra de doentes, com uma média etária de 58.2 anos, 70.2% eram casados/coabitantes, 43.0% eram pensionistas/reformados, 57.2% tinham escolaridade baixa e 46.3% tinham rendimentos médios. Dois a três problemas crónicos foram encontrados em 42.2%, quatro a cinco em 27.6% e seis ou mais problemas crónicos em 30.1% dos doentes (média de problemas crónicos de saúde 4.5). Com o aumento dos níveis de multimorbilidade verificou-se um agravamento na qualidade de vida relacionada com a saúde, particularmente a saúde física. Doentes do sexo masculino com rendimentos elevados e famílias altamente funcionais apresentaram melhor saúde física e mental. Um nível de escolaridade mais elevado e a presença de asma também estiveram associados a melhor saúde física. Pelo contrário, idosos com elevada multimorbilidade e com osteoartrose

obtiveram pior saúde física. A maioria dos doentes vivia em famílias altamente funcionais e não referiu necessidades em saúde não satisfeitas. Os restantes declararam necessidades de cuidados médicos, dentários, e óculos/outras ajudas técnicas. A incapacidade financeira foi a principal razão para não satisfazerem as suas necessidades em saúde.

No terceiro estudo da tese (PAPER IV), foi formado um painel de peritos constituído por 23 médicos de família portugueses, que através da técnica Delphi traduziu para a língua portuguesa, em duas etapas, a definição de multimorbilidade da EGPRN com uma concordância de 8.43 em 9: *"A multimorbilidade é definida como qualquer combinação de uma doença crónica com pelo menos uma outra doença (aguda ou crónica), ou com um fator biopsicossocial (associado ou não), ou com um fator de risco somático. Qualquer fator biopsicossocial, qualquer fator de risco somático, a rede social, a carga das doenças, o consumo de cuidados de saúde e as estratégias de adaptação do doente podem funcionar como modificadores (dos efeitos da multimorbilidade). A multimorbilidade pode modificar os resultados em saúde e levar a um aumento da incapacidade, à diminuição da qualidade de vida ou à fragilidade."*

O quarto e último estudo da tese (PAPER V), descritivo e qualitativo, baseado num questionário online, realizado no primeiro trimestre de 2016, englobou 74 médicos de família dos distritos de Coimbra e Aveiro. A amostra apresentou elevada consciência sobre a multimorbilidade e assinalou várias dificuldades e desafios na sua gestão. Fatores extrínsecos foram associados à gestão e logística do sistema de saúde (tempo de consulta, organização das equipas de saúde, informação clínica) e à sociedade (pressão dos média, apoio social/familiar). Fatores intrínsecos relacionados com o médico de família, o doente e a relação médico-doente também foram enumerados. As características fundamentais da medicina geral e familiar foram apontadas como as ferramentas para lidar com as dificuldades. Além disso, para gerir a complexidade do doente com multimorbilidade é necessário um tempo de consulta adequado, trabalho em equipa multidisciplinar e mais educação/treino. A clareza e a utilidade da definição de multimorbilidade da EGPRN ficou patente, assim como, a mais-valia da divulgação aos médicos de família dos dados das primeiras Fases desta tese.

Em conclusão, a multimorbilidade é um problema comum e complexo nos Cuidados de Saúde Primários em Portugal. O conhecimento dos seus determinantes e suas consequências, tal como são descritos neste projeto de investigação, pode ter um importante lugar na melhoria da gestão do doente com multimorbilidade.

Os estudos de multimorbilidade lidam frequentemente com o diagnóstico dos problemas de saúde, mas nunca se deve esquecer que os médicos de família também lidam com o peso do sofrimento da pessoa. Assim, no futuro deve-se ousar desenhar *guidelines* não apenas para o doente com multimorbilidade, mas principalmente para a pessoa com multimorbilidade.

Palavras-chave

Multimorbilidade, problemas crónicos de saúde, epidemiologia, qualidade de vida relacionada com a saúde, apoio familiar, necessidades não satisfeitas em saúde, experiências percecionadas, Cuidados de Saúde Primários, Portugal.

Abstract

Chronic diseases are undeniably important as a cause of morbidity and mortality. Most of the patients with numerous chronic diseases (or chronic health problems) – multimorbidity - receive treatment in primary health care. The negative impact of multimorbidity is felt at several levels: patient (and their caregivers), general practitioner (GP), and the health system. Multimorbidity entails increasing complexity in health care (e.g. accessibility and organization of the consultation). International literature shows that it is common for people with multimorbidity to have poor health outcomes, lower quality of life, psychological distress, greater use of health services, greater complications of medical treatments, and greater health expenditure.

This thesis aimed to study multimorbidity in the primary health care context in Portugal, from various perspectives (epidemiologic, patient's and GP's views), and explore its relevance. To achieve this general objective, the research project was divided into three Phases, specific objectives were defined (PAPER I) and it resulted in four manuscripts published in international scientific journals:

1. Determine the prevalence of multimorbidity in the adult population attending primary care in Portugal, to identify associated sociodemographic factors, and to reveal combinations of chronic health problems (PAPER II).

2. Analyse the relationship between multimorbidity, health-related quality of life, perceived family support and unmet health needs in adult patients attending primary care (PAPER III).

3. Translate the European General Practice Research Network (EGPRN) definition of multimorbidity, according to Portuguese cultural and linguistic features (PAPER IV).

4. Access GPs' knowledge, awareness, and practices regarding multimorbidity and its management. Evaluate the clarity and usefulness of the EGPRN definition of multimorbidity. Study if providing informational material depicting results of our previous studies on multimorbidity, would change current GPs' views on the subject (PAPER V).

The first study of this thesis (PAPER II), cross-sectional and analytical, conducted from October 2013 to December 2014, across the five mainland Portugal Healthcare Administrative Regions, included 1993 individuals aged 18 and older (1279 women e 714 men), approached by their GPs (98.3% acceptance rate). Through the patient's self-report (in-person interview),

the medical records, and the GP's knowledge of the patient's history, information regarding clinical data and sociodemographic characteristics was collected. In the absence of a consensual definition of multimorbidity, two definitions were used: presence of two or more chronic health problems in the same individual, as well as, three or more chronic problems (from a list of 147 possible chronic health problems). In this sample of primary health care users, with a mean age of 56.3 years, 69.5% were married/cohabiting, 41.5% were pensioners/retirees, 48.7% had a low educational level and 54.4% reported a sufficient monthly income. Multimorbidity was present in 72.7% (≥2 chronic problems) and 57.2% (≥3 chronic problems) of the sample. Multimorbidity increased significantly with age. Pensioners/retirees and individuals with low levels of education were more likely to suffer from multimorbidity. Cardiometabolic and mental disorders were the most common chronic health problems. Six combinations of chronic problems were identified.

The second study of this thesis (PAPER III), also cross-sectional, conducted from January 2014 to January 2015, in the Centre region of Portugal, included 521 primary health care patients aged 18 and older (334 women e 187 men) with multimorbidity (≥2 chronic health problems, of which at least one was required to be hypertension, diabetes, asthma or osteoarthritis). Through a face-to-face interview, was collected information regarding sociodemographic characteristics, clinical data, health-related quality of life (Portuguese Short Form-12 Health Status Questionnaire), family support (Portuguese Family APGAR), and unmet health needs (medical, surgical and dental care; prescription medications; mental healthcare or counselling; and eyeglasses or other technical aid). In this sample of patients, with a mean age of 58.2 years, 70.2% were married/cohabiting, 43.0% were pensioners/retirees, 57.2% had a low educational level and 46.3% reported a sufficient monthly income. Two to three chronic problems were found in 42.2%, four to five in 27.6% and six or more chronic problems in 30.1% of the patients (mean chronic health problems 4.5). Increased multimorbidity levels were linked to worse health-related quality of life, particularly the physical health. Male patients with high monthly incomes and highly functional families had better physical and mental health. High levels of education and the presence of asthma were also associated with better physical health. Contrariwise, elderly patients with high levels of multimorbidity and with osteoarthritis had lower physical health. The majority of the patients lived in highly functional families and did not have unmet health needs. When health needs were stated they were mostly for generalist medical care, dental care, and eyeglasses/other technical aid. Financial insufficiency was the primary reason for not fulfilling their health needs.

In the third study of the thesis (PAPER IV), a panel of experts was assembled, consisting of 23 Portuguese GPs, who using the Delphi technique translated into Portuguese, after two rounds, the EGPRN definition of multimorbidity, with a consensus score of 8.43 out of 9: *"A multimorbilidade é definida como qualquer combinação de uma doença crónica com pelo menos uma outra doença (aguda ou crónica), ou com um fator biopsicossocial (associado ou não), ou com um fator de risco somático. Qualquer fator biopsicossocial, qualquer fator de*

risco somático, a rede social, a carga das doenças, o consumo de cuidados de saúde e as estratégias de adaptação do doente podem funcionar como modificadores (dos efeitos da multimorbilidade). A multimorbilidade pode modificar os resultados em saúde e levar a um aumento da incapacidade, à diminuição da qualidade de vida ou à fragilidade."

The fourth and final study of this thesis (PAPER V), a web-based qualitative descriptive study, carried out in the first trimester of 2016, included 74 GPs from the districts of Coimbra and Aveiro. The sample was highly aware of multimorbidity and pointed out several difficulties and challenges in its management. Extrinsic factors were associated with the healthcare system logistics' management (consultation time, organization of care teams, clinical information) and society (media pressure, social/family support). Intrinsic factors related to the GP, patient, and physician-patient relationship were also stated. The fundamental characteristics of family medicine were pointed out as the tools to deal with the difficulties. Also, the complex care required by multimorbid patients needs an adequate consultation time, multidisciplinary teamwork, and more education/training. The clarity and usefulness of the EGPRN definition of multimorbidity was evident, as well as the added value of disclosing to the GPs the data of the first Phases of this thesis.

In conclusion, multimorbidity is a common and complex problem in primary health care in Portugal. The knowledge of its determinants and consequences, as described in this research project, may have an important role in improving the management of patients with multimorbidity.

The studies of multimorbidity frequently deal with the diagnosis of medical conditions, but one should never forget that GPs also deal with the burden of a person's suffering. Thus, one must dare to design future guidelines not just for the patient with multimorbidity, but mostly for the person with multimorbidity.

Keywords

Multimorbidity, chronic health problems, epidemiology, health-related quality of life, family support, unmet health needs, perceived experiences, primary health care, Portugal.

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List of Abbreviations

WHO   World Health Organization
SDGs   Sustainable Development Goals
UN   United Nations
WONCA   World Organization of Family Doctors
GP   General Practitioner
FP   Family Physician
NHS   National Health Service
EGPRN   European General Practice Research Network
COPD   Chronic Obstructive Pulmonary Disease
PPRNet   Primary Practices Research Network
NAMCS   National Ambulatory Medical Care Survey
BMI   Body Mass Index
IL   Interleukin
MM-PT   Multimorbidity in primary care in Portugal
HRQoL   Health-related quality of life
DGS   Portuguese Directorate General of Health
PES   Portuguese Social Emergency Programme

CHAPTER ONE | BACKGROUND

1 Background

"The good physician treats the disease; the great physician treats the patient who has the disease".

— Sir William Osler, circa 1900

1.1 From acute to chronic diseases

A major epidemiologic shift from predominant infectious and parasitic diseases to chronic conditions occurred in the twentieth century.[1] The control of infectious diseases, by means of better hygiene and sanitation, antibiotic use, and vaccination of children led to a decrease in infant and child mortality and an increase in life expectancy.[2] This epidemiological transition phenomenon was originally postulated by Omran in 1971.[3] One of the greatest examples of a global public health triumph was the eradication of smallpox in 1980, endorsed by the World Health Organization (WHO).[4,5] In the early 1950s smallpox killed more than 5 million people each year.[6]

According to the WHO's report *"World Health Statistics 2016: Monitoring Health for the Sustainable Development Goals (SDGs)"*[7] and the U.S. Census Bureau report *"An Aging World: 2015"*,[8] over the 16-year period from 2000 to 2015, global life expectancy improved by five years (reaching 73.8 years for women and 69.1 years for men),[7] and is projected to increase by almost eight years in 2050.[8] As a consequence of progresses in child survival, control of malaria and HIV treatment, the region with the biggest gain was Africa, with an escalation in life expectancy of 9.4 years.[7] Presently, 8.5 percent of people in the world are over 65 years of age.[8]

Chronic diseases, defined by the WHO as *"diseases of long duration and generally slow progression"*[9] and with a course that lasts or is expected to last for six months or more,[10] such as heart disease and stroke, took the position that was formerly occupied by diarrhoea, HIV, tuberculosis, neonatal infections and malaria, as major causes of death globally.[11]

In 2012, chronic diseases, mostly cardiovascular diseases, cancers, diabetes and chronic lung diseases (such as chronic obstructed pulmonary disease and asthma), were accountable for 68% of all deaths worldwide.[12] The proportion of deaths varies among countries' income groups, and although infectious diseases remain an important issue in the developing world, chronic diseases were responsible for the death of about 28 million people living in low- and middle-income countries (three quarters of the global chronic diseases deaths in 2012).[12]

Every year cardiovascular diseases and cancer claim the lives of more than 10 million people among those under 70 years of age.[7]

The European Region follows the same trend. Chronic diseases are responsible for most of the morbidity and for 86% of all deaths.[9,13] Eighty percent of older Europeans (65 years and older) suffer from chronic diseases, and this is also becoming more frequent at younger ages.[14]

In Portugal, more than 5.3 million residents aged 15 or over reported having at least one chronic disease in 2014.[15] Approximately 16% of the individuals between the ages of 15 and 64 have both chronic diseases and activity limitations.[16] Chronic diseases are also responsible for more than 80% of all deaths. Cardiovascular disease is the main cause of mortality (32%). In Portugal, the probability of dying between ages 30 and 70 years from chronic diseases is around 12%.[17]

Even though health is transnationally recognised as both an essential element of sustainable development[18] and an investment,[6] health-related gains continue to be uneven between developed and developing countries.[7] One way to balance the scales would be to achieve universal health coverage in all countries, which falls under Goal 3 – *"healthy lives and well-being for all at all ages"* – agreed in the General Assembly resolution 70/1 of the United Nations (UN).[19]

Universal health coverage aims to give people the *"health services they need without causing financial hardship"*[20] (p. 861) and it includes services for dealing with acute and chronic disease: illness prevention, treatment of disease, patients' rehabilitation and palliative care.[21] In this context, the mechanism that can best deliver a comprehensive and the needed care to populations is primary health care.[18,22]

Stigler *et al*[22] stated that the present is the ideal moment to steer the universal health coverage towards primary health care. The distinction of primary health care as an effective and efficient service, through health equity, is well-known.[23,24] Primary care prevents illness and death[23,25] (e.g. hospitalisation risk is greater for individuals without primary care[26]). In fact, even generic outcomes like life expectancy, all-cause age-adjusted mortality, self-reported health, and low birth weight are not inferior in primary care when compared to specialist care.[27] Barbara Starfield[24] pointed out the tools responsible for the positive health levels originated by primary care: i) universal financial coverage (government controlled/regulated); ii) equitable distribution of resources; iii) services' comprehensiveness; and iv) low or absent co-payments.

Although clinical outcomes are not directly linked to the number of health professionals,[24] effective skills are a requirement.[28] The World Organization of Family Doctors (WONCA),[29] described the core competencies of the general practitioner (GP)/family physician (FP) as: i)

primary care management; ii) person-centred care; iii) specific problem solving skills; iv) comprehensive approach; v) community orientation; and vi) holistic modelling.

Gillies and Freeman[30] indicated a similar broad and holistic perception of generalist care: *"medical generalists are doctors who see the widest range of health problems, manage the boundaries between illness and non-illness and between primary and secondary care - the latter being 'gatekeeping' - and practise a distinctive style of holistic medicine"*[30] (p. 725-6).

In a like manner, Ian McWhinney, considered to be one of the founders of family medicine, in his seminal work *A Textbook of Family Medicine*[31], identified the 9 principles that together constitute the distinctiveness of family physicians: i) committed to the patient (as a whole) and not to a specific body of knowledge, disease, or procedure; ii) seek to comprehend the context of the illness; iii) consider each consultation as a prospect for disease prevention and health promotion; iv) perceive their list of patients as a population at risk; v) see themselves as part of a communitywide patient support network; vi) preferably partake the same environment as their patients; vii) consult patients in their place of dwelling; viii) attach relevance not only to the traditional positivistic or objective aspects of medicine but also to subjective ones; ix) manage resources (as generalists and first-contact physicians).

While the principles of family medicine/general practice evolved over decades, there is still a lack of a uniform assessment.[32] A recent review[32] of prior scholarly work summarized five central principles that may be useful for clinical practice: i) compassionate care; ii) generalist approach; iii) continuity of relationship; iv) reflective mindfulness; v) lifelong learning.

Patients consult their GPs for both acute and chronic conditions,[33] they do it more often and at earlier stages of the disease than in secondary care.[34,35] In 2012, Portuguese GPs carried out 26 million consultations whereas secondary care was responsible for less than half.[36] This represents to some degree the importance of primary care in the health care system.

Portugal has a National Health Service (NHS) since 1979 and healthcare centres even since before that.[37] Primary care in Portugal is a good example of a comprehensive and essentially free health care system that has been extended to the full Portuguese population.[38,39] In fact, *"it is one of the pillars on which the public health system rests"*[39] (p. 826). In the last four decades primary health care in Portugal underwent various reforms,[40] the most recent being the creation of small independent functional units - Family Health Units.[39,41] They represent a collaborative working arrangement between multi-professional teams – GPs, nurses and clinical secretaries – who work together to provide close care to patients and their families.[37,39] Family Health Units have more autonomy regarding organizational, functional and technical aspects; a new payment scheme; and are integrated in network with other primary care units.[37,41] Patients can choose between Family Health Units and traditional healthcare centres (49.4% were listed in Family Health Units in 2014).[37] Patients not listed in

Family Health Units receive care in the traditional health care centres.[37] GPs working in primary care in Portugal offer the following: *"general medical care for the adult population; prenatal care; children's care; women's health; family planning and perinatal care; first aid; certification of incapacity to work; home visits; preventive services, including immunization and screening for breast and cervical cancer and other preventable diseases"*[42] (p. 100).

In the long run, as stated by McWhinney[31] around thirty years ago and even truer today than it ever was: *"Rather than dealing with acute life-or-death situations, therefore, today's practitioners are more likely to find themselves helping patients to achieve a new equilibrium with their environment in the face of chronic illness and disability."*[31] (p. 4).

1.2 Chronic diseases: "comorbidity" versus "multimorbidity" in primary care – why definition matters?

Medical terminology when used properly provides efficient communication between professionals, while minimizing the potential for misunderstandings and errors. Terminology is paramount for clinical care, epidemiology, and health services research.[43]

As the prevalence of chronic diseases increases,[44,45] the clarity of the terminology for multiple concurrent diseases becomes of vital importance.[46,47] GPs focusing on the person and not on a specific disease are the principal stakeholders dealing with patients with multiple diseases. An average of three problems are managed by GPs in each consultation.[48]

The presence of various expressions in the literature to describe the coexistence of several diseases (e.g. comorbidity, multimorbidity, polymorbidity, polypathology, pluripathology, multipathology, multicondition) produced a collection of ambiguous or inconsistent practises,[46,49] which led to unclearness and incomparability of studies' results with negative implications for both researchers and physicians.[50]

Classically, coexisting diseases have been described by Alvan Feinstein's 1970 definition of comorbidity: *"in a patient with a particular index disease, the term co-morbidity refers to any additional co-existing ailment"*[51] (p. 467). Therefore, comorbidity should be used when referring to the presence of one or more additional diseases co-occurring with an index or primary disease[50] (Figure 1).
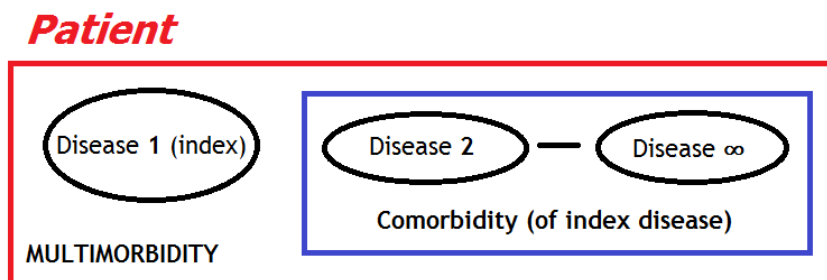
Figure 1. Multimorbidity and comorbidity. Source: adapted from Valderas *et al*[43]

In the medical literature, comorbidity is a prolific term. Between 1970 and 2012, comorbidity was used in more than sixty-seven thousand papers indexed in the MEDLINE database.[46] Be that as it may, comorbidity lacks specificity since it has been used in contexts with and without reference to an index disease.[47]

Research into multimorbidity does not have a long history. In 1996, van den Akker *et al*[50], supported by previously published German authors, suggested the use of the construct multimorbidity when no index disease is under study.[49] Currently, this concept is achieving pronounced support. Between 2009 and 2015, publications in the MEDLINE database using the term multimorbidity increased by a factor of 11, and when used it is more specific for the coexistence of several diseases in one person.[47] Importantly, the concept of multimorbidity gains more pertinence in primary care settings where the usefulness of defining a primary or index disease is not obvious.[43,49] On the contrary, comorbidity was established within the disease-oriented background of specialist care. GPs encounter a broad spectrum of diseases in their daily clinical care, while most specialities focus on a small number of organ systems.[52,53] Primary care philosophy is truly distinct from that of the specialist. Reeve[54] defines it as a *"Practice which is person, not disease, centred; continuous, not episodic; integrates biotechnical and biographical perspectives; and views health as a resource for living and not as an end in itself"* (p. 521).

Multimorbidity, on the contrary of comorbidity, recognizes that in each individual, chronic diseases overlap, interact, vary by severity and that a single disease does not remain the patients' dominant problem over time.[55,56] In multimorbidity each health problem is important and none of them takes precedence over the other.[57]

A recent literature review[46] found that multimorbidity is most commonly defined as *"the presence of more than one or multiple chronic or long-term diseases or conditions"* (none considered as an index disease). Although this definition does not comprise acute conditions,

some authors defend that it should include the whole range of diseases afflicting patients, since the patterns of recurrence of some acute conditions makes them behave as if they were chronic.[58] Others argue that limiting the definition to only long-term diseases or conditions is more advantageous since it is the prolonged period of disease that causes the increment of co-occurring conditions within patients.[49]

Although it may be simple to operationalize multimorbidity as the presence of two or more chronic conditions within an individual, a research team from Europe - European General Practice Research Network (EGPRN) – recently designed an holistic, comprehensive and enhanced definition of multimorbidity for the primary care settings, based on a systematic review: *"any combination of chronic disease with at least one other disease (acute or chronic) or biopsychosocial factor (associated or not) or somatic risk factor. Any biopsychosocial factor, any risk factor, the social network, the burden of diseases, the health care consumption, and the patient's coping strategies may function as modifiers (of the effects of multimorbidity)"*[59] (p. 321). EGPRN concept of multimorbidity was subsequently confirmed and enriched by GPs of several European countries (Bulgaria, Croatia, France, Germany, Greece, Italy and Poland).[60]

Furthermore, some authors presented a clinical definition of multimorbidity as *"a state by which the clinician along with the patient and/or the family faces the multiplicity of long-term conditions experienced by the patient"*[49] (para. 8). For Sturmberg it is *"the end result of ongoing perturbations and interconnected activities of simpler substructures that collectively constitute the complex adaptive superstructure known as us, the person or patient"*[61] (p. 509).

Multimorbidity is also complex to measure, with no standardized instrument available.[62,63] Lefèvre *et al*[57] summarized four major measures of multimorbidity: i) simple counts of chronic conditions (from a list of individual conditions); ii) grouping chronic conditions (by dyads or triads); iv) using indices (e.g. the Charlson Index[64] and the Cumulative Illness Rating Scale[65]).[57] Remarkably, simply counting the number of conditions is the most commonly used method and can have a good performance when compared to more complex measures.[57,63] The simple count of conditions may also be appropriate for predicting healthcare utilisation.[66]

Even though multimorbidity is heterogeneous in its definition and measure and no doubt needs further study,[67] the use of the concept of multimorbidity represents more than a simple semantic change. Since *"terminology used in healthcare-related literature has been shown to reflect not only the knowledge of the practitioners, but also their beliefs and attitudes regarding patient care"*[68] (p. 161), the transition from comorbidity to multimorbidity signifies a change of paradigm from a technology-dominated agenda and disease-oriented to a patient-centred care, tailored to each individual's needs. Today there is renewed attention

on patients as the hearts of healthcare. Healthcare planning, delivery and funding are increasingly taking into consideration patients' needs and priorities.[69]

1.3 Multimorbidity, the patient, and the healthcare system

There are many well-written published case reports regarding patients with multimorbidity.[49,70-72] Case reports are considered to be important educational tools and a source for scientific hypothesis generation.[73]

One illustrative example is given that of a 78-year-old woman with a previous history of myocardial infarction, type 2 diabetes, osteoarthritis, Chronic Obstructive Pulmonary Disease (COPD) and depression.[70] How common are patients like this with multiple chronic conditions seen in primary care settings? How many times in his typical day a GP asks himself: how am I going to use a standardized treatment plan focused on controlling diabetes alone in patients like this with multiple chronic conditions? This accurately reflects the "real world" of primary care today. There is no survivor's guide for GPs dealing with patients with multimorbidity.

In order to best care for patients with multimorbidity, it is important to start a research agenda.[74] Multimorbidity is a complex, intricate and overwhelming subject and to gauge the demands of its study one needs to start even when one does not know where to begin.

1.3.1 Prevalence of multimorbidity

In every country, in every part of the world, people are ageing, and in an expectable manner multimorbidity represents the norm rather than the exception.[44] Multimorbidity is a global phenomenon,[75] present in low, middle, and high-income countries.[76]

Western literature on the prevalence of multimorbidity has highlighted that, when considering the whole population, 20 to 30% of the individuals are multimorbid, and it can rise up to 98% when only elderlies are studied.[77] In the Eastern world, one-third of the adults in Indonesia live with multimorbidity,[78] reaching up to 83% in South Asia,[79] depending on the series.

Multimorbidity is not only an issue of old age since it is also found in younger individuals[74,80-82] (e.g. multimorbidity was present in 69% in 18–44 year olds, 93% in 45–64, and 98% in patients aged 65 and over seen by GPs in a Canadian study by Fortin *et al*[44]). Agborsangaya *et al*[83] reported that 70.2% of the people with multimorbidity were aged less than 65 years. In fact, it has been suggested that age can only explain between 20 to 50% of the increase of multimorbidity.[84]

There are a number of studies which illustrate the widespread increase of multimorbidity:

- From 2003 to 2009 there was a 40% increase in the prevalence of multimorbidity among individuals aged 0-105 years living in Ontario, Canada (17.4% in 2003 to 24.3% in 2009).[85] In 2011-2012, 12.9% of adult Canadians had two or more chronic conditions.[86]

- In Taiwan, multimorbidity increased in prevalence from 9.6% to 17.1% in a ten-year period, 2000–2010.[87]

- In South Africa, the prevalence of adults with multimorbidity increased from 2.73% to 2.84% between 2008 and 2012.[88]

- In 2014, one in four adults in the United States had two or more chronic conditions,[89] with no significant decrease compared to earlier years. In 2010, 21.1% had two to three chronic conditions and 4.9% had four or more.[90] By 2030, 50% of the United States population will suffer from one or more chronic conditions.[91]

Prevalence of multimorbidity vary widely between studies; the geographic settings, the recruitment method and sample size, data collection, and the number of diagnoses considered in the definition of multimorbidity are some of the appointed reasons for the variability encountered.[92] Thus, the generalisability of much published research on this topic is problematic.

Patients attending primary care are more frequently multimorbid and have a higher disease burden than the general population, which makes primary care settings ideal for resource allocation studies and planning.[93] For example, a nationally representative Australian multimorbidity study by Harrison *et al*[94] (consisting of 8.707 patients at encounters with 290 GPs in 2008-09) showed that almost half of the patients at GP encounters had multimorbidity versus only one-third in the general population. And emergency general surgical patients (aged over 65 years) admitted to the hospital have even higher rates, for instance.[95]

In recent years, there has been an increasing amount of literature regarding the prevalence of multimorbidity in ambulatory settings:

- In the Nijmegen primary care research network study (Netherlands),[45] in a register with approximately 13.5 thousand patients, the proportion of individuals with four or more chronic diseases increased 300% between 1985 and 2005.[45] In the analysis performed by Westert *et al*[96] in 2001 of the Netherlands Health Interview Survey data (1990–1997) with 13.806 Dutch patients aged 16 and older seen by GPs, almost one-fifth was multimorbid.[96] A similar percentage (29.7%) was reported by van den Akker *et al*[52] in 1998.

- In the Primary [Care] Practices Research Network (PPRNet) Study,[97] which analysed 148 primary care practices across the United States with 667.379 active adult patients as of October 2011, multimorbidity was present in 45.2% of the sample. Two years earlier, the National Ambulatory Medical Care Survey (NAMCS) 2009, reported that 37.6% of the 326 million physician office visits were made by multimorbid adults aged 18 years or older.[98]

- The English retrospective cohort study by Salisbury *et al*[99] in 2011, with almost 100 thousand individuals aged 18 years and older listed with 182 general practices, observed a prevalence of multimorbidity of 14% or 56%, depending on the measure method.

- In the 2012 Scottish study by Barnett *et al*,[100] comprising of nearly 1.8 million patients seen in 314 medical practices, 23.2% of the patients were multimorbid (around 65% of those aged more than 65 years and almost 82% of those aged 85 years or more had multimorbidity).

- The cross-sectional Spanish multimorbidity study by García-Olmos *et al*[101] (consisting of nearly 200 thousand patients aged over 14 years seen by GPs) found that 24.5% of the population was multimorbid.

- In Portugal, a 2002-2003 study concerning the "comorbidity" of four chronic diseases (asthma, hypertension, diabetes, and cardiac ischaemic disease), in the Lisbon and Beja regions, found a prevalence of 26.6% of two or more of these diseases.[102]

A recent systematic literature review that included approximately 70 million patients in 12 countries, identified a multimorbidity prevalence ranging between 12.9% and 95.1% in primary care settings.[103] The number of health problems considered in the studies may be the most important factor in estimating prevalence (the greater the number, the greater the occurrence of multimorbidity).[92]

Even though the prevalence of multimorbidity is expressively higher than that of single diseases that are considered to be common in the population (e.g. asthma, hypertension, and diabetes), the number of research studies regarding multimorbidity, especially in primary care settings, is still small and insufficient.[104]

1.3.2 Aetiology and potential biomarkers of multimorbidity

Multimorbidity is a distinct clinical entity in its own right and it is the most common chronic condition of all.[105,106] However, the aetiology of multimorbidity is not completely known and is most likely multifactorial.[107]

In the study conducted by Wikström *et al*,[108] a ten-year follow-up of population-based cohorts in Finland (1982–2012), was shown that the predisposing factors for multimorbidity were smoking habits, physical inactivity, and Body Mass Index (BMI). Overweight/obesity and physical inactivity were likewise associated with the development of patterns of multimorbidity among a sample of 4896 mid-aged women from the Australian Longitudinal Study on Women's Health.[109]

In another study by Fabbri *et al*[110] a greater increase of multimorbidity was associated not only with obesity, but also with the loss of weight in obese older adults.[110] This same author in two others studies indicated that excessively elevated resting metabolic rate was associated with multimorbidity,[111] and so it was the higher baseline levels and steeper increase over time of the inflammatory marker – Interleukin (IL)-6.[112]

A number of studies have postulated a convergence between multimorbidity and i) inflammation;[106,113,114] ii) diminished cell-mediated immune response;[115] iii) low levels of vitamin D;[116] iv) childhood disorders;[117,118] and v) a recent theme - existential unease.[107]

Some of the potential aetiological factors of multimorbidity represent new areas of study, but many are relevant for primary healthcare, since they pinpoint areas of possible tailored approaches by GPs to effective prevent and manage multimorbidity. Many chronic health problems are the result of behaviours that may be preventable. It is worth to note that a previous Australian study revealed important management gaps in GP interventions aiming lifestyle risk factors,[119] increasing the burden of chronic diseases and multimorbidity.

A note of caution is due here. In some cases, the treatment of risk factors has public health benefits but in others the medicalisation of risks as diseases is not cost-effective nor necessary, and can even result in harm.[120] This is also true when ordinary ailments are transformed into medical problems, mild symptoms into serious, and when personal problems are treated as medical conditions - these are usually named as disease mongering,[121] or *"selling of sickness that widens the boundaries of illness"*[122] and expands the drug markets.[120]

Although the terms disease, illness, and sickness are usually used interchangeably, they have different meanings.[123] Disease is a state of physiological and psychological dysfunction manifested by symptoms and signs, confined to the patient, and diagnosed by a physician. Illness is a subjective state and reflects the individual's experiences of ill health, it is also confined to the patient. Sickness is a state of social dysfunction, in relation to the role the

individual takes or is given in society.[123-125] The social and cultural conceptions of ill health shape the perception and presentation of symptoms by the individuals.[125]

Wikman *et al*[123] described some dimensions of ill health that constitutes its complexities: i) each person's state of health is defined by the individual or by the physician?; ii) severity of the condition (consequences for the individual and his or her coping mechanisms); iii) temporal aspects of the condition (acute, recurring, chronic); iv) consequences for the person's role in society.[123]

Governments, physicians and patients all together should come into play to work at avoiding disease mongering.

1.3.3 Determinants of multimorbidity

Data from several sources have identified older age, female sex and lower socioeconomic status as determinants of multimorbidity.[77,103]

Multimorbidity is commonly considered as a condition of older age;[49] and from this principle it is an understandable observation that many multimorbidity studies regard the elderly patient.[57] Even so, the absolute number of individuals with multimorbidity is higher in those bellow 65 years.[100,126]

In a Dutch general practice population, van den Akker *et al*[32] reported that the one-year occurrence of multimorbidity was linked to increasing age, in addition to other factors; with a multimorbidity prevalence of 78% in patients aged 80 years and older. A systematic review of Western prevalence studies on multimorbidity by Fortin *et al*[32] found that at age 75 multimorbidity may be as prevalent as 98.5% in primary care and 71.8% in the general population (Figure 2).
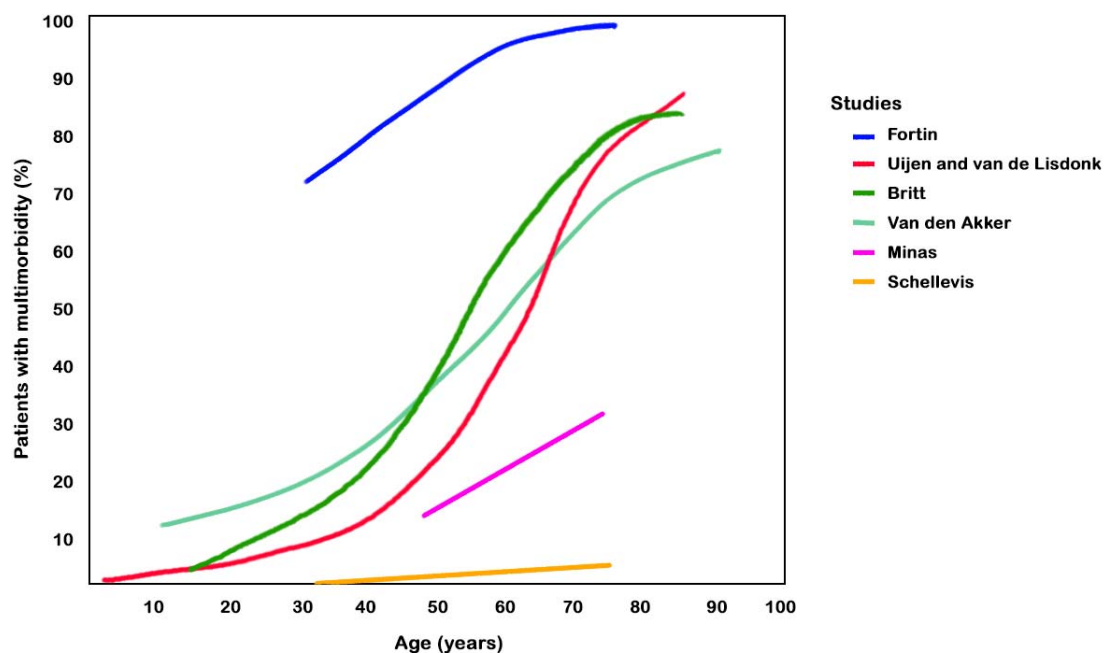
Figure 2. Multimorbidity in primary care: age. Source: adapted from Fortin *et al*[92]

According to some studies,[78,127-130] increasing age is related to the occurrence of multimorbidity not only in Western countries but also in underdeveloped and developing ones, consequence of the rise in life expectancy. In contrast, the change in lifestyle and accumulation of risk factors for chronic diseases are responsible for an increase in the prevalence of multimorbidity in young adults in low and middle-income countries.[75]

Female sex, advanced age, lower income, and having incomplete high school education were associated with multimorbidity in the general adult Canadian population.[86] Similarly, in a Swedish study by Marengoni *et al*[131] advanced age, female sex, and lower education were also linked with an increased risk for multimorbidity. On the other hand, a systematic review of the literature by the same author indicated that a large social network may protect against multimorbidity.[77]

Women are more likely than men to *"suffer from poor health not in spite of living longer, but because they live longer"*[132] (p. 12).

One study conducted by Orueta *et al*[133] in the Basque country showed that the prevalence of multimorbidity is higher in deprived than in more affluent areas. Individuals living in socioeconomic deprived areas are more likely to develop multimorbidity sooner than those living in most affluent areas (e.g. in Scotland, 10-15 years earlier) (Figure 3).[86,100] Multimorbid patients in deprived areas have a higher prevalence of depression, drugs misuse, anxiety, dyspepsia, pain, coronary heart disease, and diabetes.[134]
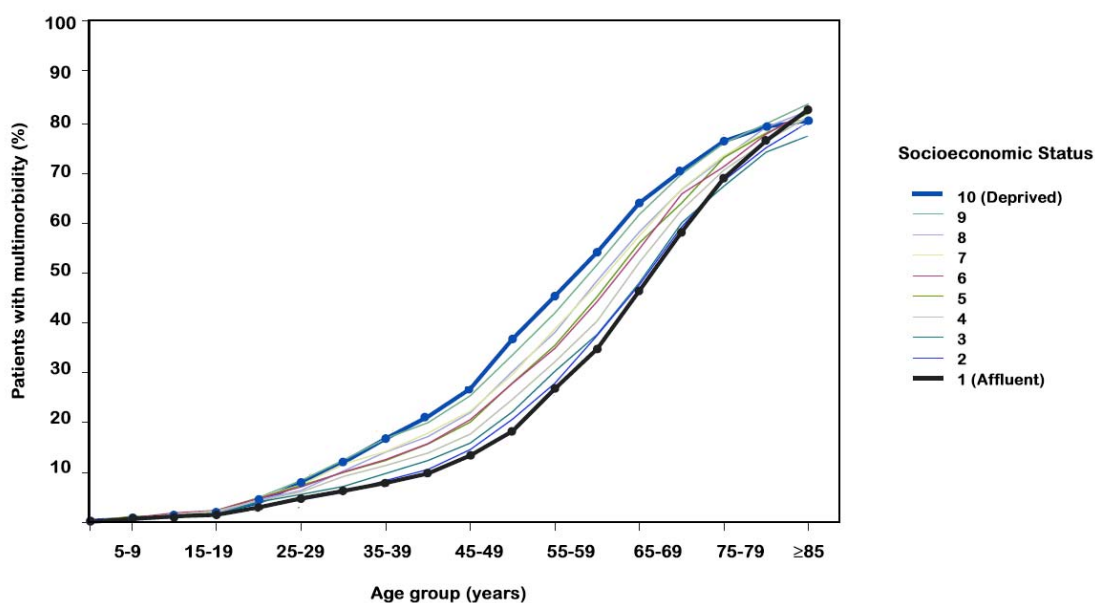
Figure 3. Multimorbidity: socioeconomic deprivation. Source: adapted from Barnett *et al*[100]

Although in a less consistent manner, multimorbidity may also vary by ethnicity/race. North American studies[126,135] showed that the prevalence of multimorbidity was higher in Blacks compared with Whites, and that Mexican and Asian Americans may have an even lower prevalence.

Further, in a geographically defined United States population, Asian Americans had lower mixed physical and mental multimorbidity relative to White Americans.[136] The coexistence of chronic mental health conditions with somatic conditions is aggravated by deprivation.[134]

1.3.4 Patterns of multimorbidity

Multimorbid patients suffer from chronic conditions that co-occur non-randomly within the same individual.[137,138] The identification of patterns of multimorbidity can be useful in clinical practice. For example, with the improvement of clinical guidelines by including common combinations of chronic conditions seen by GPs.[70]

Some combinations of conditions, such as those with dementia (dementia–hip fracture, dementia–cerebrovascular disease, and dementia–depression) are associated with higher disability.[139] And other combinations, for instance the respiratory and cardiac have a synergistic negative effect on health-related quality of life.[140] Thus, paying attention to single

diseases is not enough and there is the need to centre the care on the patient and the correlations of co-existing conditions.[141]

Piette and Kerr[142] developed a classification of chronic conditions that is not only useful for research purposes,[143] but also valuable to comprehend the common combinations of chronic conditions and their management. For these two authors, some conditions are concordant, because they are related by a common pathogenic risk and are managed similarly (e.g. diabetes, hypertension, coronary artery disease, and peripheral vascular disease), and other conditions are discordant, because they do not share the same pathogenesis or management (e.g. diabetes, chronic low back pain, prostate cancer, and asthma). Therefore, for both GPs and multimorbid patients, it is potentially more difficult to deal with discordant conditions that, intrinsically to their definition, do not have a synergistic management plan, than to deal with co-existing concordant conditions.[144]

Violan et al[103] reviewed a large number of studies on the topic of patterns of multimorbidity in primary care and found some consistency across studies on some clusters: i) cardio-metabolic conditions; ii) anxiety and depression; iii) pain (sometimes associated with anxiety and depression). The most frequent patterns found were osteoarthritis with cardiovascular and/or metabolic conditions.[103] Patients with the anxiety, depression, somatoform disorders and pain cluster are frequently females and those who suffer from cardiovascular and metabolic diseases are males.[145]

Representative population-based data from nine countries (Finland, Poland, Spain, China, Ghana, India, Mexico, Russia, and South Africa) regarding noninstitutionalized adults older than 50 years were analysed by Garin et al[76] and some epidemiologic patterns of multimorbidity have emerged across countries: cardio-respiratory (angina, asthma, and chronic obstructive pulmonary disease), metabolic (diabetes, obesity, and hypertension), and mental-articular (arthritis and depression).

In Italy, a recent population-based study by Lenzi et al[146] that included just about 1.4 million individuals, found five multimorbidity patterns: i) psychiatric disorders; ii) cardiovascular, renal, pulmonary and cerebrovascular diseases; iii) neurological diseases; iv) liver diseases, AIDS/HIV and substance abuse; and v) tumours. However, it should be mentioned that, the clusters found by Lenzi et al[146] may change if primary care data was included, which was not the case.

Since there is no standardization of the definition and assessment of multimorbidity, not only the prevalence (discussed in a previous section) but also the patterns of multimorbidity vary across the literature.[103,147]

Multimorbidity is a public health problem that needs to be increasingly addressed.[137] The study of the patterns of multimorbidity is of patent relevance. As eloquently stated by

Goodman *et al*[143] *"research on combinations of chronic conditions can help in developing approaches for improving delivery of clinical services to those persons who are in greatest need, thereby mitigating risk of harm and optimizing attainment of desired health outcomes despite the presence of clinical complexity"*[143] (p. 219).

1.3.5 Impact of multimorbidity on individuals and healthcare systems

In a well-known 2007 BMJ editorial, Fortin *et al*[148] listed some poor outcomes associated with multimorbidity. These are (including other sources of data):

- Decreased health related quality of life. There is an inverse relationship between multimorbidity and quality of life;[149] the greater the number of chronic conditions, the lower is the quality of life.[150,151] Patients with neurological problems, mental health problems, arthritis and long-term back problems have worse quality of life.[152]

- Psychological distress / mental health problems. Patients with multimorbidity are more likely to experience negative emotions about their lives and to have higher psychological distress.[153] Higher levels of depression are present in the individuals with more health conditions.[154] The coexistence of depression and physical multimorbidity increases the burden of disease.[155] This will further compromise the capability of the multimorbid patient to self-manage co-existing conditions.[156]

- Longer hospital stays and other poor hospital outcomes such as higher mortality, use of services, and average cost.[64,157] In 2009, the United States Nationwide Inpatient Sample, showed a higher mortality in patients discharged with four and more chronic conditions versus adults with one or none conditions (3.1% vs 1.9%), it was also observed a longer hospital stay and a 9% higher cost per discharge.[157] It is worth mentioning that higher rates of mortality are present in patients with more conditions, independent of age group.[49] A high number of hospital appointments are in part the consequence of multimorbid patients seeing multiple secondary care specialists.

- Complex self-care needs. Multimorbid patients feel a huge burden regarding their self-care.[158] They fear the loss of independence and to become a burden to family and friends.[91] They experience competing demands, self-care for one condition may be hindered by symptoms, treatment, or lifestyle advice of another condition.[158] Some conditions have such a dominant effect that it interferes with the care of the other conditions.[158]

- Challenging organisational problems (accessibility, coordination, consultation time). Recent reports showed that individuals with multimorbidity suffer from poor communication with and between health professionals, lack of coordination among providers, and long waiting times for health services.[159] The same current fixed consultation time for each patient is considered to be insufficient when taking into consideration the complexity of the individual with multimorbidity.[160]

- Increased use of emergency facilities. Multimorbidity is related with unplanned hospital admissions (which includes potentially preventable ones), and the risk increases when mental health problems coexist with socioeconomic deprivation.[161] Patients with five or more chronic conditions have ten times more risk of hospitalisation than individuals with no conditions.[91]

- Polypharmacy. Multimorbid patients use multiple medications, they account for two-thirds of all prescriptions filled.[91] In a Scottish primary care population study,[162] 20.8% of the patients with two conditions (multimorbidity) had four to nine medications. The more chronic conditions a person has, the higher the number of additional medications.[162] Polypharmacy adds to the complexity of care with numerous medications with varying dosing schedules, adverse drug reactions and financial burden[49] (including out-of-pocket expenses[91]). Data from 2004 shows that in the United States the average annual prescription cost per person was $75 for those without a chronic condition, $1147 for those with two, $1835 for those with three, and $3799 for those with five or more.[91]

- Difficulty in applying guidelines. Clinical guidelines have the potential benefit of allowing patients with similar conditions to be treated identically, independently of the patients' location or carer.[163] However, current guidelines are single-disease focused and their evidence comes from highly selected individuals or subsets of the population,[70] excluding patients with multimorbidity.[100] A recent review[164] of Evidence-Based Guidelines found that they do not offer sufficient recommendations on patients with co-existing conditions (mean three recommendations per guideline, range 0 to 26), and that these recommendations are based on a small number of low to moderate-quality evidence.[164]

- Fragmented, costly, and ineffective care. A 2014 Dutch study found a higher use of general practice services by multimorbid patients 55 years and older with two or more chronic diseases versus patients with one chronic disease (18.3 vs 11.7 contacts in a year).[165] In the United States, patients with five or more chronic conditions see an average of fourteen different physicians per year.[91] With each additional condition there is a significant increase in health care services utilisation and costs.[166] United States data indicates an average per capita health care spending of $994 for those

without a chronic condition, $5062 for those with two, $7381 for those with three, and $16819 for those with five or more.[91] Without coordination multimorbid patients often receive care that does not address all of their needs or is inappropriate: duplicate testing or omissions, conflicting treatment advice, and contraindicated or duplicated prescriptions.[49,91]

1.3.6 Multimorbidity and clinical care

Most of the adult patients in GPs' daily practice have multimorbidity. Traditionally, guidelines and evidence-based medicine are mostly unsuccessful in helping GPs making decisions for this specific population of patients. A 2016 Cochrane review[167] revealed the small number of randomized controlled trials in multimorbidity and their mixed results. This systematic review did not find an evident improvement regarding: *"clinical outcomes, health service use, medication adherence, patient-related health behaviours, health professional behaviours or costs"*[167] (p. 3). Remains the need for well-designed and large-scale intervention studies.[167]

In 2008 Bayliss *et al*[168] published a proposition of an ideal process of care, taking into consideration the beliefs of elderly multimorbid patients, that consisted of: i) easy access to providers (telephone, internet or in person); ii) clear communication of care plans; iii) continuity of the relationship of care; iii) single care coordinator that is caring, listens to their patients and understands their unique needs and can prioritize their competing demands.[168]

The 2016 NICE guideline [NG56] *Multimorbidity: clinical assessment and management*[169] addresses some of the clinical care issues and proposes the following approach: i) tailor the approach to care; ii) focus on the interactions between the conditions and the treatments and their consequences on quality of life; iii) focus on the patient's individual needs, preferences for treatments, health priorities, lifestyle, goals, values and priorities (disease and treatment burden); iv) focus on benefits and risks of following single-disease focused recommendations; v) agree an individualised management plan with the person (including future goals and plans, who is responsible for coordination of care, who communicates the individualised management plan to all involved, timing of follow-up and how to access urgent care).[169]

Briefly, when treating multimorbid patients GPs should never forget the patient's characteristics and preferences, should define clear objectives for each consultation, periodically review the treatment objectives, pay attention to pharmacological interactions, and ultimately carefully evaluate each therapeutic attitude.

To sum up all that was previously said, as the population ages it is important to evaluate the prevalence of multiple chronic conditions, the patterns of disease and the effect on health related quality of life.

CHAPTER TWO | AIMS AND RESEARCH METHODS

2 Aims and research methods

PAPER I

Paper I is a description of the aims and methods of the research project of this doctoral thesis, divided in three Phases. The paper was published in BMJ Open in 2014.

The supplementary material of this research project is available in the Appendix section.

BMJ Open Multimorbidity in primary care in Portugal (MM-PT): a cross-sectional three-phase observational study protocol

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ABSTRACT

Introduction: Multimorbidity is defined as the co-occurrence of more than one chronic disease in one person without assigning an index disease. This rapidly increasing phenomenon markedly influences patients' overall health, has major implications for effective provision of healthcare services and has a significant economic toll on individuals and society. Since Portugal is a country with a growing ageing population, a better understanding of the role of multimorbidity should be assessed. The aim of this study is to further the knowledge of the epidemiological factors associated with multimorbidity in Portugal, chiefly its prevalence and the health and social implications.

Methods and analysis: This study protocol describes a primary care nationwide three-phase study. The first phase is drawn to access the prevalence and patterns of multimorbidity. In the second phase, individual parameters are assessed, such as patients' health-related quality of life, perceived family support and unmet health needs of patients with multimorbidity. The third and last phase of this study aims to characterise general practitioners' knowledge, awareness and practices related to multimorbidity management.

Ethics and dissemination: The study will be conducted in accordance with the principles expressed in the Declaration of Helsinki. It has full approval from the Ethics Committee of the Faculty of Health Sciences, University of Beira Interior, and the Ethics Committee of the Central Health Region of Portugal. Study results will be published in peer-reviewed journals and presented at national and international conferences.

INTRODUCTION

Multimorbidity is defined as the co-occurrence of more than one chronic disease within one person without assigning an index disease.[1][2] It is known that prevalence of multimorbidity increases with age,[3] reaching over 90%.[4] Nevertheless, variations in prevalence of more than 60% have been reported between studies. These estimated differences may be due to sampling bias, period of collection and data source and also due to the broad definition of chronic diseases.[5]

Multimorbidity has been previously described by Martin Fortin as the rule and not the exception in primary care settings,[3] where general practitioners (GPs) manage not only the acute but mostly the chronic conditions of their patients,[6] which are often multiple.[7]

Taking into account only disease-specific recommendations can lead to a considerable treatment burden for patients with multimorbidity.[8] This in turn raises several other issues such as low compliance,[9] treatment ineffectiveness[10] and high treatment costs.[11]

Multimorbidity is also associated with lower life expectancy,[12] higher hospital admissions[13] and longer hospital stays.[14] Quality of life,[15] physical functioning[16] and psychological health[17] are also negatively affected by multimorbidity.

Chronic diseases represent a significant cause of mortality and morbidity worldwide[18] and their increasing prevalence[19] has a significant impact on patients' health and use of healthcare services.

Multimorbidity is, therefore, a subject which is rapidly becoming of great importance in primary care settings, with a pressing need for a better understanding of this phenomenon from multiple perspectives. This work aims to further the knowledge of the epidemiology of multimorbidity, regarding its prevalence and morbidity. Importantly, this will be the first study raising awareness of multimorbid conditions in adult population attending general practice in Portugal.

Terminology

For the purpose of defining multimorbidity, we will use the list of chronic conditions[20] compiled by the Family Medicine Research Centre (FMRC), University of Sydney, available online at http://sydney.edu.au/medicine/fmrc/classifications/DefiningChronicConditions.pdf.

This list represents 147 ICPC-2 (International Classification of Primary Care) rubrics.

Study objectives

The primary objective of the study described in the protocol is to determine the prevalence of multimorbidity, quality of life, family support and unmet health needs of adult patients with multimorbidity attending primary care in Portugal.

Specific objectives are to:

▶ Describe the sociodemographic and clinical profiles of patients with multimorbidity in Portugal;
▶ Characterise the unmet health needs of Portuguese patients with multimorbidity;
▶ Evaluate the impact of multimorbidity on patients' health-related quality of life;
▶ Assess family support to patients with multimorbidity in Portugal;
▶ Analyse the relationship between multimorbidity, patients' health-related quality of life and family support;
▶ Describe Portuguese GPs' knowledge, awareness and practices related to the management of multimorbidity.

METHODS AND ANALYSIS
Study design

The study consists of three phases:

1. Cross-sectional, analytical study of the prevalence and patterns of multimorbidity in the adult population attending primary care in Portugal.
2. Cross-sectional, analytical study of patients' health-related quality of life, self-perceived family support and unmet health needs of adult patients with multimorbidity attending primary care in Portugal.
3. Descriptive before–after study of Portuguese GPs' knowledge, awareness and practices regarding multimorbidity and its management.

Phase I: prevalence of multimorbidity in the adult population attending primary care in Portugal
Design

Cross-sectional, analytical study.

Setting

Primary Care Centres in mainland Portugal will be randomly selected from the five Portuguese Healthcare Administrative Regions in order to obtain a national geographical representative sample.

Sample size

Since the prevalence of multimorbidity varies greatly across research literature and there is no available estimate for Portugal, a prevalence of 50% was assumed in order to maximise the sample size. For the study to be able to estimate a 95% CI for the prevalence of multimorbidity with a maximum precision error of 2.5%, a total of 1500 patients should be recruited (Epidat 4.0—

Organización Panamericana de la Salud, Washington, DC, USA).

Study procedures

This phase of the study is expected to start in October 2013.

A two-step selection approach, based on the work of Fortin et al,[3] will be followed. First, GPs will be contacted and those who accept to participate will recruit their own patients. Assuming that a GP will be able to include at least 10 patients in a 3-week period, a total of 150 GPs has to be enrolled in the study. Considering a 30% invitation response rate, a total of 500 GPs should be invited to participate in the study: 182 in North (36%), 117 in Centre (23%), 139 in Lisbon-Tejo Valley (28%), 38 in Alentejo (8%) and 22 in Algarve (4%) in accordance with the distribution of the Portuguese adult population (18+ years) across the five mainland Portuguese Healthcare Administrative Regions.

The GPs to be invited will be randomly selected from an alphabetically ordered list prearranged per Healthcare Administrative Regions, using a random number generator (Independent Random Sampling).[21]

Enrolled GPs will be instructed to invite all adult (≥18 years) patients attending to the primary care consultation to participate in the study during 3 days on three consecutive weeks (Tuesday on week 1; Wednesday on week 2; and Thursday on week 3). Participants willing to participate in the study must give written informed consent and present willingness and ability to comply with the study requirements. Participants will be excluded if they are acutely unwell or refuse to participate.

Data collection

GPs will be responsible for collecting all data about each patient during their consultations and through the completion of a paper questionnaire developed specifically for this study. The patient's morbidities will be captured by GPs, using their knowledge of patient's history, patient's self-report and electronic and/or paper medical records of the patient. Morbidities will be collected using the ICPC-2 codes or the International Classification of Diseases—10th version (ICD-10), which are currently being used in Portuguese Primary Care Centres.

The personal information section of the Portuguese version of the EASY-Care questionnaire[22] will be used to collect patients' social and demographic characteristics, namely gender, age, residence area, current marital status, number of years of formal education, living arrangements, professional status and self-perceived economic status through the question 'In general how do your family finances work out at the end of the month?'.

Data will be electronically stored in a database specifically designed for this study using MS Access 2010. Data will be encrypted and password protected. Information

will be treated in strict confidentiality to protect the privacy of patients.

Paper copies of all informed consents will be retained in a locked file, separate from any study data.

Statistical analysis

A descriptive analysis will be performed to all study variables, namely the number of valid observations, mean, SD, median and range for quantitative variables and absolute and relative frequencies for qualitative variables. Prevalence of multimorbidity (considering two definitions: ≥ 2 or ≥ 3 diseases) will be calculated together with corresponding 95% CI. Moreover, the prevalence of multimorbidity will be estimated by subgroups, namely gender, age, residence area, current marital status, the number of years of formal education, living arrangements, professional status and self-perceived economic status. Univariate analysis will be conducted to study the associations between those characteristics and multimorbidity using χ^2 test (qualitative characteristics) or t test/Mann-Whitney (quantitative characteristics). Multiple logistic regressions will be carried out considering the presence of multimorbidity as the dependent variable and patients' characteristics as the independent variables in order to calculate ORs and corresponding 95% CIs. Total number of morbidities by patient will also be summarised together with 95% CI, and multiple regressions may be performed to analyse its association with patients' characteristics. All analyses will be performed for both aforementioned definitions of multimorbidity. All tests will be two-sided using a significance level of 0.05. Statistical analysis will be conducted using SPSS V.18.0 or higher.

Phase II: patients' health-related quality of life, perceived family support and unmet health needs of adult patients with multimorbidity attending primary care in Portugal
Design
Cross-sectional, analytical study.

Setting
Primary Care Centres in the Centre region of Portugal will be randomly selected within each Care Centres Grouping (ACES and ULS) in order to obtain a regional geographical representative sample.

Sample size
A total of 500 patients should be included in phase II in order to obtain 95% CIs for proportions with a maximum precision error of 4.5% and 95% CIs for SF-12 mean scores with a precision error of 4.5 (assuming an SD of 50).

Study procedures
Phase II of the study is expected to start in January 2014.

A two-step approach will be considered as in phase I. Assuming that each GP will enrol 10 patients and that 30% of the invited GPs will accept to participate, then about 170 GPs within the randomly selected Care Centres should be invited to participate in this phase of the study.

Primary Care Centres will be randomly selected (Independent Random Sampling)[21] and all GPs within those centres will be invited to participate (until 170 GPs are recruited).

By purposive sampling, enrolled GPs will select adult (≥ 18 years) patients with multimorbidity and with at least one of four morbidities: hypertension, diabetes, asthma and/or osteoarthritis. These morbidities were selected based on the Portuguese Directorate-General of Health (DGS—Direção-Geral da Saúde) efforts to implement specific national recommendations for the diagnosis, treatment and control of these conditions, which have high prevalence and are associated with low quality of life.[23–26]

The investigator or a previously trained research associate (GP/GP trainee) will interview the patients at their convenience, either in the GPs office or at their home. Participants willing to participate in the study must give written informed consent and present willingness and ability to comply with the study requirements. Participants will be excluded if they are acutely unwell or refuse to participate.

Data collection
All data will be collected using a paper questionnaire. Patients' morbidities, social and demographic characteristics will be registered using the same methodology as described in phase I. Health-related quality of life will be evaluated using the Portuguese Short Form-12 Health Status Questionnaire (SF-12),[27] derived from the Medical Outcomes Study 36-Item Short Form Health Survey (SF-36),[28] through interview of the patients. The Portuguese Family APGAR (Adaptation, Partnership, Growth, Affection and Resolve) Questionnaire[29 30] that evaluates family function in five dimensions[31] will be used to measure the perceived family support of patients with multimorbidity.

On the basis of the literature,[32–36] a patients' unmet health needs questionnaire was drafted. The unmet need for the following services will be evaluated: medical, surgical and dental care, prescription medications, mental healthcare or counselling, and eyeglasses or other technical aid. These will be evaluated by a set of general questions, such as 'During the past 12 months, was there a time when you wanted/needed medical care but couldn't get it at that time?' If an unmet health need is stated, available reasons to explain it are: Couldn't you get off work? Were you too sick? Didn't you have a way to get there? Did you have responsibilities to take care of someone? Were you afraid to leave home because of personal safety? Did you have other more important things to take care of? Did you have to spend your money for food, clothing, housing, etc? These questions will be translated to Portuguese by the study investigator and the translation will be subsequently reviewed by an

independent GP expert. Any disagreements will be discussed between both in order to achieve a consensus. Furthermore, a pretest will be undertaken and the translated questions will be applied to 50 participants prior to patients enrolment phase in order to verify participants' comprehensibility of those questions.

Statistical analysis

Descriptive statistics will be computed for all variables together with 95% CIs whenever relevant and applicable. Associations between qualitative-independent variables will be tested using χ^2 test. Comparisons between two or more independent groups regarding a quantitative variable are to be conducted using analysis of variance (ANOVA) or Kruskal-Wallis non-parametric test, if normality assumption is not met. ANCOVA may also be used to adjust for potential confounding factors. Associations between quantitative independent variables will be analysed using Pearson's or Spearman's correlation coefficient depending on normality assumption. All tests will be two-sided, considering a significance level of 0.05.

Phase III: Portuguese GPs' knowledge, awareness and practices regarding multimorbidity and its management
Design
Before–after, descriptive study.

Since there is a lack of research on multimorbidity in Portugal, we believe that this concept is not usually taken into account in daily practice. We also have confidence in that the dissemination of the results of parts I and II of the study will have the capability of raising awareness and change behaviour towards patients with multimorbidity. To test these hypotheses, a before–after study was designed.

Setting
Selected Primary Care Centres in two districts of the Centre region of Portugal (Coimbra and Aveiro).

Sample size
Since this is a descriptive study, no formal calculations were performed to estimate the sample size. Notwithstanding, we are willing to include at least 10% of the population of GPs in these two districts corresponding to a sample size of approximately 60 GPs.

Study procedures
GPs working in Primary Care Centres in the districts of Coimbra and Aveiro will be recruited by chain-referral sampling.

Data collection
Prior to the start of phase I of the study, an online questionnaire with open text format questions will be used to evaluate GPs' knowledge (definition of multimorbidity), awareness (relevance of multimorbidity in daily practice) and practices (management of multimorbidity). This

will be followed by a second application of the same questionnaire after the distribution of a flyer with the results of phases I and II of the study.

This questionnaire will have a semantic validation by two distinct groups. The first is composed of experts in multimorbidity and the second by possible respondents, in our case, GPs.

Statistical analysis
Before–after collected answers will be listed and analysed by the study investigator. If possible, answers will be converted into qualitative variables by the study investigator in order to evaluate knowledge, awareness and practices. This process will also be performed by an independent expert and results will be crosschecked. Discrepancies will be further discussed until a consensus is achieved. Results obtained will be summarised using descriptive statistics as previously described.

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2.1 Amendments in relation to the original protocol

The work related to this doctoral thesis was developed in three distinct phases that culminated in four published scientific articles.

Details of the amendments in relation to the original protocol regarding the "material and methods" of the three phases are presented in the published articles accessible in the next chapter.

The next chapter present the papers as listed here:

- Phase I: prevalence of multimorbidity in the adult population attending primary care in Portugal

  Prevalence of multimorbidity in the adult population attending primary care in Portugal: a cross-sectional study. Prazeres F, Santiago L. BMJ Open 2015;5(9):e009287.

- Phase II: patients' health-related quality of life, perceived family support and unmet health needs of adult patients with multimorbidity attending primary care in Portugal

  Relationship between health-related quality of life, perceived family support and unmet health needs in adult patients with multimorbidity attending primary care in Portugal: a multicentre cross-sectional study. Prazeres F, Santiago L. Health Qual Life Outcomes 2016;14(1):156.

- Phase III: Portuguese GPs' knowledge, awareness and practices regarding multimorbidity and its management

  Defining Multimorbidity: From English to Portuguese Using a Delphi Technique. Prazeres F, Santiago LM, Simões JA. Biomed Res Int. 2015;2015:965025.

  The Knowledge, Awareness, and Practices of Portuguese General Practitioners Regarding Multimorbidity and its Management: Qualitative Perspectives from Open-Ended Questions. Prazeres F, Santiago L. Int J Environ Res Public Health. 2016;13(11). pii: E1097.

CHAPTER THREE | RESULTS

PAPER II

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Prazeres F, Santiago L.

Prevalence of multimorbidity in the adult population attending primary care in Portugal: a cross-sectional study.

Paper II research was conducted to determine the prevalence of multimorbidity in the adult population attending primary care in Portugal, to identify associated sociodemographic factors, and to reveal combinations of chronic health problems. The paper was published in BMJ Open in 2015.

BMJ Open

Prevalence of multimorbidity in the adult population attending primary care in Portugal: a cross-sectional study

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ABSTRACT

Objectives: To determine the prevalence of multimorbidity in the adult population attending primary care in Portugal, to identify associated sociodemographic factors, and to reveal combinations of chronic health problems.

Design: Cross-sectional, analytical study.

Setting: Primary Care Centres in mainland Portugal across the five Portuguese Healthcare Administrative Regions.

Participants: 1279 women and 714 men agreed to participate. The mean age was 56.3 years (59.0 years for men; 54.8 years for women). The most frequent marital status was married/cohabiting (69.5%). The most predominant living arrangement was living as a couple (57.2%). A considerable proportion consisted of pensioners/retirees (41.5%) and adults with a low educational level (48.7%). Sufficient monthly income was reported in 54.4% of the cases.

Primary outcome measures: For each patient, multimorbidity was measured either by the presence of ≥ 2 or ≥ 3 chronic health problems, from a list of 147 chronic health problems. Clinical data were collected using the general practitioner's knowledge of the patient's history, patient's self-report and medical records. Cluster analyses were performed to reveal distinct patterns of multimorbidity.

Secondary outcome measures: Patient social and demographic data (sex, age, residence area, current marital status, number of years of formal education, living arrangements, professional status and self-perceived economic status). Logistic regression analyses were performed to determine the association between sociodemographic factors and multimorbidity.

Results: Multimorbidity (2 or more chronic health problems) was present in 72.7%. When a cut-off of three or more was used, an expressive percentage of multimorbidity (57.2%) remained present. The likelihood of having multimorbidity increased significantly with age. Pensioners/retirees and adults with low levels of education were significantly more likely to suffer from multimorbidity. Cardiometabolic and mental disorders were the most common chronic health problems. Six multimorbidity clusters have been identified.

Conclusions: Multimorbidity was found to be a common occurrence in the Portuguese primary care users. Future primary healthcare policies should take multimorbidity into consideration.

Strengths and limitations of this study

- This is the first study to quantify multimorbidity in the adult population attending general practice in Portugal. It contributes to a better knowledge of the epidemiological factors associated with multimorbidity in Portugal.
- This study investigated a large list of 147 chronic health problems. Most multimorbidity studies only considered a small list of chronic conditions.
- Clinical data were collected using three data sources for each patient: general practitioner (GP)'s knowledge of patient's history, patient's self-report and medical records. Most multimorbidity studies rely on only one of these sources of data.
- The study findings may not be generalisable to the entirety of the Portuguese primary care, since a random sample of each GP's patients was not possible to achieve. The study lacks a disease severity score and the cross-sectional nature of the study design does not allow for causal inferences to be proven.
- The most common chronic health problems and the prevalence of multimorbidity encountered were similar to those found in other studies, which supports the validity of the study findings.

BACKGROUND

Primary care plays a central role in the management of chronic medical conditions.[1 2] Evidence to date suggests that the majority of patients with chronic health conditions do not have a single diagnosis, but numerous diagnoses coexist within one person.[3] Multimorbidity has been defined as the co-occurrence of more than one chronic condition in an individual,[4] and this has become more common across studied population groups over time with important consequences for primary care and secondary care providers.

As the world population ages and life expectancy increases, multimorbidity becomes progressively common[5] in developed[6–8] and

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developing countries.[9–12] Nonetheless, multimorbidity can be present in all age groups, rendering it a widespread public health concern.[13]

The overall estimated prevalence of multimorbidity varies across the literature, depending on the studied population and the used methodology,[14] and the primary care setting is no exception. In a recent Dutch study[15] involving about 213 000 patients, multimorbidity was found among 13% of the population, but it can rise to as high as 95% within the group of the oldest ones.[16]

Patients who suffer from multimorbidity have poor health outcomes,[17] high healthcare utilisation[18] (78% of all primary care consultations are provided to patients with multiple chronic conditions[6]), more hospital admissions[19] and increased average cost of care.[20] This poses a significant challenge on patients' lives, general practitioners' (GPs) work and healthcare services in general.[21]

Since GPs are responsible for the complete person's health, they should pay special attention to the prevalence and patterns of multimorbidity in order to best plan and provide patient care.

Taking into consideration the demographic projections, the Portuguese population will significantly age over the course of the next four decades. By 2050, about 32% of the population is projected to be aged 65 and over, significantly above the Organisation for Economic Co-operation and Development (OECD) average of 25.7%,[22] which underlines the need for health practitioners to become acquainted with the multimorbidity phenomenon in Portugal.

This study aimed to determine the prevalence of multimorbidity in the adult population attending primary care in Portugal, to identify associated sociodemographic factors, and to reveal combinations of chronic health problems that in the future might benefit from directed care management.

METHODS
Study design
This cross-sectional study, conducted from October 2013 to December 2014, represents the first phase of the MM-PT project—Multimorbidity in primary care in PorTugal—designed to further the knowledge of the epidemiology of multimorbidity in the country from multiple perspectives. Details of study design, definitions and methods were previously published in this journal.[23]

The study was conducted in agreement with the principles of the Declaration of Helsinki[24] and received institutional Ethics Committee approval. The reporting of this study conforms to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement.[25]

Participants
The sampling approach is described in detail elsewhere.[23] Briefly, in agreement with the distribution of the Portuguese population aged 18 years and older

across the five mainland Portugal Healthcare Administrative Regions, a random sample of GPs, working in the National Health Service, was obtained aiming at a total of 1500 general practice patients recruited within them. GPs were initially invited by letter. Subsequently, frequent reminders were sent by letter, telephone, email and/or personal visits. In view of insufficient response to these recruitment strategies, changes in the study procedures were deemed necessary: recruitment awareness was raised both by emails sent to medical online discussion forums/mailing groups and via the distribution of leaflets in national conferences. No reimbursement of any kind was offered for involvement in this study.

Adult patients who attended primary care consultations during the study period and were judged as being physically and mentally able to provide informed consent were included in the study.

Data collection procedures
Data collection was performed by protocol.[23] The questionnaire was pilot tested in 25 adult general practice patients. No alterations to the questionnaire were found to be needed.

Outcome variable
For each patient, multimorbidity was measured either by the presence of ≥ 2 or ≥ 3 chronic health problems at the time of data collection. The chronic health problems of interest were drawn from the 147 International Classification of Primary Care, Second edition (ICPC-2) rubrics list gathered by the Family Medicine Research Centre, University of Sydney.[26]

Independent variables
Social and demographic characteristics such as sex (male/female), age (18–34/35–49/50–64/≥ 65 years), residence area (urban/rural), current marital status (married-cohabiting/single/widowed/separated-divorced), number of years of formal education (less than 6 years/at least 6 but not more than 9 years/more than 9 years), living arrangements (couple/extended family/alone/other), professional status (pensioner-retired/employed/unemployed/housewife/student) and self-perceived economic status ('Just enough to make ends meet'/'Not enough to make ends meet'/'Some money left over') 'were assessed by the personal information section of the Portuguese version of the EASY-Care questionnaire.

The clinical data (chronic health problems) were collected using the GP's knowledge of the patient's history, patient's self-report and electronic and/or paper medical records of the patient. Health problems were defined as chronic by the O'Halloran criteria: (A) have a duration that has lasted, or is expected to last, at least 6 months; (B) have a pattern of recurrence or deterioration; (C) have a poor prognosis and (D) produce

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consequences or sequelae that impact on the individual's quality of life.[26]

Statistical analyses

In addition to the descriptive analysis, χ^2 tests for group comparisons and logistic regressions, performed as specified in the aforementioned published study protocol,[23] cluster analyses[27] were also executed aimed at revealing distinct patterns of chronic health problems. As previously employed by Marengoni *et al*,[28] a correlation matrix was computed among the most frequent chronic health problems in the sample (prevalence >5% and >10%) using the Yule Q measure of similarity and average linkage as an algorithm.

All analyses were done using the IBM SPSS Statistics for Windows, V.21.0 (IBM Corporation, Armonk, New York, USA).

p Values <0.05 were considered statistically significant.

RESULTS

Characteristics of participants

Enrolled GPs approached a total of 2027 patients aged 18 years and older for inclusion in the study; 98.3% (1279 women and 714 men) agreed to participate. Thirty-four refused to participate due to personal reasons. All five mainland Portuguese Healthcare Administrative Regions attained or surpassed the minimum required sample size: 559 in the North (104%), 750 in the Centre (208%), 459 in the Lisbon-Tejo Valley (109%), 149 in Alentejo (124%) and 76 in Algarve (127%). The average participant-GP ratio was 28.9 patients per GP (range 10–65).

The mean age for the sample was 56.3 years (59.0 years for men and 54.8 years for women). Table 1 shows the demographic characteristics of sample respondents. The most frequent marital status was married or cohabiting in 69.5% of the sample. The most predominant living arrangement was living as a couple (57.2%). A considerable proportion of the sample consisted of pensioners and retirees (41.5%), and adults with a low level of education (48.7%). Sufficient monthly income was reported in 54.4% of the cases.

Prevalence of multimorbidity

Almost 9 out of 10 study participants (87.0%) had at least 1 chronic health problem, with an overall average of 3.4 (3.6 in men, 3.3 in women).

Multimorbidity, measured as a count of 2 or more chronic health problems, was present in 72.7% of the sample. Consistently, when a cut-off of 3 or more was used, an expressive percentage of multimorbidity (57.2%) remained present.

There was a significant relationship (p<0.05) between each demographic characteristic and multimorbidity (table 2). Males, old age, residing in rural areas, becoming a widow or widower, living alone, having a low level of education, being a pensioner or a retiree, and

Table 1 Demographic characteristics of the sample	
Characteristic	**% (n)**
Sex	
Women	64.2 (1279)
Men	35.8 (714)
Age (years)	
18–34	14.5 (288)
35–49	19.5 (388)
50–64	30.7 (612)
$\geq$65	35.4 (705)
Residence area	
Urban	53.1 (1058)
Rural	46.9 (935)
Marital status	
Married/cohabiting	69.5 (1385)
Single	12.2 (244)
Widowed	11.6 (232)
Separated/divorced	6.6 (132)
Living arrangements	
Couple	57.2 (1139)
Extended family	24.1 (481)
Alone	14.5 (289)
Other (including care home)	4.2 (84)
Education	
Low level (less than 6 years)	48.7 (971)
Medium level (at least 6 but not more than 9 years)	23.7 (472)
High level (more than 9 years)	27.6 (550)
Professional status	
Pensioner/retired	41.5 (828)
Employed (full-time/part-time)	39.3 (784)
Unemployed	10.5 (209)
Housewife	6.1 (121)
Student	2.6 (51)
Monthly income	
'Just enough to make ends meet'	54.4 (1084)
'Not enough to make ends meet'	27.5 (549)
'Some money left over'	18.1 (360)

perceiving an insufficient monthly income were associated with higher rates of multimorbidity. A similar trend was observed for three or more chronic health problems multimorbidity cut-off, with the exception of an equally prevalent multimorbidity between monthly income levels (p=0.070).

As table 3 shows, the prevalence of multimorbidity (using 2 cut-off points) increased with age in men and women. Men aged 50–64 had a higher prevalence of multimorbidity compared to their female counterparts, whereas in all other age groups women surpassed men. However, none of these differences were statistically significant.

As can be seen from table 4, after adjustment, the demographic variables that remained associated with the presence of multimorbidity were age, education and professional status. The likelihood of having multimorbidity increased significantly with age (p<0.001). Pensioners, retirees and adults with low levels of education were significantly more likely to suffer from multimorbidity. No

Table 2 Prevalence of multimorbidity according to demographic characteristics

Characteristic	Percentage of healthy adults (no chronic health problems) (95% CI)	Percentage of patients with multimorbidity (95% CI)				Mean number of chronic health problems (95% CI) [median]
		≥2 chronic health problems	p Value	≥3 chronic health problems	p Value	
Sex			0.015		0.003	
Women	14.6 (12.7 to 16.6)	70.8 (68.3 to 73.3)		54.7 (51.9 to 57.4)		3.3 (3.1 to 3.4) [3.0]
Men	10.1 (7.9 to 12.3)	75.9 (72.8 to 79.1)		61.6 (58.0 to 65.2)		3.6 (3.4 to 3.8) [3.0]
Age (years)			<0.001		<0.001	
18–34	47.6 (41.8 to 53.4)	24.7 (19.7 to 29.7)		12.8 (9.0 to 16.7)		1.0 (0.9 to 1.2) [1.0]
35–49	18.3 (14.4 to 22.2)	58.5 (53.6 to 63.4)		32.0 (27.3 to 36.6)		2.1 (1.9 to 2.3) [2.0]
50–64	6.4 (4.4 to 8.3)	81.2 (78.1 to 84.3)		64.5 (60.7 to 68.3)		3.6 (3.4 to 3.8) [3.0]
≥65	1.7 (0.1 to 2.7)	92.6 (90.7 to 94.6)		82.7 (79.9 to 85.5)		4.9 (4.7 to 5.1) [5.0]
Residence area			<0.001		<0.001	
Urban	15.5 (13.3 to 17.7)	68.3 (65.5 to 71.1)		51.3 (48.3 to 54.3)		3.1 (3.0 to 3.3) [3.0]
Rural	10.2 (8.2 to 12.1)	77.5 (74.9 to 80.2)		63.7 (60.7 to 66.8)		3.7 (3.5 to 3.9) [3.0]
Marital status			<0.001		<0.001	
Married/cohabiting	10.8 (9.2 to 12.5)	75.4 (73.1 to 77.7)		58.7 (56.1 to 61.3)		3.4 (3.3 to 3.6) [3.0]
Single	34.4 (28.4 to 40.4)	41.0 (34.8 to 47.2)		28.3 (22.6 to 34.0)		1.9 (1.6 to 2.2) [1.0]
Widowed	3.0 (0.8 to 5.2)	92.2 (88.8 to 95.7)		81.9 (76.9 to 86.9)		5.0 (4.6 to 5.3) [5.0]
Separated/divorced	13.6 (7.7 to 19.6)	68.2 (60.1 to 76.2)		50.8 (42.1 to 59.4)		3.0 (2.6 to 3.4) [3.0]
Living arrangements			<0.001		<0.001	
Couple	11.8 (9.9 to 13.6)	75.2 (72.7 to 77.8)		59.0 (56.1 to 61.9)		3.4 (3.3 to 3.6) [3.0]
Extended family	17.3 (13.9 to 20.6)	62.6 (58.2 to 66.9)		48.2 (43.8 to 52.7)		3.0 (2.7 to 3.2) [2.0]
Alone	10.0 (6.5 to 13.5)	80.3 (75.7 to 84.9)		66.4 (61.0 to 71.9)		4.0 (3.7 to 4.4) [4.0]
Other (including care home)	15.5 (7.6 to 23.4)	69.0 (59.0 to 79.1)		51.2 (40.3 to 62.1)		2.9 (2.4 to 3.4) [3.0]
Education			<0.001		<0.001	
Low level (less than 6 years)	3.9 (2.7 to 5.1)	89.3 (87.3 to 91.2)		75.9 (73.2 to 78.6)		4.5 (4.3 to 4.6) [4.0]
Medium level (at least 6 but not more than 9 years)	14.6 (11.4 to 17.8)	65.9 (61.6 to 70.2)		48.7 (44.2 to 53.3)		2.7 (2.5 to 2.9) [2.0]
High level (more than 9 years)	27.6 (23.9 to 31.4)	49.1 (44.9 to 53.3)		31.3 (27.4 to 35.2)		2.1 (1.9 to 2.2) [1.0]
Professional status			<0.001		<0.001	
Pensioner/retired	1.9 (1.0 to 2.9)	92.0 (90.2 to 93.9)		81.2 (78.5 to 83.8)		4.8 (4.6 to 5.0) [5.0]
Employed (full-time/part-time)	20.5 (17.7 to 23.4)	56.8 (53.3 to 60.2)		37.9 (34.5 to 41.3)		2.3 (2.1 to 2.4) [2.0]
Unemployed	19.6 (14.2 to 25.0)	65.1 (58.6 to 71.6)		45.9 (39.1 to 52.7)		2.7 (2.4 to 3.0) [2.0]
Housewife	8.3 (3.3 to 13.2)	81.0 (73.9 to 88.1)		60.3 (51.5 to 69.2)		3.4 (3.0 to 3.9) [3.0]
Student	60.8 (46.9 to 74.7)	13.7 (4.0 to 23.5)		2.0 (0.0 to 5.9)		0.5 (0.3 to 0.8) [0.0]
Monthly income			0.018		0.070	
'Just enough to make ends meet'	12.8 (10.8 to 14.8)	72.4 (69.8 to 75.1)		57.4 (54.4 to 60.3)		3.4 (3.3 to 3.6) [3.0]
'Not enough to make ends meet'	11.7 (9.0 to 14.4)	76.3 (72.8 to 79.9)		59.9 (55.8 to 64.0)		3.5 (3.3 to 3.7) [3.0]
'Some money left over'	15.6 (11.8 to 19.3)	67.8 (62.9 to 72.6)		52.2 (47.0 to 57.4)		3.2 (2.9 to 3.4) [3.0]

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Table 3 Prevalence of multimorbidity, by sex and age group

| | Percentage of patients with multimorbidity (95% CI) | | | | | | | | | | |
| | 18–34 years | | | 35–49 years | | | 50–64 years | | | ≥65 years | | |
	Female (n=217)	Male (n=71)	p Value	Female (n=273)	Male (n=115)	p Value	Female (n=374)	Male (n=238)	p Value	Female (n=415)	Male (n=290)	p Value
≥2 chronic health problems	25.8 (19.9 to 31.7)	21.1 (11.4 to 30.9)	0.426	60.4 (54.6 to 66.3)	53.9 (44.7 to 63.2)	0.233	79.4 (75.3 to 83.5)	84.0 (79.3 to 88.7)	0.154	93.5 (91.1 to 95.9)	91.4 (88.1 to 94.6)	0.291
≥3 chronic health problems	13.4 (8.8 to 17.9)	11.3 (3.7 to 18.8)	0.647	33.0 (27.4 to 38.6)	29.6 (21.1 to 38.0)	0.512	62.6 (57.6 to 67.5)	67.6 (61.7 to 73.6)	0.200	83.4 (79.8 to 87.0)	81.7 (77.2 to 86.2)	0.569

differences in the odds of multimorbidity were detected in terms of sex, residence area, marital status, living arrangements or monthly income.

Chronic health problems and patterns of multimorbidity

Table 5 shows the most common chronic health problems in the sample, considering a minimum prevalence of at least 5%. Globally, the two leading problems were lipid disorder (44.8% males, 35.7% females) and uncomplicated hypertension (43.8% males, 33.4% females). Depressive disorder was the third most common chronic health problem among females (22.8%) and non-insulin dependent diabetes among males (25.4%). In both sexes, obesity came in fourth place (19.5% males, 14.4% females). The least common problem was osteoporosis with a prevalence of around 5%.

As could be expected, each common chronic health problem co-occurred with some other chronic health problem at a greater extent than as a stand-alone condition (table 5).

Women with a diagnosis of non-insulin dependent diabetes, osteoarthritis of the knee, back syndrome with radiating pain and lipid disorder were 74.4 times, 62.3 times, 42.5 times and 21.1 times, respectively, more likely to have multimorbidity (2 or more chronic health problems) than women without these diagnoses (p<0.001). When considering multimorbidity as the co-occurrence of three or more chronic health problems, there was a decrease in the odds. Nonetheless, women with osteoarthritis of the knee, lipid disorder, non-insulin dependent diabetes and back syndrome with radiating pain were 13.4 times, 11.3 times, 9.9 times and 8.7 times, respectively, more likely to have three or more chronic health problems than women without these diagnoses (p<0.001) (table 6).

In men, the highest ORs for multimorbidity (2 or more chronic health problems) were associated with obesity (OR, 28.7 (95% CI 7.0 to 117.5); p<0.001), lipid disorder (OR, 16.0 (95% CI 8.9 to 28.8); p<0.001) and benign prostatic hypertrophy (OR, 14.8 (95% CI 4.7 to 47.3); p<0.001). Men with complicated hypertension were 26.2 times more likely to have three or more chronic health problems than non-hypertensive men (table 6).

Figure 1 shows the six disease clusters that were identified using cluster analysis. One cluster was comprised solely of overweight. Two clusters included two diseases: one anxiety disorder/anxiety state and depressive disorder, and one varicose veins of the leg and back syndrome without radiating pain. One cluster included three diseases: obesity, non-insulin dependent diabetes and uncomplicated hypertension. Two clusters included four diseases: one osteoarthrosis (other), osteoporosis, goitre and back syndrome with radiating pain and one complicated hypertension, lipid disorder, osteoarthritis of the knee and benign prostatic hypertrophy.

As a corroboration procedure, a second cluster analysis was performed using chronic health problems with a prevalence >10%. Obesity, non-insulin dependent

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Table 4 Logistic regression model for demographic determinants of multimorbidity

| Characteristic | Multimorbidity | | | | | |
| | ≥2 chronic health problems | | | ≥3 chronic health problems | | |
	OR	95% CI	p Value	OR	95% CI	p Value
Sex						
Women	base	–	–	base	–	–
Men	0.9	0.7 to 1.2	0.649	1.0	0.8 to 1.3	0.990
Age (years)						
18–34	base	–	–	base	–	–
35–49	3.3	2.2 to 4.8	<0.001	2.5	1.6 to 3.8	<0.001
50–64	6.7	4.4 to 10.1	<0.001	7.0	4.5 to 11.0	<0.001
≥65	9.3	5.0 to 17.4	<0.001	11.1	6.3 to 19.7	<0.001
Residence area						
Urban	base	–	–	base	–	–
Rural	1.0	0.8 to 1.3	0.746	1.2	0.9 to 1.5	0.157
Marital status						
Married/cohabiting	1.4	0.9 to 2.3	0.182	1.0	0.6 to 1.7	0.958
Single	base	–	–	base	–	–
Widowed	1.3	0.7 to 2.6	0.410	1.2	0.7 to 2.1	0.521
Separated/divorced	1.0	0.6 to 1.7	0.985	1.0	0.6 to 1.8	0.948
Living arrangements						
Couple	1.4	0.9 to 2.3	0.182	0.9	0.6 to 1.5	0.778
Extended family	1.0	0.6 to 1.7	0.985	1.0	0.6 to 1.6	0.979
Alone	base	–	–	base	–	–
Other (including care home)	1.3	0.7 to 2.6	0.410	0.9	0.5 to 1.7	0.819
Education						
Low level (less than 6 years)	2.0	1.4 to 2.8	<0.001	1.7	1.3 to 2.4	0.001
Medium level (at least 6 but not more than 9 years)	1.3	1.0 to 1.8	0.081	1.4	1.1 to 2.0	0.014
High level (more than 9 years)	base	–	–	base	–	–
Professional status						
Pensioner/retired	4.4	1.6 to 11.9	0.003	15.2	2.0 to 117.6	0.009
Employed (full-time/part-time)	1.9	0.8 to 4.7	0.143	8.2	1.01 to 62–2	0.041
Unemployed	2.5	1.0 to 6.2	0.053	10.8	1.4–82.3	0.022
Housewife	2.5	0.9–7.1	0.073	8.5	1.1 to 66.8	0.043
Student	base	–	–	base	–	–
Monthly income						
'Just enough to make ends meet'	0.8	0.6 to 1.1	0.158	–	–	–
'Not enough to make ends meet'	base	–	–	–	–	–
'Some money left over'	0.8	0.5 to 1.1	0.182	–	–	–

diabetes and uncomplicated hypertension remained together in a cluster and so did complicated hypertension and lipid disorder. Overweight, back syndrome with radiating pain and depressive disorder remained in independent clusters.

DISCUSSION
Strengths of the study
This is the first study to report the prevalence and patterns of multimorbidity in the Portuguese population aged 18 and older attending primary care consultations. It is cross-sectional, which is the most frequent design to assess the epidemiology of multimorbidity.[29] A simple count of individual chronic conditions was the approach used to measure multimorbidity, which is also the most common across the literature.[30]

Although there is no agreement regarding the number and type of chronic health problems that should be included in multimorbidity related studies, the use of 12 or more frequent chronic diseases has been suggested by some authors[31] as being the cut-off for better prevalence estimates; this study largely meets this principle, since a list of 147 chronic health problems was used.

Statement of overall findings
In general, the study results substantiate the commonly assumed perception that multimorbidity is the rule in primary care.[3] Even though it may not be entirely accurate to directly compare the prevalence estimates of multimorbidity between studies, owing to the differences in the employed methodologies,[14] some authors have stated that prevalence estimates are similar when multimorbidity is defined as two or more disease entities, independently of how a disease entity is defined.[32] In this study, the high prevalence of two or more chronic

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Table 5 Chronic health problems with a prevalence >5% and their co-occurrence rates

ICPC2 code	Chronic health problem	N	Stand-alone (%)	Associated chronic health problems (%)			
				+1	+2	+3	+4 or more
T93	Lipid disorder	776	3.7	9.8	14.7	18.9	52.8
K86	Hypertension, uncomplicated	740	6.4	14.1	16.8	19.1	43.8
P76	Depressive disorder	340	10.9	12.9	13.8	18.5	43.8
T90	Diabetes, non-insulin dependent	333	2.7	8.4	13.2	19.2	56.5
T82	Obesity	323	4.3	9.6	16.4	18.6	51.1
L86	Back syndrome with radiating pain	250	3.6	10.0	10.8	14.0	61.6
T83	Overweight	213	4.7	11.3	16.0	18.3	49.8
K87	Hypertension, complicated	206	0	2.9	8.7	16.0	72.3
K95	Varicose veins of leg	195	4.1	9.7	14.9	17.9	53.3
L90	Osteoarthritis of knee	191	0.5	6.3	6.3	11.0	75.9
P74	Anxiety disorder/anxiety state	176	6.8	13.1	13.1	17.0	50.0
L91	Osteoarthrosis, other	130	1.5	3.8	10.0	15.4	69.2
Y85	Benign prostatic hypertrophy	116	2.6	6.9	9.5	18.1	62.9
L84	Back syndrome without radiating pain	108	5.6	7.4	10.2	24.1	52.8
T81	Goitre	107	1.9	15.0	15.0	13.1	55.1
L95	Osteoporosis	105	1.9	4.8	7.6	16.2	69.5

health problems—multimorbidity—is consistent with data present in the literature.[29]

Given the current absence of a consensual definition of multimorbidity, the recommendation of Fortin *et al*[31] of using two operational definitions of multimorbidity was followed. Therefore, in this study, multimorbidity was also defined by three or more chronic health problems. Although only a few studies have used this definition,[29] it is of relevance for practitioners since it can identify patients with higher needs.[31] More than half of the study participants had three or more chronic health problems, which is a common prevalence found in developed countries.[3][33]

These findings suggest that Portuguese GPs are likely to struggle with increasingly daily practice concerns, since they will face many challenges regarding the

Table 6 ORs (and 95% CIs) for multimorbidity associated with 10 most common chronic health problems in women and men

| ICPC2 code	Chronic health problem	Multimorbidity							
		≥2 chronic health problems				≥3 chronic health problems			
		%	OR	95% CI	p value	%	OR	95% CI	p value
Women (n=1279)									
T93	Lipid disorder	96.5	21.1	12.6 to 35.3	<0.001	86.8	11.3	8.3 to 15.4	<0.001
K86	Hypertension, uncomplicated	93.7	10.1	6.7 to 15.3	<0.001	78.7	5.0	3.8 to 6.5	<0.001
P76	Depressive disorder	88.4	4.0	2.7 to 5.8	<0.001	75.0	3.2	2.4 to 4.2	<0.001
T82	Obesity	93.5	7.1	3.9 to 12.8	<0.001	82.1	4.6	3.1 to 6.8	<0.001
L86	Back syndrome with radiating pain	98.8	42.5	10.5 to 172.4	<0.001	89.5	8.7	5.3 to 14.5	<0.001
K95	Varicose veins of leg	96.3	12.7	5.6 to 29.0	<0.001	85.2	5.7	3.6 to 8.9	<0.001
T90	Diabetes, non-insulin dependent	99.3	74.4	10.4 to 533.7	<0.001	90.8	9.9	5.7 to 17.4	<0.001
P74	Anxiety disorder/anxiety state	91.9	5.3	2.8 to 9.9	<0.001	76.5	3.0	2.0 to 4.5	<0.001
L90	Osteoarthritis of knee	99.2	62.3	8.7 to 447.5	<0.001	93.1	13.4	6.8 to 26.7	<0.001
T83	Overweight	95.2	9.3	4.1 to 21.4	<0.001	81.7	4.2	2.6 to 6.7	<0.001
Men (n=714)									
T93	Lipid disorder	95.9	16.0	8.9 to 28.8	<0.001	85.9	8.5	5.8 to 12.3	<0.001
K86	Hypertension, uncomplicated	93.6	8.9	5.4 to 14.7	<0.001	80.8	4.8	3.4 to 6.8	<0.001
T90	Diabetes, non-insulin dependent	95.6	9.6	4.6 to 20.0	<0.001	87.3	6.1	3.8 to 9.8	<0.001
T82	Obesity	98.6	28.7	7.0 to 117.5	<0.001	91.4	8.9	4.8 to 16.4	<0.001
Y85	Benign prostatic hypertrophy	97.4	14.8	4.7 to 47.3	<0.001	90.5	7.5	3.9 to 14.2	<0.001
K87	Hypertension, complicated	100.0	–	–	–	97.1	26.2	8.2 to 83.6	<0.001
T83	Overweight	95.4	7.6	2.7 to 21.0	<0.001	87.4	5.0	2.6 to 9.6	<0.001
L86	Back syndrome with radiating pain	91.1	3.6	1.6 to 8.0	0.001	79.7	2.7	1.5 to 4.8	<0.001
L90	Osteoarthritis of knee	100.0	–	–	–	93.3	9.8	3.5 to 27.5	<0.001
P76	Depressive disorder	93.8	5.1	1.6 to 16.6	0.003	83.3	3.3	1.5 to 7.2	0.001
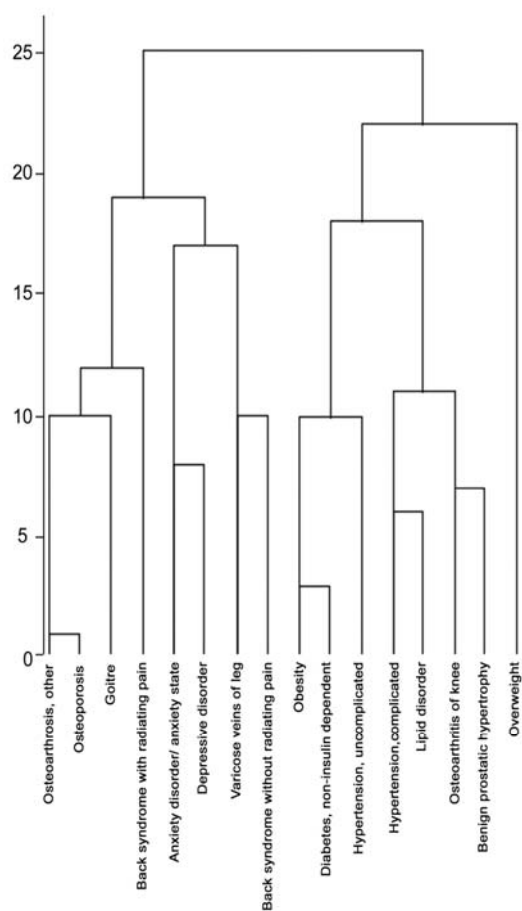
Figure 1 Dendogram resulting from cluster analysis.

multimorbidity impact on disease management, as is the case in other countries.[34] Caring for patients with multimorbidity is a demanding task because, on the one hand, there is a lack of multimorbidity related guidelines[35] and, on the other, current interventions have had mixed effectiveness results.[36] There remains the need to identify patients with multimorbidity in order to develop new and stronger patient-oriented interventions.[36] These can be supported by a longitudinal doctor-patient relationship-based care, the offer of a benefit-risk balance to each individual, and decision taking driven by the patient's capability to cope with them, ultimately avoiding overdiagnosis and overtreatment.[37] Recent efforts to address multimorbidity within guidelines are also being pursued.[38]

Relationship with other studies

In line with previous reports,[3 7 13 15 18 39–42] a significant association between age and prevalence of multimorbidity, irrespective of the definitions used, was found in this study. The presence of multiple chronic health problems increased with age and was highest among adults aged 65 or older. This is due to the accumulation of chronic health conditions during the ageing process.[43] The prevalence of multimorbidity in each individual age

group match those observed in a prior study,[3] but are higher than the ones obtained by the majority of the published studies.[29] Whether this is a real difference between the adult Portuguese primary care users and the primary care practice settings from other western countries, or the consequence of different methodologies of estimating multimorbidity prevalence, will remain the object of further research.

Women are associated with increased risk for multimorbidity.[41] The majority of the study participants were female. Nonetheless, males were associated with higher rates of multimorbidity. This gender effect, however, did not persist after adjusting for all sociodemographic variables. These results therefore need to be interpreted with caution.

Krieger et al[44] listed the level of education, occupational prestige and income as indicators of socioeconomic status. Lower socioeconomic status is a known determinant of multimorbidity,[29] and this study's findings support it. Therefore, the level of education[45] and professional status of the patients with multimorbidity should be taken into consideration when developing prevention strategies in primary care practice settings.

The type of source of data collection interferes with the prevalence estimates of multimorbidity.[42] To minimise this effect, three sources of data were simultaneously used for each patient in this study: self-reported health status, analyses of medical records and GP's knowledge of the patient's history.

In agreement with previous reports,[46] cardiometabolic and mental disorders were the most common chronic health problems in the study sample. Compared with national estimates, lipid disorder is lower in the sample (38.9% vs 47.0%[47]), whereas hypertension (uncomplicated plus complicated)—47.5% vs 42.2%,[48] depressive disorder—17.1% vs 7.9%,[49] diabetes (non-insulin dependent)—16.7% vs 11.7%[50] and obesity—16.2% vs 14.2%[51] are higher in the sample. However, these studies present considerable differences in methodologies and target populations, which make prevalence comparisons difficult and the focus of further research. A possible reason for the relative high prevalence of depressive disorder in the sample may be the worsening of the socioeconomic conditions that Portugal faced due to the austerity programme from the International Monetary Fund and European Union.[52] Another possible explanation for this is that depressive disorder is most frequently present in females,[53] who constitute the majority of the sample.

The most common chronic health problems observed in the sample systematically coexisted with other chronic conditions in line with previous studies.[46] Both females and males affected by one of the most common chronic health problems have an increased risk of having multimorbidity (two or more and three or more chronic conditions).

According to a recent review,[29] there is no consistent pattern of multimorbidity across studies, mostly due to

differences in the study design and inclusion criteria.[54] Nevertheless, comorbidities can be grouped into three broad types: cardiometabolic, anxiety-depression and pain related.[29] The results of this study further support this classification in adult patients with multimorbidity in the primary care. The cardiometabolic pattern found reflects three of the main features of the metabolic syndrome:[54] diabetes, obesity and hypertension. This clustering of illness and risk factors is considered to be the agent of a new epidemic of cardiovascular disease.[55] The anxiety-depression cluster favours the diagnosis of a syndromal combined anxiety and depressive disorder, very common in primary care and seen most frequently in this setting.[56] A cluster with pain was also present in this study; back syndrome with radiating pain was found to be associated with other chronic health problems that can cause or contribute to it such as osteoarthrosis and osteoporosis (indirectly by leading to painful fractures of the vertebrae). These findings strengthen the idea of the presence of associations of chronic health problems in patients with multimorbidity.

Limitations of the study

Some limitations of the study need to be stated. First, volunteer GPs collected data only from patients whom they have observed in consultations, which may have caused an over-representation of the frequent users of primary care services. The use of a random sample of each GP's patients might have produced more accurate results,[3] although this would have not been practicable due to financial and time restraints. Nonetheless, the results of this study produce an image of the type of health problems tackled in GP practices. Second, even though all five mainland Portuguese Healthcare Administrative Regions were represented in this study, local unknown biases could have been introduced and our findings may not be generalisable to all Portuguese primary care. Third, although important when studying multimorbidity, no indicator of disease severity was used as it would be too demanding for participating GPs to evaluate in each consultation. Finally, this study is cross-sectional, and therefore no causal relationship could be proven. Despite the stated limitations, the study suggests that the most common chronic health problems and the encountered prevalence of multimorbidity were similar to those found in other studies, which supports the validity of the study findings.

CONCLUSION

This study contributes to an increase in the understanding of multimorbidity and chronic health problems of the Portuguese population aged 18 and older attending primary care consultations. Multimorbidity was found to be a common occurrence in the studied sample. The highest levels of multimorbidity were identified among some vulnerable groups: the elderly, the less educated and the pensioners/retirees, which make them the

target audience to consider in terms of public policies in the fields of health promotion and disease prevention. Regarding the prevalence of cardiometabolic and mental disorders, they clearly are two areas that need to be prioritised by GPs in the community. Six multimorbidity clusters have been identified. In the future, these patterns may benefit from directed care management, but only further research with a longitudinal approach will tell.

Survivorship with multimorbidity is the price of success of effective primary and secondary care, but do primary care patients with multimorbidity have a positive quality of life in Portugal? This is a question that phase II of our study will aim to answer.

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Prevalence of multimorbidity in the adult population attending primary care in Portugal: a cross-sectional study

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PAPER III

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Prazeres F, Santiago L.

Relationship between health-related quality of life, perceived family support and unmet health needs in adult patients with multimorbidity attending primary care in Portugal: a multicentre cross-sectional study.

Paper III research was conducted to analyse the relationship between multimorbidity, health-related quality of life, perceived family support and unmet health needs in adult patients attending primary care in Portugal. The paper was published in Health and Quality of Life Outcomes in 2016.

Health and Quality
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Relationship between health-related quality of life, perceived family support and unmet health needs in adult patients with multimorbidity attending primary care in Portugal: a multicentre cross-sectional study

Filipe Prazeres[1,2*] and Luiz Santiago[1,3]

Abstract

Background: Multimorbidity has a high prevalence in the primary care context and it is frequently associated with worse health-related quality of life (HRQoL). Few studies evaluated the variables that could have a potential effect on HRQoL of primary care patients with multimorbidity. The purpose of this study, the first of its kind ever undertaken in Portugal, is to analyse the relationship between multimorbidity, health-related quality of life, perceived family support and unmet health needs in adult patients attending primary care.

Methods: Multicentre, cross-sectional survey conducted among primary care patients with multimorbidity. It included 521 participants (64.1 % females) who met the inclusion criteria. HRQoL was evaluated using the Portuguese Short Form-12 Health Status Questionnaire. The Portuguese Family APGAR was used to measure the perceived family support. A patients' unmet health needs questionnaire was used. The unmet needs for medical, surgical and dental care; prescription medications; mental healthcare or counselling; and eyeglasses or other technical aid was assessed. Descriptive and multivariate analyses were performed.

Results: The sample had an overall average of 4.5 chronic health problems. Increased multimorbidity levels were linked to worse health-related quality of life, particularly the physical health. Some variables were confirmed as playing a role on health-related quality of life. Male patients with high monthly incomes and highly functional families had better physical and mental health. High levels of education and the presence of asthma were also associated with better physical health. Contrariwise, elderly patients with high levels of multimorbidity and with osteoarthritis had lower physical health. The majority of the patients did not have unmet health needs. When health needs were stated they were mostly for generalist medical care, dental care, and eyeglasses/other technical aid. Financial insufficiency was the primary reason for not fulfilling their health needs.

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Conclusion: To improve the quality of life of multimorbid patients, within primary care practices and health delivery systems, one should take into special account the sex of the patient, the perceived family support and the self-perceived economic status because of their relationship with both physical and mental health. Limitations and recommendations are discussed.

Keywords: Multimorbidity, Health-related quality of life, Family support, Unmet health needs, Primary health care, Portugal

Background

The prevalence of multimorbidity, defined as the co-occurrence of 2 or more chronic health problems within one person [1], is increasing worldwide due to the effects of improved living conditions, better medical care and an aging population [2, 3]. Portuguese epidemiologic data follows the same tendency, with a high prevalence of multimorbidity (72.7 %) amongst adult patients attending primary care [4]. Factors such as social deprivation [5], marginalisation [6], mental health disorders [5], and poor housing conditions [7] are associated with an increased prevalence of multimorbidity.

Living with multimorbidity can be a difficult task for the patients as well as for their healthcare providers. Multimorbid patients are more likely to die early [8], experience poor clinical outcomes [9] and a decline of physical functioning [10]. When describing the health burden of chronic diseases, healthcare providers should include measurements of health-related quality of life (HRQoL) [11].

HRQoL is a multidimensional concept that includes domains related to physical, mental, emotional and social functioning associated with an illness or treatment [12]. The Centers for Disease Control and Prevention (CDC) defined HRQoL as an individual's or group's perceived physical and mental health over time [13]. Self-rated health status is also a predictor of mortality [14].

Since multimorbidity has a significant negative impact on HRQoL [15–19], it would be expected that this relationship would be commonly researched, particularly in the primary care context where the majority of treated patients are multimorbid [20], but this is not the case [16]. Limited information exists about the influence of sociodemographic factors (e.g. social support, educational background, economic status) on HRQoL of primary care patients with multimorbidity [2]. There is some evidence to suggest that strong social support from family members can protect against illness or disability [21] and improve chronic illness outcomes [22].

Therefore, a comprehensive approach to the multimorbid patient should take into consideration not only the measurement of HRQoL, but also the impact of the different sociodemographic factors on HRQoL [2, 16],

including family support, and the health needs of this group of patients, for GPs to improve care to multimorbid patients and ultimately improve the efficacy of healthcare planning and deal with the inherent social costs, particularly in contexts with limited resources [23].

The purpose of the present study, the first of its kind ever undertaken in Portugal, is to determine the impact of multimorbidity on HRQoL in patients aged 18 years and above attending primary care. Specifically, this study aims to i) characterise the unmet health needs of adult patients with multimorbidity, ii) assess family support to adult patients with multimorbidity; iii) analyse the relationship between multimorbidity, patients' health-related quality of life, perceived family support and unmet health needs.

Methods

Study design

A multicentre, cross-sectional survey was conducted among primary care patients with multimorbidity in thirteen Primary Care Centres in the Centre region of Portugal, between January 2014 and January 2015. This study reports on Phase II of a Three-Phase project (MM-PT: Multimorbidity in primary care in PorTugal) aimed at raising awareness on the relevance to deal with multimorbidity in Portugal. Details regarding the full project's protocol were previously published elsewhere [24].

The study was approved by local research ethics committees (Faculty of Health Sciences – University of Beira Interior – and the Central Health Region of Portugal) and was conducted in accordance with the principles of the Declaration of Helsinki [25]. Informed consent was obtained from all participants and confidentiality was maintained.

The reporting of this study conforms to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement [26].

Sample

Study size and sampling of the Primary Care Centres have been described elsewhere [24]. Enrolled GPs recruited patients presenting for a primary care appointment at each

of the institutions during the period of the study. They ensured that each individual patient met the criteria for eligibility. Participation inclusion criteria included being a willing volunteer to participate; being 18 or more years of age; and having a recorded diagnosis of at least two chronic health problems, of which at least one was required to be hypertension, diabetes, asthma or osteoarthritis. These 4 diseases were selected because, on the one hand, they have high prevalence and are frequently associated with low quality of life, and on the other hand, there are national efforts to implement specific recommendations for the diagnosis, treatment and control of these diseases [24]. Exclusion criteria included being acutely unwell or presenting inability to provide independent informed consent. A total of 548 patients were approached (including approximately 10 % above estimated sample size to account for expected missing data). Twenty-seven individuals refused to participate without any stated reason. Therefore, 521 interviews were performed; all interviews were fully completed and so no missing data was encountered.

Data collection procedures

Data collection was performed by protocol [24]. It was carried out through a structured face-to-face interview delivered by the investigator or a GP/GP trainee. In order to minimize interview bias, all interviewers were very experienced in conducting face-to-face interviews and, if needed, received additional training from members of the research team. Interviews were performed after the patient's clinical visit or while waiting for their appointment. Consenting patients were evaluated at a single-time point and the responses were recorded on paper. The average time of the interview was 15 min.

Measures
Sociodemographic characteristics

Using the personal information section of the Portuguese version of the EASY-Care questionnaire [27], self-reported data were obtained for sex (male/female), age group (18-34/35-49/50-64/≥65 years), residence area (urban/rural), current marital status (married-cohabiting/single/widowed/separated-divorced), number of years of formal education (less than 6 years/at least 6 but not more than 9 years/more than 9 years), living arrangements (couple/extended family/alone/other), professional status (pensioner-retired/employed/unemployed/housewife/student) and self-perceived economic status ("Just enough to make ends meet"/"Not enough to make ends meet"/"Some money left over").

Medical history and measures of multimorbidity

Patients' chronic health problems were collected by the investigator or a GP/GP trainee using 3 data sources for each patient: GPs knowledge of patient's history, patient's self-report and medical records.

The current study considered the 147 International Classification of Primary Care (ICPC-2) diagnoses gathered by O'Halloran et al. [28] (Family Medicine Research Centre, University of Sydney). These diagnoses were defined as chronic by the O'Halloran criteria: a) have a duration that has lasted, or is expected to last, at least 6 months; b) have a pattern of recurrence, or deterioration; c) have a poor prognosis and d) produce consequences, or sequelae that impact on the individual's quality of life [28].

Multimorbidity was measured based on simple counts of chronic health problems coexisting within one person. Drawing on the categorization of Kadam et al. [29], multimorbidity was classified into low morbidity count (2 or 3 chronic health problems), medium (4 or 5 chronic health problems) and high (6 or more chronic health problems). No assessment of disease severity in the multimorbid conditions found was undertaken.

Health-related quality of life

The Portuguese Short Form-12 Health Status Questionnaire (SF-12) [30], was used to assess health-related quality of life from the patient's perspective.

The SF-12 [31] is a short form survey with 12 questions. In studies with large samples ($n = 500$) it is a valid alternative to the 36-item Short Form (SF-36) [31] since it takes an average of 2 min to administer and has a reduced respondent and administrative burdens [31–33]. The SF-12 addresses the same 8 domains as identified in the SF-36: physical functioning (PF, 2 items); role limitations due to physical health problems (RP, 2 items); bodily pain (BP, 1 item); general health perceptions (GH, 1 item); vitality (VT, 1 item); social functioning (SF, 1 item); role limitations due to emotional problems (RE, 2 items) and mental health (MH, 2 items). The SF-12 also assesses 2 health status composite scores: physical health (Physical Component Summary, PCS) and mental health (Mental Component Summary, MCS). These composite scores are generated using an algorithm for comparison to normative data—general United States (US) population—with a mean score of 50 and a standard deviation of 10; scores above 50 indicate better physical or mental health and scores bellow 50 indicate worse health [31]. Since there is little difference between standard scoring algorithms (US-derived) and country-specific algorithms, the use of the standard scoring algorithms is recommended to allow data comparisons across countries [34].

This brief tool (SF-12) has been used extensively in clinical and population-based studies [32], including those with chronic health conditions. The Portuguese version has shown satisfactory reliability and validity [30]. In the present study, both summary measures

exceeded the 0.70 level for Cronbach's Alpha (internal consistency) indicating satisfactory results (α for the PCS and the MCS was 0.84 and 0.82, respectively).

Family support

The Portuguese Family APGAR Questionnaire [35, 36] was used to measure the perceived family support of patients with multimorbidity. This questionnaire is commonly used in the Portuguese primary care setting, since it is widely available to GPs as an integral part of the electronic health records software.

Family APGAR Questionnaire features five closed-ended questions measuring family member's satisfaction with each of the five basic components of family function (Adaptation, Partnership, Growth, Affection and Resolve) [37]. The response format is a three-point scale ("almost always"—two points; "some of the time"—one point; or "hardly ever"—zero points). The scores for each of the five questions after totaled originate the following categories: a) severely dysfunctional families (0 to 3 points); b) moderately dysfunctional families (4 to 7 points); or c) highly functional families (8 to 10 points) [37, 38]. In the study, Cronbach's Alpha (internal consistency) for the total scale was 0.86.

Patients' unmet health needs

The unmet needs for medical, surgical and dental care; prescription medications; mental healthcare or counselling; and eyeglasses or other technical aid were evaluated. The detailed set of questions used in this study are provided in the previously published protocol [24]. These questions were pilot tested for comprehensibility in 50 adult general practice patients, no changes were necessary.

Statistical analyses

Variables were summarized using descriptive statistics namely absolute (n) and relative (%) frequencies for categorical variables and mean and standard deviation (SD) for numerical variables.

Univariate analyses were performed to study the association between presence of unmet health needs, presence of moderate/severe dysfunctional family and health related quality of life with patients' characteristics using Chi-square test (categorical variables) or Kruskal-Wallis test (numerical variables which did not follow normal distribution).

Multiple binary logistic regression for presence of unmet health needs and perceived moderately/severely dysfunctional family was performed using variables found to be statistically significant in the univariate analysis and a stepwise selection method (variables were entered considering a stepwise probability of 0.05). Pairwise comparisons within comorbidity groups were performed

using Dunn's [39] procedure with a Bonferroni correction for multiple comparisons.

Multiple linear regression was performed for PCS and MCS scores using variables significant in the univariate analysis and a stepwise selection method (variables were entered considering a stepwise probability of 0.05).

All tests were two-sided considering a significance level of 0.05. Statistical analysis was performed using IBM SPSS Statistics for Windows, Version 21.0 (IBM Corporation, Armonk, NY, USA).

Results

Characteristics of participants

Demographic and medical characteristics of the 521 study participants are shown in Table 1. Mean age was 58.2 years (61.2 years for men and 56.6 years for women). The majority of participants were female (64.1 %) and 57.2 % had a low level of education. Approximately half of those surveyed (46.3 %) reported a sufficient monthly income. Seventy per cent were married or cohabiting, and 54.3 % lived as a couple.

Low morbidity count was present in 42.2 % of the sample, 27.6 % had a medium morbidity count and a high morbidity count was encountered in 30.1 %, with an overall average of 4.5 chronic health problems per participant (4.6 in men and 4.5 in women).

Unmet health needs and multimorbidity

Unmet health needs are described in Table 2. At least one unmet health need in the preceding 12 months was reported by about one third of the patients and 7.3 % reported two or more unmet health needs.

The most common unmet health needs were related to generalist medical care, dental care, and eyeglasses or other technical aid. The most frequently cited reason for explaining the presence of unmet health needs was financial (18 % of the respondents had to spend their money for food, clothing, housing, etc.).

Presence of unmet health needs was statistically similar across the three multimorbidity groups ($p = 0.676$) (Table 2).

Unmet health needs and other characteristics

From univariate analysis, presence of unmet needs was more frequently reported by women than men (37.7 % vs. 18.7 %; $p < 0.001$), by patients with lower/medium education levels than higher level (33.3 % vs. 23.0 %; $p = 0.030$), by patients with insufficient monthly income than by sufficient/higher monthly incomes (48.2 % vs. 22.4 %/13.6 %; $p < 0.001$), by non-diabetics than diabetic patients (33.8 % vs. 23.8 %; $p = 0.026$), and by patients with osteoarthritis than without it (35.7 % vs. 24.4 %; $p = 0.006$). Moreover, patients reporting unmet health needs were 5 years younger than patients

Table 1 Demographic and medical characteristics of participants (n = 521)

Sex, % (n)	
Women	64.1 (334)
Men	35.9 (187)
Age group, % (n)	
18–34 years	9.0 (47)
35–49 years	15.7 (82)
50–64 years	39.5 (206)
≥ 65 years	35.7 (186)
Residence area, % (n)	
Urban	49.1 (256)
Rural	50.9 (265)
Marital status, % (n)	
Married/cohabiting	70.2 (366)
Single	11.5 (60)
Widowed	8.6 (45)
Separated/divorced	9.6 (50)
Living arrangements, % (n)	
Couple	54.3 (283)
Extended Family	31.3 (163)
Alone	11.9 (62)
Other (including care home)	2.5 (13)
Education, % (n)	
Low level (less than 6 years)	57.2 (298)
Medium level (at least 6 but not more than 9 years)	19.4 (101)
High level (more than 9 years)	23.4 (122)
Professional status, % (n)	
Pensioner/retired	43.0 (224)
Employed (full-time/part time)	34.2 (178)
Unemployed	11.3 (59)
Housewife	10.4 (54)
Student	1.2 (6)
Monthly income, % (n)	
"Not enough to make ends meet"	38.2 (199)
"Just enough to make ends meet"	46.3 (241)
"Some money left over"	15.5 (81)
Multimorbidity group, % (n)	
Low (2–3 chronic problems)	42.2 (220)
Medium (4–5 chronic problems)	27.6 (144)
High (≥6 chronic problems)	30.1 (157)
Chronic health problems[a], % (n)	
Hypertension	61.8 (322)
Diabetes mellitus	29.0 (151)
Asthma	17.3 (90)
Osteoarthritis	57.6 (300)

Table 1 Demographic and medical characteristics of participants (n = 521) *(Continued)*

Other prevalent chronic health problems[a], % (n)	
Lipid disorder	63.1 (329)
Depressive disorder	19.6 (102)
Obesity	14.2 (74)
Overweight	10.9 (57)
Varicose veins of leg	9.8 (51)
Benign prostatic hypertrophy	8.1 (42)
Osteoporosis	7.9 (41)
Goitre	7.7 (40)
Liver disease	7.1 (37)
Anxiety disorder/anxiety state	5.4 (28)

[a]The same participant may have more than one condition

without unmet needs (average/range: 55 years/20–92 years vs. 60 years/18–93 years; $p = 0.003$).

Multivariate analysis (Table 3) shows that variables remaining important in explaining the presence of unmet health needs were sex, age, monthly income and education level. Women were 2.3 times more likely to report unmet health needs than men. Patients aged 18–34 years were 2.5 times more likely to report unmet health needs than older patients. Patients with insufficient monthly income were nearly 3.3 times more likely to report unmet health needs. Patients with low/medium level of education were 2 times more likely to report unmet health needs. The presence of diabetes or osteoarthritis was not statistically significant to the model.

Perceived family support and multimorbidity

Regarding the family support as reported by the sample, the majority (70.4 %) perceived their families to be highly functional, 20.3 % reported as being moderately dysfunctional and 9.2 % severely dysfunctional (Table 2). On a scale of 0 to 10 (where 0 corresponds to the lowest and 10 to the highest family support) this represents a mean (SD) of 7.9 (2.7) for the overall sample.

According to the multimorbidity range, the group of patients with a high morbidity count (6 or more chronic health problems) had slightly higher perception of having a dysfunctional family than the low and medium multimorbidity groups; although this difference was not statistically significant ($p = 0.363$) (Table 2).

Perceived family support and other characteristics

From univariate analysis, perception of family dysfunction (moderate/severe) was more frequently reported by women than men (35.6 % vs. 18.7 %; $p < 0.001$), by patients living in urban that rural areas (33.6 % vs. 25.7 %; $p = 0.047$), by not married than married patients (45.2 % vs. 23.0 %; $p < 0.001$), by patients with insufficient

Table 2 Unmet health needs, perceived family support and health related quality of life

	Overall [n = 521]	Multimorbidity Group			P-value
		Low [n = 220]	Medium [n = 144]	High [n = 157]	
No. of unmet needs by participant, % (n)					
0	69.1 (360)	69.1 (152)	66.7 (96)	71.3 (112)	0.676
1	23.6 (123)	23.2 (51)	25.7 (37)	22.3 (35)	
2	6.0 (31)	6.8 (15)	5.6 (8)	5.1 (8)	
3	0.8 (4)	0.5 (1)	0.7 (1)	1.3 (2)	
4	0.6 (3)	0.5 (1)	1.4 (2)	0.0 (0)	
Type of unmet needs, % (n)[a]					
Prescription medications	1.2 (6)	0.9 (2)	2.8 (4)	0.0 (0)	n.a.
General medical care	13.1 (68)	13.2 (29)	16.0 (23)	10.2 (16)	0.330
Surgical care	1.0 (5)	0.5 (1)	1.4 (2)	1.3 (2)	n.a.
Mental healthcare/counselling	1.0 (5)	0.0 (0)	2.8 (4)	0.6 (1)	n.a.
Dental care	12.7 (66)	13.2 (29)	11.1 (16)	13.4 (21)	0.803
Eyeglasses/technical aid	11.3 (59)	12.3 (27)	10.4 (15)	10.8 (17)	0.838
Reasons, % (n)[a]					
Professional	3.1 (16)	5.5 (12)	2.8 (4)	0.0 (0)	n.a.
Too sick	1.2 (6)	1.4 (3)	1.4 (2)	0.6 (1)	n.a.
Mobility	1.7 (9)	0.5 (1)	2.8 (4)	2.5 (4)	n.a.
Care provider of a dependent	1.2 (6)	1.4 (3)	0.7 (1)	1.3 (2)	n.a.
Afraid to leave home	1.0 (5)	0.5 (1)	2.8 (4)	0.0 (0)	n.a.
Other concerns	1.0 (5)	1.8 (4)	0.7 (1)	0.0 (0)	n.a.
Financial	18.0 (94)	18.2 (40)	16.7 (24)	19.1 (30)	0.857
Access to GP consultations	8.6 (45)	6.4 (14)	12.5 (18)	8.3 (13)	0.123
Family APGAR categories, % (n)					
Severely Dysfunctional	9.2 (48)	7.3 (16)	8.3 (12)	12.7 (20)	0.363
Moderately Dysfunctional	20.3 (106)	22.3 (49)	18.1 (26)	19.7 (31)	
Highly Functional	70.4 (367)	70.5 (155)	73.6 (106)	67.5 (106)	
SF-12 scores, mean (SD)					
PF	44.2 (12.4)	48.5 (10.8)	42.4 (12.4)	39.7 (12.6)	<0.001
RP	43.1 (12.9)	47.2 (11.1)	42.1 (13.0)	38.1 (13.2)	<0.001
BP	40.0 (12.4)	43.6 (12.0)	39.1 (12.6)	36.0 (11.5)	<0.001
GH	34.6 (11.2)	39.0 (11.5)	32.5 (9.9)	30.4 (9.6)	<0.001
VT	48.0 (11.4)	50.3 (10.8)	47.1 (11.3)	45.7 (11.6)	<0.001
SF	44.8 (13.5)	47.5 (12.7)	43.8 (13.5)	41.8 (14.1)	<0.001
RE	44.1 (12.6)	46.3 (11.3)	44.2 (12.8)	40.8 (13.5)	<0.001
MH	45.1 (12.9)	46.9 (12.5)	45.5 (12.7)	42.3 (13.1)	0.002
PCS	40.3 (11.9)	45.0 (11.0)	38.3 (11.3)	35.5 (11.1)	<0.001
MCS	46.6 (12.2)	47.8 (12.0)	47.0 (12.3)	44.6 (12.4)	0.033

n.a. – Chi-square test not applicable due to low frequencies
PF physical functioning, *RP* role physical, *BP* bodily pain, *GH* general health, *VT* vitality, *SF* social functioning, *RE* role emotional, *MH* mental health, *PCS* physical component summary, *MCS* mental component summary
[a]The same participant may have reported more than one option

Table 3 Multiple logistic regression for presence of unmet health needs

Factors	OR (95 % CI)	P-Value
Sex		
Women	2.33 (1.48–3.66)	<0.001
Age group		
18–34 years	2.47 (1.21–5.05)	0.013
Monthly income		
"Not enough to make ends meet"	3.29 (2.17–4.99)	<0.001
Education		
Low/medium level	2.03 (1.15–3.58)	0.015

Reference category: sex = male; monthly income = "Just enough to make ends meet" aggregated with "Some money left over"; age group = higher than 34 years; education = high level

monthly income than with sufficient/higher monthly incomes (40.7 % vs. 25.3 %/14.8 %; $p < 0.001$), by patients living alone than with an extended family (54.8 % vs. 22.7 %, $p < 0.001$) and by patients with unmet health needs than without them (44.1 % vs. 23.1 %; $p < 0.001$).

Table 4 shows that variables remaining associated with perception of family dysfunction in multivariate analysis were sex, marital status, monthly income, living arrangements and presence of unmet needs. Women were 2 times more likely to perceive a dysfunctional family than men. Single/divorced/widow patients were 2.8 times more likely to perceive a dysfunctional family than married patients. Patients with insufficient monthly income were 1.8 times more likely to perceive a dysfunctional family. Patients with unmet needs were 1.9 times more likely to report a dysfunctional family. Patients living alone are more likely to perceive a dysfunctional family than patients living in an extended family.

Table 4 Multiple logistic regression for perceived moderately/ severely dysfunctional family

Factors	OR (95 % CI)	P-Value
Sex		
Women	2.01 (1.26–3.20)	0.003
Marital status		
Single/divorced/widow	2.77 (1.48–5.17)	0.001
Monthly income		
"Not enough to make ends meet"	1.81 (1.18–2.78)	0.007
Living arrangements		
Couple	0.905 (0.39–2.09)	0.815
Extended family	0.389 (0.19–0.79)	0.009
Other	0.910 (0.26–3.22)	0.884
Unmet needs		
Presence	1.94 (1.24–3.0)	0.003

Reference category: sex = male; marital status = married; living arrangements = alone; monthly income = "Just enough to make ends meet" aggregated with "Some money left over"; unmet needs = absent

Health-related quality of life and multimorbidity

The majority of the sample had a score bellow 50 (mean of the reference population) in all eight domains of the SF-12, particularly in general health (91.0 %) and bodily pain (77.9 %) (Fig. 1). Regarding the two health status composite scores, physical health (PCS) was worse than the mental health (MCS) (Table 2).

All SF-12 scores were statistically related with the multimorbidity groups, showing that health related quality of life decreases when levels of multimorbidity rise (Table 2). Pairwise comparisons revealed no statistically differences between (a) medium versus high morbidity groups in PF ($p = 0.196$), BP ($p = 0.063$), GH ($p = 0.226$), VT ($p = 0.928$), SF ($p = 0.799$) and PCS scores ($p = 0.139$); (b) medium versus low/high in RE, MH and MCS scores.

Health-related quality of life and other characteristics

Univariate analysis shows that the SF-12 eight domains and the two health status composite scores were related to at least one participant characteristic besides the multimorbidity level (Table 5). Indeed, all SF-12 scores were statistically related with marital status, monthly income, perceived family support (family APGAR) and the presence of unmet needs (Table 5).
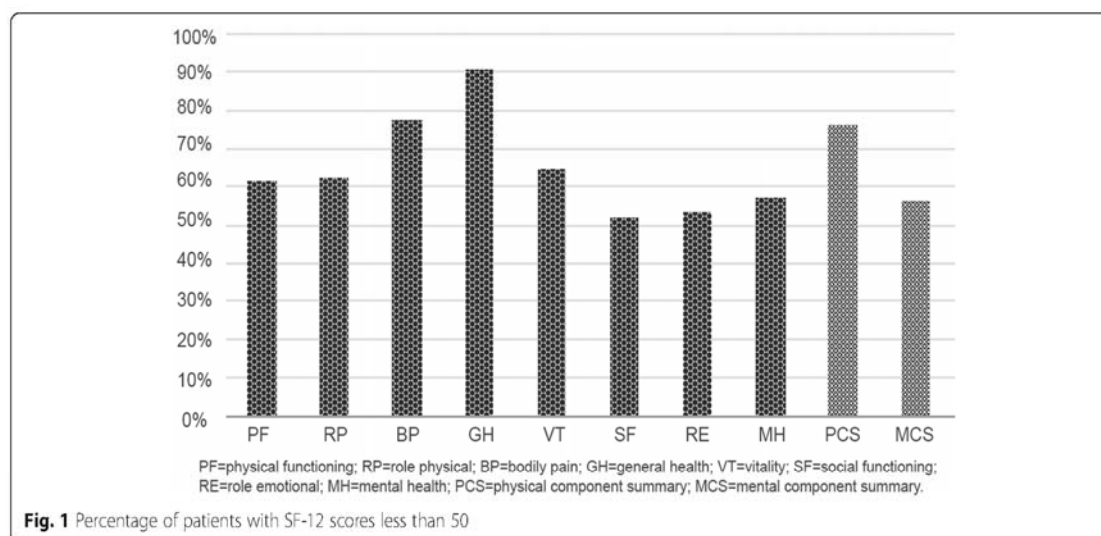
Multivariate analysis for PCS scores (Table 6) shows that sex, age, monthly income, education, multimorbidity groups, family APGAR, osteoarthritis and asthma were statistically significant predictors for PCS score. Male, higher monthly income, higher level of family functionality, higher level of education, younger age, lower levels of multimorbidity, absence of osteoarthritis, and presence of asthma are related with a predicted higher score at PCS. Regarding MCS scores, sex, monthly income, and family APGAR are statistically significant predictors. Being male, having a higher monthly income and a higher level of family functionality are MCS protective factors.

Discussion

The current study represents the first analysis on health-related quality of life among adult patients with multimorbidity in a primary-care context in Portugal.

Globally, the multimorbid sample in this study reported poorer health-related quality of life than the reference population (recommended for international comparisons) [34], which demonstrates the adverse effect of multimorbidity on health-related quality of life. This overall finding is in line with the available literature [15–19, 40]. However, existing studies lack comparable samples and methodologies and no direct comparisons can be made [2].

Health-related quality of life decreased inversely with the number of concurrent chronic health problems, which reflects previous studies [16, 18, 41, 42]. This

PF=physical functioning; RP=role physical; BP=bodily pain; GH=general health; VT=vitality; SF=social functioning; RE=role emotional; MH=mental health; PCS=physical component summary; MCS=mental component summary.

Fig. 1 Percentage of patients with SF-12 scores less than 50

occurrence was particularly evident when comparing the low (2 or 3 chronic health problems) and high (6 or more chronic health problems) morbidity count groups for all SF-12 dimensions (the eight domains and the two health status composite scores). Nonetheless, there was only a moderate evidence of the effect of multimorbidity on mental health compared to its effect on physical health, which also seems to be consistent with previous research [16, 17].

As could be expected from previous studies [43–45], increasing age was associated with poorer physical health. However, no effect of aging was observed on mental health. This discrepancy can be attributed to the psychological adaptation to illness, over time [46].

Female sex [2, 42, 43, 47, 48], low level of education [2, 43, 49], and a low income [15, 49, 50] are commonly associated with impaired health-related quality of life, and the current study's findings corroborate this. An implication of this is the possibility that multimorbid patients may benefit from financial aid through social policy programs.

This study also considered other variables that were earlier pointed out as having a possible impact on health-related quality of life [16] such as marital status,

Table 5 Association between SF-12 scores and participants' characteristics

Characteristic	SF-12 scores (P-values*)									
	PF	RP	BP	GH	VT	SF	RE	MH	PCS	MCS
Sex	<0.001	0.023	<0.001	0.016	0.004	<0.001	n.s	<0.001	0.001	<0.001
Age group	<0.001	<0.001	0.001	<0.001	n.s	n.s	n.s	n.s	<0.001	n.s.
Living arrangements	0.010	0.009	n.s	n.s	n.s	0.025	n.s	0.012	0.007	0.043
Education	<0.001	<0.001	<0.001	<0.001	<0.001	0.019	n.s	0.017	<0.001	n.s.
Residence area	n.s.	n.s	n.s	0.027	n.s	0.045	n.s	n.s	n.s.	n.s.
Marital status	<0.001	0.001	0.001	<0.001	0.017	<0.001	<0.001	0.003	<0.001	0.001
Monthly income	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Professional status	<0.001	<0.001	<0.001	<0.001	0.021	n.s	0.012	0.011	<0.001	n.s.
Family APGAR	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Unmet health needs	<0.001	0.003	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	0.001	<0.001
Asthma	<0.001	<0.001	<0.001	<0.001	n.s	n.s	n.s	n.s	<0.001	n.s.
Osteoarthritis	<0.001	<0.001	<0.001	<0.001	0.002	n.s	n.s	0.023	<0.001	n.s.
Diabetes	0.002	0.047	n.s	<0.001	n.s	n.s	n.s	n.s	0.001	n.s.
Hypertension	<0.001	0.001	0.029	<0.001	n.s	n.s	n.s	n.s	<0.001	n.s.

PF physical functioning, *RP* role physical, *BP* bodily pain, *GH* general health, *VT* vitality, *SF* social functioning, *RE* role emotional, *MH* mental health, *PCS* physical component summary, *MCS* mental component summary
*P-values are for score comparison between categories of each characteristic (bivariate analysis)

Table 6 Multiple linear regression for PCS and MCS

Variable	PCS			MCS		
	B	SE_B	β	B	SE_B	β
Intercept	34.82	3.49	-	22.02	2.41	-
Sex	3.23	0.97	0.13*	2.44	1.03	0.10*
Age group	-1.73	0.65	-0.14*	-	-	-
Monthly Income	1.71	0.67	0.10*	2.92	0.71	0.17*
Education	2.28	0.68	0.16*	-	-	-
Multimorbidity group	-2.41	0.60	-0.17*	-	-	-
Family APGAR	1.93	0.71	0.11*	6.16	0.78	0.33*
Osteoarthritis	-2.76	0.98	-0.12*	-	-	-
Asthma	3.23	1.34	0.10*	-	-	-

SE_B standard error of the coefficient, β = standardized coefficient
*$p < 0.05$; B = unstandardized regression coefficient

living arrangements and professional status. The current results do not show a clear relationship between these variables and health-related quality of life. Therefore, further work is still required to clarify the full impact of sociodemographic data on health-related quality of life in patients with multimorbidity [16].

Prior studies have noted the relationship between family APGAR scores and the presence of chronic illness [51, 52]. Despite its multiple chronic health problems, the study's sample reported high family support. Family dysfunction was present at a quite lower proportion than in previous reports [52–54]. This inconsistency may be due to the fact that in previous studies the age of the sample was limited to the geriatric population whereas in this study the age group was 18+ years old. The established distribution of family support was the same between age groups ($p = 0.182$).

In this study, as expected by previous findings [55, 56], perceived family support had an impact on health-related quality of life. Multimorbid patients from dysfunctional families reported worse physical and mental health. From these results, it is possible to infer that adult patients with multimorbidity in a primary-care context may have a potential gain in health-related quality of life if family members provide support for their care. In Portugal, most of the support comes from families, more than three quarters of informal caregivers provide daily care [57]. Increased social support from family members improves chronic illness outcomes [22] (e.g. better glycaemic control for diabetic patients [58], better blood pressure control for hypertensive patients [59], and lower disease activity for patients with arthritis [60]). As such, GPs should devise efforts to inform and engage patients' families as partners in the care of the multimorbid patient, notably the women living alone and with an insufficient monthly income.

In the present study, patients with unmet health needs had a statistically significant higher perception of having a dysfunctional family than those without unmet needs. The presence of unmet needs was also associated with lower health-related quality of life. Hence, family intervention programs for multimorbid patients (especially young women with an insufficient monthly income, living alone, and with low/medium level of education) will have to address their needs as to have a significant impact on quality of life and health outcomes [61].

Contrary to expectations, by taking into consideration the sample's morbidity levels, the majority of the patients did not have unmet health needs. But when health needs were stated they were mostly for generalist medical care, dental care, and eyeglasses or other technical aid. Financial insufficiency was the primary reason for not fulfilling their health needs. These findings not only reinforce the previously stated necessity of financial support to multimorbid patients (in particular women), but also that primary care teams should organize resources and schedules to meet the medical care needs of multimorbid patients. Interestingly, younger patients reported greater unmet health needs than older patients. A possible explanation for this finding is the relationship of multimorbidity with higher out-of-pocket spending [62]. Portugal is among the four Organization for Economic Co-operation and Development (OECD) countries with the highest out-of-pocket spending, mostly due to the recently imposed restrictions on tax-deductible expenses [63]. This increase in expenditures affects younger taxpayers and leaves out the older poor patients with tax exemptions. A note of caution is due here, since patients' needs may change as a result of the phase of illness, during major events, periods of disease exacerbation and patient's socioeconomic status. Future studies with a longitudinal approach are therefore recommended.

Several limitations need to be acknowledged. Four chronic health problems have been selected based on their importance and although this excluded patients with multimorbidity without at least one of the selected conditions, the study's sample captured 109 out of a total of 147 possible chronic health problems, a much higher number than the majority of the previously published health-related quality of life studies [16]. The current study did not take into account the severity of each chronic health problem and it had a cross-sectional design, so it was not possible to establish causal relationships. A sample selection bias due to the possibility of non-consecutive recruitment of patients by the GPs, should also be considered.

Conclusion
The findings of this study link the increased multimorbidity levels to worse health-related quality of life, particularly the physical health, in multimorbid patients aged 18 and older attending primary care consultations.

Some variables were confirmed as playing a role on health-related quality of life. As a result, to improve the quality of life of multimorbid patients, within primary care practices and health delivery systems, one should take into special account the sex of the patient, the perceived family support and the self-perceived economic status because of their relationship with both physical and mental health. This will also be of relevance when planning longitudinal and interventional studies regarding health-related quality of life.

Further research is suggested on larger nationwide samples to corroborate the results of the current study. It is also recommended to include the quality of household and living conditions in future health-related quality of life studies in the area.

Authors' contributions
FP and LS led the design of the study. FP performed the statistical analyses and drafted the manuscript. LS revised the manuscript critically for important intellectual content. Both authors read and approved the final manuscript draft.

Competing interests
The authors declare that they have no competing interests.

Consent for publication
Not applicable.

Ethics approval and consent to participate
The study was conducted in agreement with the principles of the Declaration of Helsinki. It was approved by the Ethics Committee of the Faculty of Health Sciences, University of Beira Interior, and the Ethics Committee of the Central Health Region of Portugal.

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PAPER IV

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Paper IV research was conducted to translate the European General Practice Research Network (EGPRN) definition of multimorbidity, according to Portuguese cultural and linguistic features. The paper was published in BioMed Research International in 2015.

Research Article

Defining Multimorbidity: From English to Portuguese Using a Delphi Technique

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Objective. To translate the European General Practice Research Network multimorbidity definition according to Portuguese cultural and linguistic features. *Methods.* Similar to the process completed in several other European countries, a forward and backward translation of the English multimorbidity definition using the Delphi technique was performed in Portugal. *Results.* Twenty-three general practitioners (GPs)—14 males and 9 females—agreed to form the Portuguese expert panel for the Delphi process (59% acceptance rate). The Portuguese definition of multimorbidity was achieved after two Delphi rounds with a mean (SD) consensus score for final round of 8.43/9 (0.73). *Conclusion.* With this paper the definition of multimorbidity is now available in a new language—Portuguese. Its availability in the local language will raise Portuguese GPs' awareness about multimorbidity and allow future national and international research. The operationalization of the definition will allow an easier identification of patients with multimorbidity.

1. Introduction

Clinicians working in the primary health care context, namely, family physicians and general practitioners (GPs), deal with the broad spectrum of conditions affecting each individual seeking a medical consultation. In this setting, most of the time it is not possible to pinpoint an index disease, nor is it useful for the patient's care [1]. Therein lies the main difference between comorbidity and multimorbidity; the former always involves the presence of an index disease [2]. Thus, the majority of GP visits comprise individuals with multimorbidity [3]. The most frequent measure of multimorbidity is the presence of 2 or more chronic diseases in the same person [4]. Although this is a useful operational definition, the construct of multimorbidity is still difficult to define in clinical terms [5]. Recently, after a systematic literature review, the European General Practice Research Network published a comprehensive definition which states that "multimorbidity is defined as any combination of chronic disease with at least one other disease (acute or chronic) or biopsychosocial factor (associated or not) or somatic risk factor. Any biopsychosocial factor, any somatic risk factor, the social network, the burden of diseases, the health care consumption, and the patient's coping strategies may function as modifiers (of the effects of multimorbidity). Multimorbidity may modify the health outcomes and lead to an increased disability or a decreased quality of life or frailty" [6]. This definition aims to be especially useful in long term care and in family medicine settings [6] and at the same time to be valid for future collaborative research [7]. For this last purpose, it has been translated into ten European languages [7]. The Portuguese language was not one of them.

In Portugal, the 40-year history of family medicine led to the recognition of its importance in the country's health care delivery [8]. Multimorbidity is present in around 70% of the adult patients attending primary care in Portugal [9], and this high prevalence will produce significant difficulties in the provision of medical care. Using a definition of multimorbidity in the country's own language will standardize the

TABLE 1: Characteristics of the expert panel.

	Portuguese translation (n = 23)	Global average of previous translations [7] (n = 229)	P value
Males, %	60.87	50.69	0.51[*]
Mean (SD) age, years	45.78 (12.82)	48.26	0.36[†]
Mean (SD) years of practice	18.09 (13.28)	18.82	0.79[†]
Mean (SD) number of English publications	6.13 (7.12)	5.91	0.88[†]
Mean (SD) number of other publications	15.09 (15.24)	20.45	0.11[†]

[*]Fisher's exact test.
[†]Student's t-test.

identification of multimorbid patients while simultaneously enabling future collaborative projects as well as addressing more effectively this overwhelming medical problem.

It is expected that this definition will have a broad suitability to other Portuguese language settings and countries. The British Council's report "Languages for the Future" [10] identifies Portuguese as one of the ten languages most vital to UK over the next 20 years. With approximately 203 million speakers, Portuguese is the sixth most spoken language in the world [10], the third most spoken language in the Western Hemisphere, and the first most spoken language in the Southern Hemisphere [11].

In this study, the authors aimed to translate the English multimorbidity definition according to Portuguese cultural and linguistic features using a forward-backward translation by a Delphi technique.

2. Materials and Methods

Similar to the process completed in Bosnia, Bulgaria, Croatia, France, Germany, Greece, Italy, Poland, and Spain [7], a forward and backward translation of the English multimorbidity definition [6] using the Delphi technique was performed in Portugal. This technique is easily adapted to reach a consensus in a variety of issues [12], including medical research [13].

The first phase involved translating the definition from English to Portuguese (forward translation). This was done by a team of one official translator and one physician; both were native Portuguese speakers.

In the next phase the Delphi process was implemented. Aiming at a sample size between 10 to 30 national expert GPs as recommended by the European General Practice Research Network [7], 39 possible participants were individually contacted by email to receive the original English multimorbidity definition and its translation into Portuguese. GPs were selected on the basis of having a Portuguese nationality, being fluent in English (understanding/speaking/writing), being involved in clinical practice, in research, and/or in teaching activities, and having the willingness to dedicate the time to this method of discussion. The expert panel was requested to rate their level of agreement with the Portuguese translation on a Likert-type scale ranging from 1 = "absolutely no agreement" to 9 = "full agreement." If a rating less than 7 was given it was mandatory to justify the reasons for that

evaluation. Consensus was defined as at least 70% of the GPs rating 7 or above the Portuguese definition. If a consensus was not reached in the first round, the expert panel's remarks were compiled into a unified translation, and a subsequent round of assessment was followed in the same way as for the first one. This process was repeated until a consensual translation was found. The participating GPs' characteristics (gender, age, years of practice, number of English publications, and number of other publications) were collected by a self-administered questionnaire conducted through email.

When a consensual Portuguese translation was reached it was submitted to a Portuguese linguist from the University of Coimbra (Portugal) for validation.

The final phase involved translating the consensual definition in Portuguese to English (backward blind translation). This was done by a team of one official translator (native English speaker) and one physician. They had no previous knowledge of the original definition. Subsequently, the authors of the study compared the back-translated version with its original version for linguistic congruence and cultural relevancy.

As no patient was involved in the study, no formal ethics approval was necessary. Consent was inferred by participants' completion of the survey.

A descriptive analysis was performed and both Fisher's exact test and Student's t-test were used to compare the current study's expert panel with the panel of the previous translations. P values <0.05 were considered statistically significant.

3. Results

Twenty-three GPs (14 males and 9 females) agreed to form the Portuguese expert panel for the Delphi process (59% acceptance rate). All members of the expert panel satisfied the inclusion criteria. The profile of the Portuguese GPs did not differ significantly from that of the previous translations [7] (Table 1).

The Portuguese definition of multimorbidity was achieved after two Delphi rounds with a mean (SD) consensus score for final round of 8.43 (0.73). Only one expert rated the forward translation below 7 (95.7% approval rate). The expert panel produced 43 comments in total. The terms which originated remarks were "burden of disease" and "health outcomes." Minor grammatical annotations were

TABLE 2: Portuguese final translation and the backward translation.

Portuguese final version	Portuguese final version translated into English
A multimorbilidade é definida como qualquer combinação de uma doença crónica com pelo menos uma outra doença (aguda ou crónica), ou com um fator biopsicossocial (associado ou não), ou com um fator de risco somático.	Multimorbidity is defined as any combination of chronic disease with at least one other disease (acute or chronic) or biopsychosocial factor (associated or not) or somatic risk factor.
Qualquer fator biopsicossocial, qualquer fator de risco somático, a rede social, a carga das doenças, o consumo de cuidados de saúde e as estratégias de adaptação do doente podem funcionar como modificadores (dos efeitos da multimorbilidade).	Any biopsychosocial factor, any somatic risk factor, the social network, the burden of diseases, the health care consumption, and the patient's coping strategies may function as modifiers (of the effects of multimorbidity).
A multimorbilidade pode modificar os resultados em saúde e levar a um aumento da incapacidade, à diminuição da qualidade de vida ou à fragilidade.	Multimorbidity may modify the health outcomes and lead to an increased disability or a decreased quality of life or frailty.

frequently suggested, recorded, and incorporated into the definition.

Table 2 shows the final consensual Portuguese definition of multimorbidity and the backward translation as accepted by the authors of this study. No changes were found in comparison with the original English definition.

4. Discussion

With the current study the translation of the English multimorbidity definition into Portuguese was achieved.

No universal guidelines exist on how to apply the Delphi technique [14]. Some authors have even stated that the advantages and disadvantages of this method are equally weighted [12]. Nonetheless, with methodological precision and research rigour the Delphi technique can be properly and efficiently used [14]. In the current study, the successful methodology employed in previous translations was adopted.

The Portuguese translation was the end result of the reviews of an expert panel of practicing GPs that verified that the terms expressed in the definition complied with the ones in use in Portugal. The Portuguese panel had similar characteristics to the average of the panels of the previous translations [7]. This ratifies the thorough selection process used to choose the GP experts in this study. The challenged terms were the same as in the other countries' translations; this may be explained by the fact that those expressions are less commonly used on a daily basis. In the second round this was overcome and the backward translation did not reveal any changes in comparison with the original English definition.

5. Conclusion

With this paper the definition of multimorbidity is now available in a new language—Portuguese. Its availability in the local language will raise Portuguese GPs' awareness about multimorbidity and allow future national and international research. The operationalization of the definition will allow an easier identification of patients with multimorbidity.

Ethical Approval

As no patient was involved in the study, no formal ethics approval was deemed necessary.

Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of this paper.

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PAPER V

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Paper V research was conducted to access GPs' knowledge, awareness, and practices regarding multimorbidity and its management. Evaluate the clarity and usefulness of the EGPRN definition of multimorbidity. Study if providing informational material depicting results of our previous studies on multimorbidity, would change current GPs' views on the subject. The paper was published in International Journal of Environmental Research and Public Health in 2016.

Article

The Knowledge, Awareness, and Practices of Portuguese General Practitioners Regarding Multimorbidity and Its Management: Qualitative Perspectives from Open-Ended Questions

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Abstract: Multimorbidity's high prevalence and negative impact has made it a subject of worldwide interest. The main aim of this study was to access the Portuguese knowledge, awareness, and practices of general practitioners (GPs) regarding multimorbidity and its management, in order to aid in the development of interventions for improving outcomes in multimorbid patients in primary care. A web-based qualitative descriptive study was carried out in the first trimester of 2016 with primary care physicians working in two districts of the Centre region of Portugal. Open-ended questions were analysed via inductive thematic content analysis. GPs pointed out several difficulties and challenges while managing multimorbidity. Extrinsic factors were associated with the healthcare system logistics' management (consultation time, organization of care teams, clinical information) and society (media pressure, social/family support). Intrinsic factors related to the GP, patient, and physician-patient relationship were also stated. The most significant conclusion to emerge from this study is that although GPs perceived difficulties and challenges towards multimorbidity, they also have the tools to deal with them: the fundamental characteristics of family medicine. Also, the complex care required by multimorbid patients needs adequate consultation time, multidisciplinary teamwork, and more education/training.

Keywords: Portugal; primary care; qualitative study; perceived experiences; multimorbidity

1. Introduction

In recent years, there has been a worldwide increasing interest in multimorbidity [1], and this is understandable because of its high prevalence [2] and negative consequences, as multimorbidity is ultimately responsible for 63% of all deaths worldwide [3]. Multimorbidity, the presence of multiple chronic conditions or diseases in the same individual [4–6], is becoming progressively more common [7]. Currently, an estimated 50 million people in the European Union suffer from multimorbidity [8], making it the most common chronic condition [5]. Also, in America, the number of people with chronic conditions is projected to increase steadily for the next 30 years [9]. In a recent study in Portugal the prevalence of multimorbidity in primary care was above 70% in adult patients [10].

Multimorbid patients have a higher number of primary care consultations and health-related costs [11]. This has significant implications for the healthcare system and patients' quality of life [12,13]. Multimorbidity is thus a major challenge to primary care [14]. Nonetheless, general practitioners (GPs), practising closely to the community, are highly-trained to provide appropriate and cost-effective care for patients across their life span [14,15].

Evidently, primary care will play a significant role in future strategies to deal with multimorbidity. For the development of interventions for improving outcomes in multimorbid patients, it is important to assess GPs' experiences and opinions regarding multimorbidity and its management [16,17].

To date, qualitative studies that have explored the lived experiences of GPs did not find a single unifying result [18]. This may be the consequence of different research methods and distinct health care systems studied. Consequently, interventions towards multimorbidity in primary care in Portugal will have to take into account the country's own health care particularities, which are known to local practising GPs. Most of the Portuguese population has health care coverage [19] and the primary care centre is commonly the first point of contact with the public system [20]. GPs in primary care centres provide the following services: "general medical care for the adult population; prenatal care; children's care; women's health; family planning and perinatal care; first aid; certification of incapacity to work; home visits; preventive services, including immunization and screening for breast and cervical cancer and other preventable diseases" [20] (p. 100). GPs also act as gatekeepers, and the referrals to secondary care are made through them [20].

Portuguese GPs' views and attitudes will be used to inform health care policy and potential interventions and will also add to the existing international knowledge regarding multimorbidity in other National Health Services with a gatekeeping system in place.

The main aim of this study was to access GPs' knowledge, awareness, and practices regarding multimorbidity and its management. The second objective was to evaluate the clarity and usefulness of the European General Practice Research Network (EGPRN) definition of multimorbidity [21], recently translated to Portuguese [22]. This is a comprehensive concept of multimorbidity [23] that may have a positive contribute for a future consensual definition. A consensus will be important for the comparability of results across studies. The third objective was to study if providing informational material depicting results of our previous studies on multimorbidity, would change current GPs' views on the subject.

2. Materials and Methods

A web-based qualitative descriptive study [24] was carried out in the first trimester of 2016 and represents the third and final phase of the MM-PT project (Multimorbidity in primary care in Portugal) [25]. In general, this project explores the epidemiology of multimorbidity in Portugal [25].

An internet-based approach was employed since it can be an effective alternative to postal and telephone surveys of health professionals [26]. Qualitative data collected by this process has comparable quality to other collection methods, at lower costs and with shorter response times [27].

The current study was conducted in agreement with the principles of the Declaration of Helsinki [28]. Ethical clearance was obtained from an Ethics Committee at Faculty of Health Sciences (University of Beira Interior) and at Central Regional Health Administration (Portugal). The reporting of this study conforms to the Standards for Reporting Qualitative Research (SRQR) guidelines [29].

2.1. Sample and Recruitment

Primary care physicians working in two districts of the centre region of Portugal (Coimbra and Aveiro) participated in the study. These districts were conveniently chosen to maximize sample variation since features of the Primary Care centres located in these regions were known to the research team.

Considering that there is no universally established sample size for qualitative research [24], no formal calculations were performed to estimate sample size. Nonetheless, at least 10% of the population of GPs in these two districts, corresponding to a sample size of approximately 60 GPs, was anticipated to be included in the study. Purposive sampling [30] was used in the study with the goal to maximize variation in regard to primary care physicians' sex, age, academic degree, career level, experience in primary care, and practice type.

Different recruitment strategies were used: the questionnaire's web address was publicized on medical open web sites and electronic discussion groups and also distributed by chain referral [31] between peers. Monthly reminders were sent. Participation was voluntary and no reimbursement was offered. All respondent GPs have been included and no exclusion criteria was used. Sampling ceased after saturation [32] (i.e., once the research team considered that there was a sufficient variation in respondent characteristics and that a broad range of opinions towards knowledge, awareness, and practices regarding multimorbidity were expressed).

2.2. Data Collection

A questionnaire divided into three sections was designed for data collection. The first section consisted of standard questions concerning respondents' demographic and professional background information. The second section elicited primary care physician ideas regarding multimorbidity—knowledge (definition of multimorbidity), awareness (relevance of multimorbidity in daily practice), and practices (management of multimorbidity). These main topics were evaluated by the following questions: (1) "Are you familiar with the concept of multimorbidity?" (yes/no); (2) "In your opinion, what is the meaning of multimorbidity?" (open-ended); (3) "How clear is the European General Practice Research Network (EGPRN) concept of multimorbidity?" (extremely/very/moderately/slightly/not at all) (N.B. the Portuguese translation [22] was provided to participants immediately before this question); (4) "How useful is the EGPRN concept of multimorbidity (Portuguese translation) [22]?" (extremely/very/moderately/slightly/not at all); (5) "Give your comments, ideas or suggestions regarding the previously presented definition of multimorbidity" (open-ended); (6) "In your opinion, what is the importance of multimorbidity in your day as a GP?" (open-ended); (7) "In clinical practice, what are the difficulties and challenges that you find in the consultations with patients with multimorbidity?" (open-ended); (8) "In clinical practice, how do you manage the difficulties and challenges found in consultations with patients with multimorbidity?" (open-ended). The third section briefly itemized the available results from the previous phases of the MM-PT project [10,25,33] (Figure 1) and questioned the respondents if after reading the information provided they would change their former ideas regarding the (1) concept of multimorbidity (no/yes; justify your choice: open-ended); (2) importance of multimorbidity (open-ended); (3) primary care physicians' clinical practice (open-ended). The last section also allowed respondents to manifest comments, ideas, or suggestions regarding the MM-PT project's results.
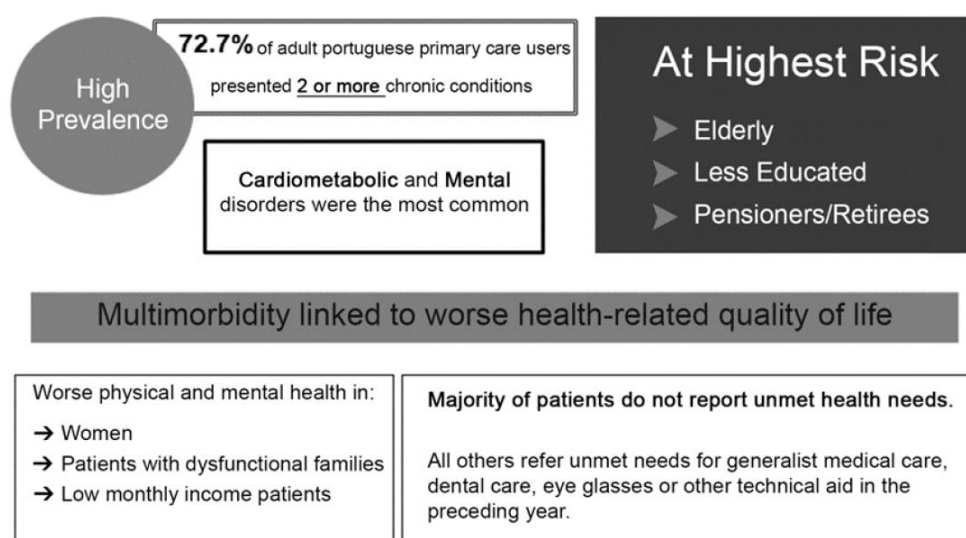

Figure 1. Informational material depicting results of our previous studies on multimorbidity in Portugal.

The questionnaire was posted online after being pre-tested and reviewed by a panel of experts in multimorbidity and experienced GPs in order to check its comprehensibility. The questionnaire was completed anonymously. Mean response time was 15 min. Incomplete questionnaires were not included in the analysis.

2.3. Data Analysis

Open-ended questions were analysed via inductive thematic content analysis [34,35]. This process followed the recommendations of Braun and Clarke [35]. No computer-assisted qualitative data analysis software was used, since open-ended data analysis are commonly done by human coding [36]. In brief, the study investigator tagged (by using code names) the segments of text that described distinctive ideas. Similar codes were grouped together to delineate themes. This procedure was revised by an independent expert and results were further discussed until a consensus was achieved. The concepts and categories that emerged from the Portuguese qualitative data were translated to English as described by Chen and Boore [37].

Basic descriptive statistics from questionnaire data were done using the IBM SPSS Statistics for Windows, Version 21.0 (IBM Corporation, Armonk, NY, USA).

3. Results

Seventy-four (51 females and 23 males) of 122 primary care physicians completed the questionnaire. Table 1 summarizes respondents' characteristics. There was sufficient variation in sex, age, academic degree, career level, experience in primary care, and practice type.

Table 1. Physicians characteristics (*n* = 74).

Characteristic	*n* (%)	Mean (SD)
Sex		
Women	51 (68.92)	
Men	23 (31.08)	
Age (years)		43.73 (13.78) min = 26; max = 64
Academic degree		
Entry-level medical degree (MD)	55 (74.32)	
Higher medical degrees (Postgraduate/Master/PhD)	19 (25.68)	
Career level		
General practitioner (GP)	54 (72.97)	
GP in training	20 (27.03)	
Experience in primary care (years)		16.19 (13.29) min = 1; max = 37
Practice type		
Family Health Unit (family practice based model)	50 (67.57)	
Personalized Healthcare Unit (individual based model)	24 (32.43)	
Place of work (district)		
Coimbra	35 (47.30)	
Aveiro	39 (52.70)	

3.1. Definition of Multimorbidity

The majority of the respondents (62/74) were familiar with the concept of "multimorbidity". Nonetheless, its definition varied within the sample.

Almost all respondents (68/74) considered multimorbidity as having multiple diseases (or health problems), whereas a few suggested it to be equal to multipathology or polypathology (Quote 1) (see also Quote 3). Twenty-four respondents considered only chronic diseases and four both chronic and acute diseases in their own definitions.

"Several diseases coexist in the same patient, particularly chronic and of complex clinical management, which may interfere with his quality of life, autonomy, and ultimately longevity." (Quote 1 Respondent 39)

Cut-off counts of two, three, and five chronic diseases were suggested by the respondents (23/74). The cut-off of two chronic diseases was the most frequently referred (19/74).

Some definitions were more complex. They included some negative outcomes of multimorbidity and its management challenges (Quote 1, Quote 2).

"Presence of two or more chronic diseases in the same person causing decreased quality of life, increased demand for health resources and also creating challenges in patients' treatment and counselling." (Quote 2 Respondent 8)

One respondent (Quote 3) used the term "health problem" since it can be more inclusive in the primary care context than the term disease which is characterized by specific signs and symptoms.

"[...] means having several pathologies, or in this case, health problems. Partly it is synonymous to multiple pathologies, but in the context of Primary Health Care, goes further than that, because not all health problems are actually diseases." (Quote 3 Respondent 43)

Another respondent (Quote 4) referred the lack of an index disease when defining multimorbidity.

"Unlike comorbidity this concept [multimorbidity] does not place a disease as central and others as satellites. All have a contributing role." (Quote 4 Respondent 74)

Definition of Multimorbidity by the European General Practice Research Network (EGPRN)

The majority of the respondents (50/74) considered the EGPRN's definition of multimorbidity to be very/extremely clear. A slight smaller proportion (40/74) found it to be very/extremely useful for primary care.

"It is very important to better identify patients with multimorbidity. It is very complete. I agree with this definition." (Quote 5 Respondent 52)

For only a select few this definition has limited use for primary care since it can be too complex, extensive, and its various subterms (such as "biopsychosocial factor" and "somatic risk factor") are lacking operationalization.

3.2. Relevance of Multimorbidity in Daily Practice

All the respondents made comments endorsing the importance of multimorbidity in everyday practice (74/74). They recognize that multimorbidity is "inextricably linked to general practice" because multimorbid patients have a high prevalence in primary care settings and single disease patients are the exception (25/74).

"It is very prevalent. In an aging population, there is a large percentage of people who are walking medical textbooks [have every illness you can imagine]. Stress factors, unemployment, poor working conditions, the presence of a dependent elderly [in the household], diseases in family member etc. are factors that aggravate this situation, I believe that single disease patients have no expression in my daily practice." (Quote 6 Respondent 7)

In addition to the stated epidemiologic theme, other respondents went further and referred that the importance of multimorbidity in primary care is attributable to the difficulties and challenges of managing multimorbid patients. This is further described below.

3.3. Perceived Difficulties and Challenges

Two broad themes emerged from the analysis. Difficulties and challenges perceived by the respondents were felt at a systemic level, regarding the Heath Care System, and at an individual level, regarding the general practitioner and the patient (Table 2).

Table 2. Difficulties and challenges.

Systemic Level: **Health Care System**	Inherent to the Healthcare System	• Lack of resources: consultation time restraints; interdisciplinary care/teams; computing and informatics • Organisational barriers between primary and secondary care providers
	External to the Healthcare System	• Media pressure • Insufficient patient support: community-based support services, family support
Individual Level: **General Practitioner and** **Multimorbid Patient**	General Practitioner related	• GPs role of treating the whole person: reconciling doctor-patient agenda; doctor-patient communication difficulties; feelings of inability to help; pressure to follow clinical indicators/guidelines • Medical education
	Multimorbid Patient related	• Diagnostic challenges and complex clinical management • Poor patient engagement

3.3.1. Difficulties and Challenges Inherent to the Health Care System

Lack of resources:

Respondents' most important lacking resource was consultation time. They stated that the Portuguese Health Care System's "consultation time is short", insufficient to "listen to the patient and his multiple complaints" and hinders the GP's assessment of the entire perspective on the patient's situation thereby resulting in inappropriate, fragmented care (Quote 7).

> *"Lack of time to be able to see the big picture, ending always to work smaller parts at a time and the results are not always good, it leads to forgetfulness, [treatment] redundancies, delays [in diagnosis]..."* (Quote 7 Respondent 17)

The shortage of multidisciplinary healthcare professionals (e.g., psychologists, nutritionists, dentists, etc.) was also mentioned as one of the reasons leading to excessive demand for the use of primary care services and increased amount of work for the GP.

Respondents also stated that the limited and unadjusted information and communication technologies obstruct retrieval and transfer of important medical data and do not provide drug information regarding contraindications and interactions, thus interfering with patient care.

Organisational barriers between primary and secondary care providers:

Respondents highlighted the current lack of collaboration between secondary and primary care providers. This was felt at several levels: (1) accessibility—lack of timely appointments in secondary care; (2) communication—inefficient feedback from secondary care providers; (3) secondary care provider role—absence of coordinated care (Quote 8).

> *"Secondary care providers do not deliver a global care [for the multimorbid patient], but fragmented [focusing on a specific health problem], because there is no hospital physician (e.g., internist), in straight connection with the GP, to act as a care manager for these patients"* (Quote 8 Respondent 10)

3.3.2. Difficulties and Challenges External to the Health Care System

Media pressure:

Participants mentioned that the pressure from the media is a barrier to patient care. Although these statements were very generic, and did not provide more details on how this pressure is manifested (e.g., "we feel pressured by the media when treating our patients").

Insufficient patient support:

Respondents recognized that the present unavailability of resources that could be provided by community-based support services and/or by family members increases workload for the GP and makes GPs responsible for everything regarding the care of their patients (Quote 9).

> *"The lack of support [...] to help solve many of the problems (which are not organic diseases) that affect the physical well-being of multimorbid patients creates an excessive demand for the use of primary care services. The GP feels powerless to solve social, work and family related problems."*
> (Quote 9 Respondent 52)

3.3.3. Difficulties and Challenges Related to the GP

GP's role of treating the whole person:

Participants stated that the GP's role of providing a whole person health care to multimorbid patients is challenging (Quote 10).

> *"Managing multimorbidity is hard work for GPs because we focus on the health of the whole person. And the whole person is difficult to manage pharmacological and non-pharmacologically."*
> (Quote 10 Respondent 48)

Several reasons were referred. Respondents considered that it is demanding to make a holistic assessment of the multimorbid patient because of the difficulties of obtaining an accurate history from elderly patients and with low educational levels. Consequently, it becomes challenging to negotiate priorities and goals tailored to the patient agenda. Respondents also refer that they feel pressured to follow clinical indicators/guidelines and ultimately they experience emotional distress with feelings of inability to help.

Medical education:

Participants stated that they have "insufficient training and practice in the topic of multimorbidity". They also mentioned that it is "difficult to try to keep up to date with medical knowledge since the multimorbid patient can suffer from countless conditions at the same time".

3.3.4. Difficulties and Challenges Related to the Multimorbid Patient

Diagnostic challenges and complex clinical management:

Respondents pointed out diagnostic and therapeutic challenges when dealing with multimorbid patients. Clinical cases are more complex and difficult to handle since their conditions may be masked by multiple overlapping symptoms. Polypharmacy was extensively mentioned (Quote 11) as the most common therapeutic challenge in multimorbidity. Due to the need to treat numerous conditions and since guidelines are single-disease oriented, these will increase the use of multiple drugs per patient with an increased risk of iatrogenesis (effects of possible drug-disease and drug-drug interactions and medical error) and also of low levels of medication adherence.

> *"Two common areas of difficulty are polypharmacy and health promotion, since taking into account what is best for a condition may worsen another."* (Quote 11 Respondent 8)

Participants mentioned that they also have difficulties in recognising what conditions and outcomes are most important for the patient and for the GP, how to avoid treatments that lack solid supporting evidence, and how to deprescribe.

Poor patient engagement:

Respondents noted that multimorbid patients are poorly engaged in their own treatment. They have limited health literacy skills, do not acknowledge the future implications of multimorbidity, do not comprehend the health-related information communicated by the GPs, and do not adopt healthier lifestyles because of their belief in personal invulnerability.

The possible relations between the different sets of perceived difficulties and challenges were considered in the diagram depicted in Figure 2.
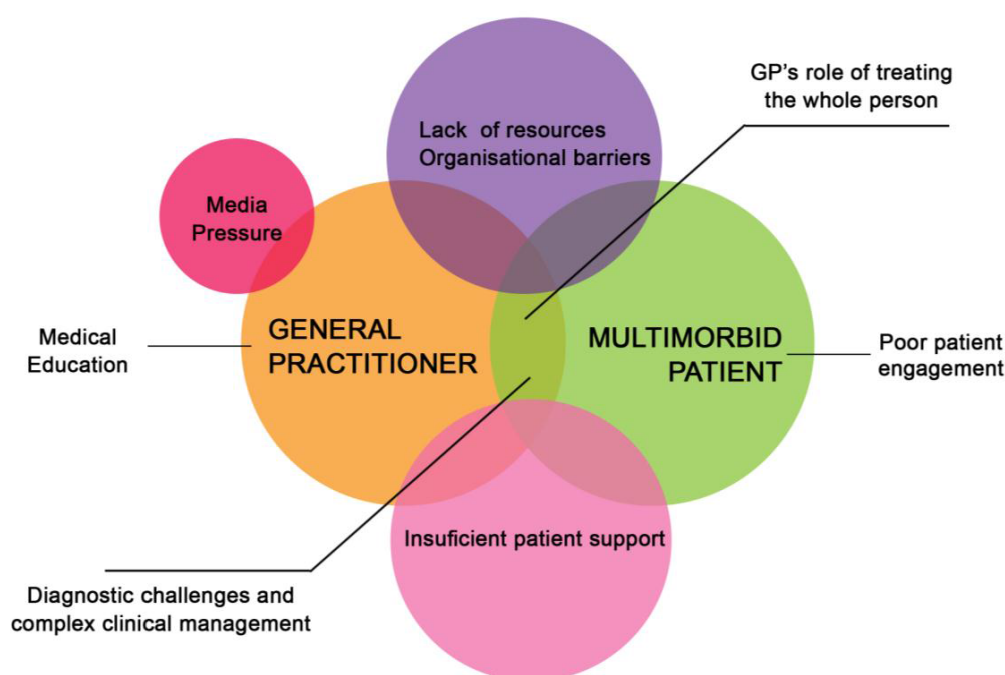
Figure 2. Relations between the perceived difficulties and challenges.

3.4. Management of Multimorbidity

Analysis of the data revealed seven main themes (Table 3).

Table 3. Tools used by GPs to manage the difficulties and challenges of multimorbidity.

(1) person centeredness
(2) holistic model
(3) effective doctor-patient relationship
(4) integrated approach
(5) continuing management
(6) coordination with others and teamwork
(7) problem solving skills

Participants stated that they are fully committed to helping their patients with multimorbidity even though they find it to be a very difficult task and a source of distress.

" . . . with great difficulty and distress due to the [short] consultation times, allied with constant interruptions by various coworkers, patients are often inevitably cut short in the exposure of their concerns. Owing to the lack of existing human resources, family doctors are then required to see to not only their list of patients as well as others whose doctors are absent and in need of urgent care. This situation is not easy to solve." (Quote 12 Respondent 53)

Characteristics commonly associated to family medicine [15] were mentioned by the respondents as the tools used in daily practice to manage the difficulties and challenges of multimorbidity: (1) person centeredness—"focus care on the person and not on diseases", "know the patient, his background (myths and expectations), living situation and family dynamics", "reconcile doctor and patient agendas" by being "aware of each patient's needs and priorities", "promote patient empowerment by educating and keeping them and their families well informed" and "get patients to take responsibility for their own health"; (2) holistic model—"make a global approach, never forgetting the dimensions (bio-psycho-social) of the patient"; (3) effective doctor-patient relationship —take advantage of "empathy", "proximity", "patience", and "perseverance" in the therapeutic relationship, "use clear and straightforward language in the doctor-patient communication"; (4) integrated approach—"disease prevention efforts" should be devised as well as a focus on managing multiple conditions; (5) continuing management—"offer longer consultations" (including online doctor consultations), "increase the number of consultations", and arrange a "short span of time between consultations"; (6) coordination with others and teamwork—"work together with other health care professionals (generally with the nurses)", "include inter-organisational collaboration", and "cooperate with families and other carers"; (7) problem solving skills—"attend continuing education courses and postgraduate educational activities", "balance the best available evidence with the experience based medicine", "optimize drug prescribing by avoiding the tendency to medicalize, negotiating treatment with the patient, updating the patient's medication list at each visit, deprescribing when needed, and by using non drug therapies".

3.5. Informational Material Bearing the Results from Previous Portuguese Multimorbidity Studies

After reading the informational material provided (Figure 1), (1) approximately one-quarter of the sample (18/74) would amend their previous definition of multimorbidity. The most frequently stated change was the inclusion of "social factors" and the "negative influence of multimorbidity on quality of life" in the definition (one respondent would add the "need of multidisciplinary care" and another participant thought that it was important to complement the definition with "difficulty in access to care when needed"); (2) nearly the entire sample highlights the extremely high importance of multimorbidity—"data shown accentuates the importance of multimorbidity and the need to establish strategies for dealing with this condition, particularly among the elderly", "it is much more prevalent than sometimes we remember", "the maximum importance, underlining the psychosocial aspects", "extremely important as it can be a generator of burn-out among health professionals", "it is a serious problem for the (Portuguese) National Health Service"; (3) the majority (52/74) will change their daily practice regarding multimorbidity—"even more dedication to the diagnose and management of patients with multimorbidity", "further improve accessibility for the at risk and vulnerable groups", "pay more attention to the management of the most at risk groups of multimorbidity and take into special consideration the mental and cardiometabolic illnesses", "start applying instruments of measurement of quality of life", "training in the management of the most prevalent diseases and the interactions of different drugs used in their treatment", "create a distinct consultation for multimorbid patients", "give at least 30 min consultations for these patients".

4. Discussion

The current study found high levels of awareness regarding multimorbidity within its participants. In accordance with available literature [21,38,39], no universally accepted definition of multimorbidity was found, and the concept was heterogeneous between respondents [39]. Interestingly, none of

the definitions were incorrect. This highlights the complexity of this area of research and also the importance of finding a consensus on how multimorbidity is defined.

When queried about the EGPRN's definition of multimorbidity (Portuguese translation [22]), the sample recognized the clarity and usefulness of the definition for primary care settings. This result may be explained by the fact that EGPRN's definition is comprehensive [21], more adapted to the complexity of the multimorbid patient [23], and eventually superior for clinical purposes than the commonly used definition of co-occurrence of two or more long-term conditions in the same patient [40].

This study adds to findings from previous studies of GPs' views and attitudes in multimorbidity [16–18,41–44]. To our knowledge, this is the first study of its kind done in Portugal. Our sample included sufficient variation in sex, age, academic degree, career level, experience in primary care, and practice type, which provided a deeper understanding of GPs' subjective perceptions. All respondents were practising physicians and therefore provided real-world data.

A shared view amongst respondents was that multimorbidity is very common and associated with old age, which supports former qualitative research reporting GPs' perspectives [41] and is consistent with data obtained from epidemiologic studies [10].

GPs pointed out several difficulties and challenges while managing multimorbidity. As expected, common consequences of these drawbacks are a significant burden related to patient management and the toll on patient care [16,41,43].

Perceived difficulties and challenges could be classified on the basis of their relation to the GP or the patient into two types, extrinsic and intrinsic.

Extrinsic factors were associated with the healthcare system logistics management (consultation time, organization of care teams, clinical information) and society (media pressure, social/family support). These practical issues seem to be consistent with the ones identified in earlier studies [43,44], with the exception of the "media pressure" topic that has not previously been reported in multimorbidity. Partial media coverage may have a negative impact on patient care [45] and although austerity measures are associated with increased mortality [46], in the last few months Portugal's healthcare system was targeted by the media concerning cuts in the health service and mortality cases [47], which consequently may put pressure on physicians in general and particularly on GPs that manage complex multimorbid patients. This will certainly require further study.

The perceived extrinsic factors demonstrate the necessity for longer consultations [18,41,42,48]. In Portugal, the average consultation length in general practice is approximately 15 min [49,50], similar to Belgium and Switzerland, and longer than Germany, Spain, the Netherlands, and the United Kingdom [51]. Usually GPs do not have enough time to manage patients with chronic diseases [52], but when they do, it decreases GPs stress and increases patient enablement [53]. If impossible, GPs may adopt time-management strategies [54] and take advantage of efficient health information technologies [55] to warrant more effective consultations. There is also the need for team-based care [56] that includes other co-workers in addition to the GPs (e.g., psychologists, nutritionists, dentists, care coordinators, etc.), cooperation with families and social organizations for better patients' social support [43,44], and improvement of referral systems for hospital care [43]. In Portugal, there is a known lack of coordination between specialist care and primary care with a large number of patients bypassing their GP by visiting emergency departments [20]. The referral rate from primary to secondary care is approximately 6% [57,58], which is similar to the situation in Spain [59]. The waiting times for specialist care may vary widely from one to six months [60], and feedback from secondary care providers is received in less than 40% of the cases [58,60,61].

Intrinsic factors related to the GP, patient, and physician-patient relationship were also stated. In the recent review of Cottrell and Yardley [18] and in the present study, GPs acknowledged the complexity in managing multimorbidity with an increasing workload [41,44,62]. GPs faced difficulties and challenges in delivering holistic care [16], they experienced feelings of inability to help considering existing resources, and stated lacking competences in dealing with multimorbidity [41,43,44], including uncertainty on how to recognise what conditions and outcomes are most important for the patient

and for the GP, how to avoid treatments that lack solid supporting evidence, and how to deprescribe. Inadequacy of guidelines and polypharmacy were also mentioned as major therapeutic challenges, as shown in previous studies [16,44]. Difficulties in communicating with multimorbid patients, frequently elderly and individuals with low education levels, may be the reason of poor patient engagement. Some researchers have emphasized that physicians with better communication and interpersonal skills are able to perform more quality consultations [63].

Characteristics fundamental to family medicine [15] were mentioned by the respondents in an extremely positive and optimistic way as the tools that could be used in daily practice to manage the challenges of multimorbidity. The current results match those of Le Reste et al. [23], which indicated that GPs consider these characteristics as a valid contribute to the detection and management of multimorbid patients [23]. In the study of Luijks et al. [17] and in the present study, a person-centred approach was considered to be the crucial intervention strategy for multimorbidity. A key element of such an approach in family medicine is the "understanding of the patient as well as his disease" [64] (p. 24). Some researchers have highlighted the value of individualised care not only for GPs but also from the patients' perspectives [18], including a better physician-patient relationship [65].

The informational material provided concerning data on multimorbidity in Portugal was able to increase consciousness regarding the importance of multimorbidity and at the same time was capable of driving change in the way GPs deal with multimorbidity and multimorbid patients in their daily practice. This material was well received by the GPs. One respondent, a GP 62 years of age, made the following final comment: "There should be more studies like these. Researchers should whenever possible disseminate the results of their previous studies and ask for opinions as did this colleague of ours. Thank you and congratulations." Providing short informational materials to GPs may also be one way to bring together clinical research and clinical practice, which in turn benefits patients and healthcare as a whole [66].

The main limitations in this study are similar to the ones presented in previous qualitative studies regarding GPs' perceptions of multimorbidity. Although not the objective of the study, current data does not directly evaluate GPs' daily practices but only what they perceive they do [16]. Future research with a different design should be undertaken to investigate this further. Patient views and also their caregivers were not sought in the current study and will require consideration in following research [16] in Portugal.

5. Conclusions

One of the more significant findings to emerge from this study is that although GPs are overwhelmed by the difficulties and challenges of multimorbidity, at the same time, they have the tools to deal with them: the fundamental characteristics of family medicine. Also, the complex care required by multimorbid patients needs adequate consultation time, multidisciplinary teamwork, and more education/training. Improvements to the organization of care delivery are mandatory and this study provided data that can be used to plan future interventions towards multimorbidity in primary care in Portugal.

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CHAPTER FOUR | GENERAL DISCUSSION

4 General discussion and implications

This thesis allowed to study multimorbidity within primary care in Portugal, from multiple perspectives (although not wanting to exhaust the theme), and to explore its relevance.[170] Ultimately raising the awareness/interest of Portuguese GPs in this topic.[171]

As previously mentioned, this research project was divided into three phases.[170]

Phase I, a cross-sectional study, consisting of 1993 patients aged 18 and older, attending primary care consultations across the five Portuguese Healthcare Administrative Regions, found that 72.7% of the sample had two or more conditions out of a list of 147 chronic health problems (24.7% in 18-34 year olds, 58.5% in 35-49, 81.2% in 50-64 and 92.6% in patients aged 65 and over).[172] On the one hand, these findings supported previous research suggestion that multimorbidity is the rule in primary care settings,[44] while on the other they are a matter of concern. The observed high percentage of primary care adult patients in all age-groups living with multiple chronic conditions makes evident that dealing with multimorbidity is virtually an everyday work for GPs in Portugal. Thus, in the present Portuguese primary care context of both short and fixed consultation times, GPs and patients will experience frequent conflicting demands when addressing multimorbidity.[171]

In the studied sample, the determinants of multimorbidity were age, education and professional status.[172] This presents a great challenge to Portuguese GPs since they will have to deliver personalised health care to patients that have not only a higher risk of adverse health outcomes but also have fewer years of education which may potentiate patient-physician communication barriers and worsen the patients' capability of deciding about their own health care including non-adherence to treatment. These patients will most likely need greater decision-making support from their physicians. For this, GPs must be well-versed on the subject of the broad problematic of multimorbidity, including patient acceptance, perspectives on managing multimorbidity, and the risks of polypharmacy. As an example, a recently published interventional study based on self-management support that targeted multiple chronic conditions and risk factors showed promising results in Canada.[173]

Cardiometabolic and mental conditions remained the two most frequent groups of chronic health problems, making them priority conditions for GPs when dealing with multimorbid patients.[172] This finding becomes more relevant when knowing that although it is accepted that lifestyle modifications are the first line management for cardiometabolic conditions and other chronic health problems, they are insufficiently tackled by GPs.[119] Thus, improvements in the interventions aiming risk factors might be important in preventing multimorbidity.[173] Another source of concern is the fact that when mental conditions are found together with physical multimorbidity, the burden of disease increases,[155] the capability to self-manage

co-existing conditions decreases,[156] and also that mental conditions have an impact on caregivers burden and on their mental health.[174,175] Multimorbid patients' needs should be regularly assessed and psychosocial treatment offered, in addition to pharmacotherapy when needed. And the same can be said for their caregivers.

Six patterns of multimorbidity emerged from the study data: i) overweight; ii) anxiety disorder/anxiety state and depressive disorder; iii) varicose veins of the leg and back syndrome without radiating pain; iv) obesity, non-insulin dependent diabetes and uncomplicated hypertension; v) osteoarthrosis (other), osteoporosis, goitre and back syndrome with radiating pain; vi) complicated hypertension, lipid disorder, osteoarthritis of the knee and benign prostatic hypertrophy.[172] Although there is still no directed care management for specific combinations of chronic health problems, such combinations should be kept in mind when managing multimorbidity because there is some evidence in the literature of a synergistic effect for some combinations[140,176] and also because some are formed by discordant conditions and therefore may possibly have a more difficult management and care.[144] It also should be kept in mind that chronic pain sufferers experience not only a worsening of their lives but also negative attitudes and feelings from physicians and family members,[177] which may contribute to an inadequate management of their health problems and a lack of family support. This implies that GPs also need to pay more attention to combinations of chronic health problems associated with chronic pain. And that studies of interventions for improving outcomes in multimorbidity are also needed.

Phase II, a cross-sectional study, consisting of 521 multimorbid patients aged 18 and older attending primary care consultations in thirteen Primary Care Centres in the Centre region of Portugal, found that multimorbidity has a negative impact on health-related quality of life (HRQoL). Patients with more chronic health problems had worse HRQoL, particularly the physical health.[178] In a multidimensional patient-centred concept, this low perception of health may signify multimorbid patients' inability to cope with their disability and limitations. Moreover, impaired HRQoL was previously linked with increased risk of adverse outcomes, such as death and hospitalisation.[179-182] The same can be assumed to apply to multimorbid patients. This reinforces the previously stated notion that these patients will need more support from their GPs.

Despite the predictable higher support needs of patients with multimorbidity, 69% of the respondents did not report unmet health needs,[178] which indicate that they were able to meet their needs. Nonetheless, 31% were not. Participants who reported unmet needs were mostly for general medical care, dental care, and eyeglasses or other technical aid.[178] Primary care teams will have to continue to optimize resources and schedules in order to meet the needs of multimorbid patients,[178] including patients' access to GP consultations. The Portuguese Ministry of Health is also analysing the feasibility of including dentists in the

Primary Care Centres, a measure that may in the future suppress the unmet need of dental care.

It is important to note that regarding family support, the majority of the patients suffering from multimorbidity reported high family support.[178] On the one hand, this finding may suggest that most multimorbid patients will have gains in HRQoL and in clinical outcomes through the support given to them by family members, but on the other hand, an increase in informal care may lead to family members' burden and consequently to the need of support and assistance to them (e.g. a close contact between the caregiver and the health care system,[183] or aid from another person to perform the care[184]).

Latest Portuguese Directorate-General of Health (DGS) data shows that 27.5% of the population in Portugal was at-risk-of-poverty in 2014 (4.2% higher than the European average), meaning below the poverty threshold.[185] It would also be helpful to multimorbid patients and their families (in terms of quality of life, fulfilling health needs, and family support), if there were improvements in their economic and social conditions. For example, through the Portuguese Social Emergency Programme (PES) which involves the participation of local authorities and civil society organizations related to the social and solidarity sector.[186] High financial burden is responsible for patients with disability, chronic conditions and low income to forgo medical care, which may result in health decline.[187,188] Individuals with chronic diseases are also vulnerable to cost-related medication nonadherence,[189] which may be of particular importance to patients with multimorbidity.

Phase III, the final phase of the project, has undergone some changes and was done differently from what was predicted, as can be perceived by comparing the protocol to Phase III published articles.

First, the translation to Portuguese of the European General Practice Research Network (EGPRN) definition of multimorbidity using a Delphi technique[190] was added to the project. The inclusion is justified by the belief that in the future this comprehensive definition of multimorbidity will aid clinicians and researchers to better serve the multimorbid patient, particularly after the publication of studies regarding its operationalization.[59,190,191] Its clarity and usefulness were afterwards recognized by Portuguese GPs.[171] Interestingly, this sample of GPs, highly aware of the topic multimorbidity, when asked to define multimorbidity reached no consensus,[171] as also did not the medical community in general.[67] The now translated EGPRN concept of multimorbidity may be another step towards finding a consensus,[171] but only time and further research will demonstrate the best way to deal with this matter.

Second, the study that aimed to access GPs' knowledge, awareness and practices regarding multimorbidity and its management[171] was converted from a before-after study to a single-point-in-time observation, a web-based qualitative descriptive study. This change was deemed necessary because of the non-viability of maintaining a sample during the long period

of time of the first two phases of the project. Although this could be interpreted as a methodological limitation, the study produced significant results regarding real-world data from a varied sample of practising physicians.[171]

GPs' views regarding prevalence of multimorbidity (and the perception that it increases with age) are aligned with the epidemiological findings of Phase I of the research project, as one respondent so vividly put it: "[...] I believe that single disease patients have no expression in my daily practice"[171] (p. 5). GPs recognized the importance and complexity of multimorbidity because it is "inextricably linked to general practice"[171] (p.5) and also because it creates important difficulties and challenges (extrinsic factors associated with the healthcare system logistics management and society; intrinsic factors related to the GP, patient, and physician-patient relationship).[171]

Although GPs considered that General Practice/Family Medicine is well-equipped to deal with the difficulties and challenges of multimorbidity, mostly because of its person-centred approach[192] and by its "understanding of the patient as well as his disease"[193] (p. 24), they are still overwhelmed by multimorbidity, a condition that tends to worsen over time, and that currently has no guidelines for orientation. In Portugal, DGS guidelines are single-disease oriented and when used as a guide to manage patients with multimorbidity they have to be used together with other related guidelines. When this is associated with the pressure of following performance indicators, that are rigid and not person-tailored, GPs feel that they are unable to help patients with multimorbidity.[171] Do multimorbid patients need more consultations or more consultation time?

Are GPs well-equipped, but ill-prepared for this new, more difficult and challenging, era of multimorbidity? One thing is for certain, not only patients with multimorbidity (and their families), as implied in Phase I and Phase II, but also GPs need support.

The organization of care delivery to the multimorbid patient will have to suffer changes and improve the existing resources, in the near future. For GPs, supports can come in the form of:

- Inclusion of other allied health professionals in the development of a management plan (team-based care[194]). Psychologists, nutritionists, dentists, care coordinators, social workers are among some of the needed partners to help manage multimorbidity.

- Inclusion of individuals to assist with ongoing education for the patient (i.e. family members and social organizations who understand the patient's situation[195,196]).

- Better preparation for GPs (education/training) by:

  - Starting to expose undergraduate medical students to multimorbid patients and their problems and to use these interactions for students to develop effective interpersonal and communication skills.

  - Providing comprehensive and validated training in the competencies that GPs feel that are ill-prepared (e.g. by workshops, online courses).[197]

  - Providing informational materials regarding multimorbidity, since they can increase GPs awareness and motivate change in daily practice regarding multimorbidity and the multimorbid patient.[171]

- Adequate/increased consultation time.[171]

- Enhancement of the referral systems for hospital care.[195]

The strengths and weaknesses of this research project, that have been discussed in full in each published article, should be kept in mind when interpreting the global results. Considering the heterogeneity in multimorbidity patterns and in multimorbidity research, current findings may not be generalizable to all primary care practices in a community setting, nor can they be directly compared to previous studies with divergent methodologies.

The most important limitations are the consequence of financial and time restraints, common to research that is unfunded. First, although all five mainland Portuguese Healthcare Administrative Regions were represented in Phase I, this was not sought in Phases II and III. Second, no random sample of each GP's patients was possible to achieve and so there is a possibility of sample selection bias. Third, no indicator of disease severity was used (although of relevance in multimorbidity studies). Finally, the cross-sectional design does not make possible to establish causal relationships, nor trends or interactions over time. Furthermore, when GPs' views were studied, it was only analysed what they perceive they do and this may or may not be what they are actually doing when delivering care to patients with multimorbidity. It is important to point out that the study of GPs' attitudes regarding multimorbidity deserves following profound work not only to allow better care, but also to prevent work-related stress and even burnout.

For the future, there are some potential research directions. First, further work is suggested on larger samples to confirm the results of the current research project. Second, further research is warranted to evaluate if these epidemiological findings can be supported in other settings (e.g. secondary care, general population). Third, there is also the need to analyse multimorbid patients' views and also their caregivers' about multimorbidity and its management. Fourth, it is recommendable to develop and field test the operationalization of

the EGPRN concept of multimorbidity. Finally, longitudinal and interventional studies are still needed, which could, in time, lead to guidelines on multimorbidity.

As previously acknowledged, multimorbidity requires reflection on the impact of each chronic health problem on the sphere of the patient, thus transcending the merely boundaries of each disease. In short, it is the human being in interaction with his health problems. Primary care presents a continuous, coordinated and comprehensive care for patients with multimorbidity and it is encouraging that participant GPs considered this in a positive and optimistic way.[171] Current research project has a major practical implication for GPs everyday practice, and although a causal link cannot be proven, it highlighted some associations between multimorbidity and patient characteristics that may help identify those patients that are suffering the most, are in need of greater support, and will require much more attention when treating multimorbid patients.

In conclusion, while more research will still be needed to fully grasp the complete picture of multimorbidity in Portugal, the current results are, nonetheless, important to GPs, multimorbidity researchers, healthcare service planners, Med School teachers, and indubitably to patients with multimorbidity and their families.

The studies of multimorbidity frequently deal with the diagnosis of medical conditions, but one should never forget that GPs also deal with the burden of a person's suffering. Thus, one must dare to design future guidelines not just for the patient with multimorbidity, but mostly for the person with multimorbidity.

CHAPTER FIVE | REFERENCES

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APPENDICES

Appendix 1: Ethics Committee of the Faculty of Health Sciences, University of Beira Interior

UNIVERSIDADE DA BEIRA INTERIOR
FACULDADE DE CIÊNCIAS DA SAÚDE

PARECER

Processo: CE-FCS-2013-019

Data conclusão processo: 11-09-2013

Tema Projecto/Proponente: *"MM-PT study: Multimorbidity in primary care"*– Exmo. Sr. Dr. José Filipe Chaves Pereira Prazeres

Exmo. Sr. Presidente da Faculdade de Ciências da Saúde

Apreciado o pedido referente ao processo acima mencionado esta Comissão não detectou matéria que ofenda os princípios éticos.

Covilhã, 26 de Setembro de 2013

O Presidente da Comissão de Ética
Prof. Doutor José Martinez de Oliveira

O Vice-Presidente da Comissão de Ética
Prof. Doutor Joaquim Viana

Appendix 2: Ethics Committee of the Central Health Region of Portugal

GOVERNO DE PORTUGAL
MINISTÉRIO DA SAÚDE

ARSC ADMINISTRAÇÃO REGIONAL DE SAÚDE DO CENTRO, I.P.

COMISSÃO DE ÉTICA PARA A SAÚDE

PARECER FINAL:	DESPACHO:
FAVORÀVEL	*Homologa-se o parecer final da comissão de ética para a saúde 19.9.2013* Conselho Diretivo da A.R.S. do Centro I.P. Dr. José Manuel Azinha Tereso Presidente, Dr. Fernando José Gomes de Almeida Vice-Presidente, Dr. Luís Manuel Milhão Mendes Cabral Vogal, Dr.ª Maria Augusta Mota Vogal,

ASSUNTO: Análise em sede da Comissão de Ética do projecto "MM-PT study: multimorbidity in primary care"

Dos elementos fornecidos no projecto o contacto com os doentes será feito, apenas, pelos médicos. É referido pelo investigador que este "não ficará a conhecer dados sensíveis", que "nenhuma informação que poderá identificar os utentes será incluída nos questionários e/ou base de dados". Desta forma julgo estar assegurada a confidencialidade da informação de saúde dos doentes que aceitem participar no estudo. De igual forma está, também, garantida a obtenção de um consentimento informado, livre e esclarecido do doente para a participação no estudo. Consentimento que será obtido pelos médicos de MGF.

Parece-nos um estudo que devidamente conduzido e aproveitado poderá trazer uma mais valia para a qualidade de vida do doente com multimorbilidade.

Relator: Dra Carla Barbosa.
Aprovado em reunião da Comissão de ética, em 12 de Setembro de 2013.

Appendix 3: Paper II – Data collection tools

UNIVERSIDADE DA BEIRA INTERIOR
Covilhã | Portugal

CONSENTIMENTO LIVRE E INFORMADO

Investigador: Dr. FILIPE PRAZERES   **Contacto telefónico**:   234891197

O aumento das doenças crónicas exige que se conheçam as necessidades das pessoas para promover políticas e programas adequados. Assim, com este estudo (**MM-PT study: multimorbidity in primary care**) procuramos identificar as principais necessidades de pessoas com várias doenças, considerando diversos tipos: de saúde, familiares e de qualidade de vida. Neste sentido, precisamos que responda a um questionário, que demora cerca de **2 minutos**.

Nenhuma informação que o identifique será incluída nos questionários, qualquer eventual referência será substituída por códigos. Responder a este questionário não é prejudicial para a sua saúde e a sua decisão de participar ou não participar não terá qualquer impacto no seu tratamento clínico presente ou futuro. A sua participação não terá qualquer custo para si. Se decidir participar, pode mesmo assim retirar o seu consentimento ou interromper a sua participação em qualquer altura. É livre de não responder a qualquer pergunta, continuando as restantes a serem importantes.

Os seus registos médicos não serão afectados por este estudo. A confidencialidade dos seus dados será mantida.

Qualquer dúvida ou questão pode ser colocada ao investigador (ver o contacto no início da folha).

Declaro que:

☐ Não aceito participar
☐ Aceito participar
- Assinatura do utente _____
- Assinatura de testemunha _____
- Assinatura do investigador _____
- Consentimento verbal ☐

Adaptado de EASY-Care – UA - PT

Código de identificação	
Data de recolha de dados	

ATENÇÃO: só preencher o questionário se o utente tiver 18 ou mais anos

DADOS SOCIODEMOGRÁFICOS DO UTENTE

Q1. **Sexo**:
❒ Feminino
❒ Masculino

Q2. **Idade**: _____

Q3. **Zona de residência**:
❒ Rural
❒ Urbana

Q4. **Estado civil**:
❒ Solteiro
❒ Casado(a)/união de facto
❒ Divorciado(a)/Separado(a)
❒ Viúvo(a)

Q5. **Anos de educação formal (ou grau académico):** _____

Q6. **Em geral como caracteriza as suas finanças no fim do mês?**
❒ Não chegam para as necessidades
❒ Suficientes
❒ Sobra algum dinheiro

Q7. **Com quem vive?**
❒ Sozinho
❒ Em casal
❒ Com família alargada
❒ Em instituição
❒ Outra situação. Qual? _____

Q8. **Situação profissional**
❒ Empregado(a) a tempo integral
❒ Empregado(a) a tempo parcial
❒ Desempregado(a)
❒ Doméstica
❒ Pensionista/Reformado(a)
❒ Estudante

PROBLEMAS ACTIVOS/DOENÇAS DO UTENTE

Q9. **Registo de todos os problemas activos/ doenças do utente**
Para facilidade de preenchimento pode registar somente o código ICPC-2 (**exemplo:**HIPERTENSÃO COM COMPLICAÇÕES ou K87)

NOTA: deixar em branco se o utente for saudável

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

UNIVERSIDADE DA BEIRA INTERIOR
Covilhã | Portugal

CONSENTIMENTO LIVRE E INFORMADO

Investigador: Dr. FILIPE PRAZERES   **Contacto telefónico:**   234891197

O aumento das doenças crónicas exige que se conheçam as necessidades das pessoas para promover políticas e programas adequados. Assim, com este estudo (**MM-PT study: multimorbidity in primary care**) procuramos identificar as principais necessidades de pessoas com várias doenças, considerando diversos tipos: de saúde, familiares e de qualidade de vida. Neste sentido, precisamos que responda a um questionário, que demora cerca de **10 minutos**.

Nenhuma informação que o identifique será incluída nos questionários, qualquer eventual referência será substituída por códigos. Responder a este questionário não é prejudicial para a sua saúde e a sua decisão de participar ou não participar não terá qualquer impacto no seu tratamento clínico presente ou futuro. A sua participação não terá qualquer custo para si. Se decidir participar, pode mesmo assim retirar o seu consentimento ou interromper a sua participação em qualquer altura. É livre de não responder a qualquer pergunta, continuando as restantes a serem importantes.

Os seus registos médicos não serão afectados por este estudo. A confidencialidade dos seus dados será mantida.

Qualquer dúvida ou questão pode ser colocada ao investigador (ver o contacto no início da folha).

Declaro que:

☐ Não aceito participar
☐ Aceito participar
- ▪ Assinatura do utente _____
- ▪ Assinatura de testemunha _____
- ▪ Assinatura do investigador _____
- ▪ Consentimento verbal ☐

Adaptado de EASY-Care – UA - PT

Código de identificação: _____

Data de recolha de dados: _____

DADOS SOCIODEMOGRÁFICOS DO UTENTE

1. **Sexo**: Feminino ☐   Masculino ☐

2. **Idade**: _____

3. **Zona de residência**: Rural ☐   Urbana ☐

4. **Estado civil**:

Solteiro ☐

Casado(a)/união de facto ☐

Divorciado(a)/Separado(a) ☐

Viúvo(a) ☐

5. **Anos de educação formal (grau académico):** _____

6. **Em geral como caracteriza as suas finanças no fim do mês?**

Não chegam para as necessidades ☐

Suficientes ☐

Sobra algum dinheiro ☐

7. **Com quem vive?**

Sozinho ☐

Em casal ☐

Com família alargada ☐

Em instituição ☐

Outra situação ☐ Qual? _____

8. Situação profissional

Empregado(a) a tempo integral ❑   Empregado(a) a tempo parcial ❑

Desempregado(a) ❑   Doméstica ❑

Pensionista/Reformado(a) ❑   Estudante ❑

PROBLEMAS ACTIVOS/DOENÇAS

9. Registo dos problemas activos / doenças

Para facilidade de preenchimento pode ser registado somente o código ICPC-2

(exemplo: HIPERTENSÃO COM COMPLICAÇÕES ou K87)

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____
21. _____
22. _____

NECESSIDADES EM SAÚDE

10. Nos últimos 12 meses alguma vez precisou mas não conseguiu? (pode *assinalar* mais do que uma opção)

Receitas Médicas (renovação de receituário) ☐

Consulta Médica (generalista) ☐

Cirurgia ☐

Psiquiatra (aconselhamento em saúde mental) ☐

Saúde Oral (Dentista) ☐

Óculos ou outras ajudas técnicas ☐

10.1. Qual a razão? (pode *assinalar* mais do que uma opção)

Não conseguia sair do trabalho? ☐

Estava demasiado doente para lá chegar? ☐

Não tinha maneira de lá chegar? ☐

Tinha a responsabilidade de cuidar de alguém? ☐

Tinha medo de sair de casa por se sentir inseguro? ☐

Tinha assuntos mais importantes para tratar? ☐

Tinha o dinheiro contado para alimentação, vestuário, habitação, etc? ☐

Outra. Qual? _____

QUESTIONÁRIO APGAR FAMILIAR

11. Assinale a resposta que melhor se adapta à sua experiência pessoal com a sua família

	QUASE SEMPRE	ALGUMAS VEZES	QUASE NUNCA
	2	1	0
Estou satisfeito(a) com a ajuda que recebo da minha família, sempre que alguma coisa me preocupa.			
Estou satisfeito(a) pela forma como a minha família discute assuntos de interesse comum e partilha comigo a solução do problema			
Acho que a minha família concorda com o meu desejo de encetar novas actividades ou de modificar o meu estilo de vida.			
Estou satisfeito(a) com o modo como a minha família manifesta a sua afeição e reage aos meus sentimentos (ex. irritação, pesar e amor).			
Estou satisfeito(a) com o tempo que passo com a minha família.			

Análise:

Pontuação Total: _____

> **Famílias altamente funcionais: 7 a 10 pontos**
> **Famílias moderadamente disfuncionais: 4 a 6 pontos**
> **Famílias severamente disfuncionais: 0 a 3 pontos**

QUESTIONÁRIO DE ESTADO DE SAÚDE (SF-12v2)

Instruções para o preenchimento deste questionário

Por favor responda a todas as perguntas. Algumas perguntas podem parecer parecidas com outras, mas todas são diferentes. Pedimos que leia com atenção cada pergunta e que responda o mais cuidadosamente possível.

A SUA SAÚDE EM GERAL

1. Em geral, diria que a sua saúde é:

Excelente	Muito boa	Boa	Razoável	Fraca
1	2	3	4	5

2 As perguntas que se seguem são sobre actividades que executa no seu dia-a-dia. Será que a sua saúde o/a limita nestas actividades? Se sim, quanto?

(Por favor assinale com um círculo um número em cada linha)

	Sim, muito limitado/a	Sim, um pouco limitado/a	Não, nada limitado/a
a. **Actividades moderadas**, tais como deslocar uma mesa ou aspirar a casa	1	2	3
b. Subir **vários** lanços de escada	1	2	3

3. Durante as últimas 4 semanas teve, no seu trabalho ou actividades diárias, algum dos problemas apresentados a seguir como consequência do seu estado de saúde físico?

Quanto tempo, nas **últimas quatro semanas**...	Sempre	A maior parte do tempo	Algum tempo	Pouco tempo	Nunca
a. Fez **menos** do que queria?	1	2	3	4	5
b. Sentiu-se limitado/a no **tipo** de trabalho ou outras actividades...............................	1	2	3	4	5

4. Durante as últimas 4 semanas, teve com o seu trabalho ou com as suas actividades diárias, algum dos problemas apresentados a seguir devido a quaisquer problemas emocionais (tal como sentir-se deprimido/a ou ansioso/a)?

Quanto tempo, nas **últimas quatro semanas**...	Sempre	A maior parte do tempo	Algum tempo	Pouco tempo	Nunca
a. Fez **menos** do que queria?	1	2	3	4	5
b. Executou o seu trabalho ou outras actividades **menos cuidadosamente** do que era costume..	1	2	3	4	5

5. Durante as últimas 4 semanas, de que forma é que a dor interferiu com o seu trabalho normal (tanto o trabalho fora de casa como o trabalho doméstico)?

Absolutamente nada	Pouco	Moderadamente	Bastante	Imenso
1	2	3	4	5

6. As perguntas que se seguem pretendem avaliar a forma como se sentiu e como lhe correram as coisas nas últimas quatro semanas. Para cada pergunta, coloque por favor um círculo à volta do número que melhor descreve a forma como se sentiu.

Quanto tempo, nas **últimas quatro semanas**...	Sempre	A maior parte do tempo	Algum tempo	Pouco tempo	Nunca
a. Se sentiu calmo/a e tranquilo/a?	1	2	3	4	5
b. Se sentiu com muita energia?	1	2	3	4	5
f. Se sentiu deprimido/a?	1	2	3	4	5

7. Durante as últimas quatro semanas, até que ponto é que a sua saúde física ou problemas emocionais limitaram a sua actividade social (tal como visitar amigos ou familiares próximos)?

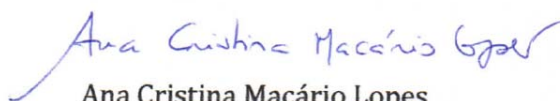| Sempre	A maior parte do tempo	Algum tempo	Pouco tempo	Nunca
1	2	3	4	5

MUITO OBRIGADO

Appendix 5: Paper IV – Linguistic validation

Declaração

Atesto que a tradução portuguesa da definição de 'multimorblidade' está linguisticamente correta.

Coimbra, 12.9.2015

Ana Cristina Macário Lopes

Ana Cristina Macário Lopes

Profª Associada com Agregação

Faculdade de Letras da Universidade de Coimbra

Appendix 6: Paper V – Data collection tools

Multimorbilidade - Cuidados de Saúde Primários

"Portuguese GPs' knowledge, awareness and practices regarding multimorbidity and its management."

Autores: Prazeres, F.; Santiago, L.

Ex. mo(a) Colega,

No âmbito do programa doutoral em Medicina, da Faculdade de Ciências da Saúde da Universidade da Beira Interior (Covilhã), gostaríamos de estudar a opinião, dos médicos de família dos distritos de Coimbra e Aveiro, sobre o tema **multimorbilidade**.

Os dados recolhidos neste questionário, serão utilizados para a elaboração de um artigo original, o qual será submetido a revista indexada na Medline. Garantimos a confidencialidade em relação a toda a informação recolhida, nunca havendo qualquer identificação do inquirido. As respostas serão sempre analisadas dentro dos objetivos do estudo.

Agradecemos pela disponibilidade em participar no nosso questionário. A sua colaboração é fundamental para o sucesso deste estudo.

Subscrevo-me atenciosamente,

Filipe Prazeres
Assistente de Medicina Geral e Familiar

Existem 18 perguntas neste inquérito

Dados socio-demográficos e laborais

Qual o seu sexo? *

Por favor, selecione **apenas uma** das seguintes opções:

- ☐ Feminino
- ☐ Masculino

Qual a sua idade? *

Neste campo só é possível introduzir números.

Por favor, escreva aqui a sua resposta:

[ ]

Qual o seu grau académico? *

Por favor, selecione **apenas uma** das seguintes opções:

- ☐ Licenciatura / Mestrado Integrado
- ☐ Pós-graduação / Mestrado / Doutoramento

Qual a sua categoria profissional? *

Por favor, selecione **apenas uma** das seguintes opções:

- ☐ Médico Interno
- ☐ Médico Especialista

Quantos anos tem de prática clínica em Medicina Geral e Familiar? *

Neste campo só é possível introduzir números.

Por favor, escreva aqui a sua resposta:

[ ]

Por favor indique se trabalha em USF ou UCSP? *

Por favor, selecione **apenas uma** das seguintes opções:

- [ ] USF
- [ ] UCSP

Por favor indique se trabalha no distrito de Coimbra ou de Aveiro? *

Por favor, selecione **apenas uma** das seguintes opções:

- [ ] Coimbra
- [ ] Aveiro

Multimorbilidade - página 1

Está familiarizado/a com o conceito de <u>Multimorbilidade</u>? *

Por favor, selecione **apenas uma** das seguintes opções:

- ☐ Sim
- ☐ Não

Na sua opinião, o que é a <u>Multimorbilidade</u>? *

Por favor, escreva aqui a sua resposta:

131

Multimorbilidade - página 2

A definição de Multimorbilidade do European General Practice Research Network (EGPRN), recentemente traduzida por nós para a língua portuguesa, é a que de seguida se transcreve:

"A multimorbilidade é definida como qualquer combinação de uma doença crónica com pelo menos uma outra doença (aguda ou crónica), ou com um fator biopsicossocial (associado ou não), ou com um fator de risco somático.

Qualquer fator biopsicossocial, qualquer fator de risco somático, a rede social, a carga das doenças, o consumo de cuidados de saúde e as estratégias de adaptação do doente podem funcionar como modificadores (dos efeitos da multimorbilidade).

A multimorbilidade pode modificar os resultados em saúde e levar a um aumento da incapacidade, à diminuição da qualidade de vida ou à fragilidade." *

Por favor, selecione a posição apropriada para cada elemento:

	Quão clara é a definição de multimorbilidade do EGPRN?	**Quão útil** é a definição de multimorbilidade do EGPRN para o sua prática clínica?
Extremamente	☐	☐
Muito	☐	☐
Moderadamente	☐	☐
Pouco	☐	☐
Nada	☐	☐

Indique comentários, ideias ou sugestões em relação à definição de multimorbilidade anteriormente apresentada:

Por favor, escreva aqui a sua resposta:

132

Multimorbilidade - página 3

Na sua opinião, qual a importância que atribui à multimorbilidade no seu dia-a-dia como médico de família? (Por favor, seja o mais completo possível na sua resposta) *

Por favor, escreva aqui a sua resposta:

Na sua prática clínica, quais são as dificuldades e os desafios que encontra nas consultas aos doentes com multimorbilidade? (Por favor, seja o mais completo possível na sua resposta) *

Por favor, escreva aqui a sua resposta:

Na sua prática clínica, como gere as dificuldades e os desafios que encontra nas consultas aos doentes com multimorbilidade? (Por favor, seja o mais completo possível na sua resposta)

*

Por favor, escreva aqui a sua resposta:

133

Multimorbilidade - página 4

Por favor preste atenção à imagem seguinte:

Multimorbilidade nos Cuidados de Saúde Primários (CSP) em Portugal
[projeto realizado no âmbito do programa doutoral em Medicina]

Resumidamente, o que se sabe até agora:

ALTA PREVALÊNCIA

72.7% dos adultos nos CSP apresentaram 2 ou mais problemas crónicos de saúde

Problemas do foro CARDIO-METABÓLICO e MENTAL foram os mais comuns

EM MAIOR RISCO:
- IDOSOS
- PENSIONISTAS/REFORMADOS
- BAIXOS NÍVEIS EDUCAÇÃO

Multimorbilidade associou-se a pior qualidade de vida

Pior saúde física e mental em:
- Mulheres
- Doentes com Famílias Disfuncionais
- Baixos rendimentos mensais

A maioria não referiu necessidades não alcançadas em saúde

Os restantes doentes referiram, nos últimos 12 meses, terem precisado de consulta médica generalista, saúde oral, e óculos ou outras ajudas técnicas mas não conseguiram.

Depois de ler as informações constantes na imagem supra, alteraria a sua definição de Multimorbilidade? Se sim, por favor explique no espaço dos comentários.

*

Por favor, selecione **apenas uma** das seguintes opções:

☐ Não

☐ Sim (por favor explique no espaço dos comentários)

Escreva um comentário à sua escolha aqui:

Depois de ler as informações constantes na imagem supra, qual a importância que agora atribui à multimorbilidade no dia-a-dia do médico de família? (Por favor, seja o mais completo possível na sua resposta)

*

Por favor, escreva aqui a sua resposta:

Depois de ler as informações constantes na imagem supra, que alterações fará na sua prática clínica? (Por favor, seja o mais completo possível na sua resposta)

*

Por favor, escreva aqui a sua resposta:

Indique comentários, ideias ou sugestões em relação aos dados apresentados na imagem supra:

Por favor, escreva aqui a sua resposta:

135

Submeter o seu inquérito
Obrigado por ter concluído este inquérito.