Archives of Medical Research 48 (2017) 121–127

Archives of Medical Research

ORIGINAL ARTICLE

Multimorbidity Patterns in Older Adults: An Approach to the Complex Interrelationships Among Chronic Diseases

Dolores Mino-León,[a] Hortensia Reyes-Morales,[b] Svetlana V. Doubova,[c] Ricardo Pérez-Cuevas,[d] Liliana Giraldo-Rodríguez,[a] and Marcela Agudelo-Botero[a]

[a]*Departamento de Epidemiología Clínica, Instituto Nacional de Geriatría, Ministerio de Salud, Ciudad de México, México*
[b]*Dirección de Investigación, Hospital Infantil de México Federico Gómez, Ministerio de Salud, Ciudad de México, Mexico*
[c]*Unidad de Investigación en Epidemiología y Servicios de Salud CMN Siglo XXI, Instituto Mexicano del Seguro Social, Ciudad de México, Mexico*
[d]*División de Protección Social y Salud, Banco Interamericano de Desarrollo, Ciudad de México, Mexico*

Received for publication July 26, 2016; accepted February 2, 2017 (ARCMED-D-16-00444).

Background and Aims. There is a growing need for evidence based answers to multimorbidity, especially in primary care settings. The aim was estimate the prevalence and patterns of multimorbidity in a Mexican population of public health institution users ≥60 years old.

Methods. Observational and multicenter study was carried out in four family medicine units in Mexico City; included older men and women who attended at least one consultation with their family doctor during 2013. The most common diseases were grouped into 11 domains. The observed and expected rates, as well as the prevalence ratios, were calculated for the pairs of the more common domains. Logistic regression models were developed to estimate the magnitude of the association. Cluster and principal components analyses were performed to identify multimorbidity patterns.

Results. Half of all of the patients who were ≥60 years old and treated by a family doctor had multimorbidity. The most common disease domains were hypertensive and endocrine diseases. The highest prevalence of multimorbidity concerned the renal domain. The domain pairs with the strongest associations were endocrine + renal and hypertension + cardiac. The cluster and principal components analyses revealed five consistent patterns of multimorbidity.

Conclusions. The domains grouped into five patterns could establish the framework for developing treatment guides, deepen the knowledge of multimorbidity, develop strategies to prevent it, decrease its burden, and align health services to the care needs that doctors face in daily practice.

Key Words: Multimorbidity, Older adults, Chronic diseases, Complexity, Primary care.

Introduction

Multimorbidity is the concurrence of two or more chronic diseases in one person (1,2). Reports of its prevalence vary between 20 and 30% of the general population and between 55 and 98% among older adults (1). This age-related difference is due to various reasons, including the source of information used (e.g., questionnaires, clinical records, administrative data), the methodology applied, the analyzed age groups, the diagnoses considered, and the population studied (3–6). Furthermore, this condition has had a global effect because of the rapid modification of the demographic structure in recent decades in most countries (7,8). The World Health Organization reported that life expectancy exceeded 70 years old in 2013, and this longevity trend is on the raise (9,10). Worldwide, the proportion of people ≥60 years of age has gradually increased. In 1960, this age group represented 8.1% of the world's population; in 2000 and 2013, these figures were 10% and 11.7%,

Address reprint requests to: Dolores Mino-León, Economía No. 15, Colonia Copilco Universidad, Delegación Coyoacán, 04360, Ciudad de México, México; Phone: (+52) (55) 5659-4130; E-mail: minod_mx@yahoo.com.

0188-4409/$ - see front matter.
http://dx.doi.org/10.1016/j.arcmed.2017.03.001

respectively (11). Also, chronic health problems replaced infectious diseases as the main reason for seeking healthcare over the last century (1). In 1990, 26.6 million deaths resulting from non-communicable diseases (NCDs) were reported throughout the world, a figure that increased to 34.5 million in 2010 (12). Besides, the incidence and mortality of NCDs increase with age; in 2012, 58% of all deaths related to NCDs happened among people over 70 years old (9).

Often, patients with NCDs have more than one chronic disease, which makes their treatment more complex and requires permanent monitoring for their control (13). These situations place pressure on healthcare systems to provide efficient and quality care that prioritizes primary care (3,14–16) to reduce the risks of hospitalization, premature death, loss of functionality, depression, polymedication, and poor quality of life (1).

According to the 2010 census data, ten million adults ≥60 years old live in Mexico, representing 9% of the total population, with an annual growth rate of 3.8% (17). Of these adults, 36.2% are affiliated with the Mexican Social Security Institute (IMSS in Spanish) (18) which is the largest public healthcare institution in Mexico that provides services to formal workers and their families. The frequency of NCDs in the Mexican population over 60 years old reaches up to 67% (19), and multimorbidity rates are also high in this age group. For example, a study of older adult users of the family medicine services of the IMSS with non-cancer pain syndrome found that the average number of NCDs per older adult was 3.6 (SD ± 1.4) (20). However, studies on the patterns of multimorbidity in this age group are scarce. The objective of this study was to estimate the prevalence and patterns of multimorbidity in a sample of older adults attending to IMSS family medicine units (FMUs).

Material and Methods

Design and Procedures

This observational, retrospective and multicenter study was based on information extracted from the electronic clinical records (ECRs) of four IMSS FMUs (two located north and two south of Mexico City). These FMUs were selected for having similar characteristics on their structure, organization, services provided, and number of affiliates.

The sample consisted of 77,573 men and women aged ≥60 years who attended at least one consultation with their family doctor during 2013. The age, sex, and diagnosis of each patient were extracted from the ECRs and coded based on the Internal Classification of Diseases and Related Health Problems (ICD-10).

The Medical Research Committee of the IMSS approved this study, considering it exempt from informed consent because participants were not at risk (i.e., anonymous information collected from ECRs).

ECR Characteristics and Disease Selection

The IMSS ECRs are composed of several databases that are interconnected with information concerning medical histories, physical exams, medical visit notes, the progression of patients with specific diseases (e.g., diabetes, prenatal care, and hypertension), and care provided by other levels of care and services. The notes from each visit include the registry of the codified diagnoses based on the ICD-10. To select the diagnoses to be analyzed, two investigators (DML and HRM) reviewed the frequencies of the diagnoses recorded during the patients' last visits and grouped them into domains based on the criteria proposed by other authors (4) that are supported by the domains of the Cumulative Illness Rating Scale (CIRS). In total, 11 domains were included, and each one consisted of its respective ICD-10 codes (Table 1). Multimorbidity was defined as the presence of morbidity in two or more domains.

Statistical Analysis

Prevalence was calculated per 100 people for each domain selected and considering the presence or absence of multimorbidity. In addition, the rates were estimated for the most common pairs of domains. The estimated prevalence (i.e., the product of the individual rates) and the prevalence ratio (observed/expected) were calculated for each pair of domains. We used the χ^2 test to determine the independence of each pair of domains, and built logistic regression models (both crude and adjusted for age, sex, and the other domains) between each pair of domains to estimate the magnitude of their association.

To establish multimorbidity patterns, we used cluster and principal components analyses as grouping methods.

Table 1. The domains included in the analysis and the ICD-10 codes included in the domains

Number	Domain	ICD-10 codes
1.	Endocrine	E10–E14
2.	Psychological	F32, F32.0, F32.1, F33, F33.0–F33.4, F40–F48
3.	Neurological	G20, G25.9, G30, G43, G44, G51, G45, G57.0, G62.8, G62.9, G63
4.	Hypertension	I10–I15
5.	Cardiac	I20, I20.0–I20.9, I25, I49.8, I49.9, I50.0
6.	Vascular	E78.0–E78.5, I70, I83, I87.2
7.	Respiratory	J40, J42, J43, J44, J45
8.	Upper gastrointestinal	K21, K25, K26, K27, K28, K29, K29.7
9.	Musculoskeletal	M05, M06, M06.8, M06.9, M13, M15, M16, M17, M18, M19, M20, M54, M79, M80, M81
10.	Renal	N18.0–N18.9, N19
11.	Neoplasia	C00–D48