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Original Article

Chronic diseases and geriatric syndromes: The different weight of comorbidity

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ABSTRACT

Background: Comorbidity is a relevant health determinant in older adults. Co-occurrence of several diseases and other age-associated conditions generates new clinical phenotypes (geriatric syndromes [GS] as falls, delirium etc.). We investigated the association of chronic diseases, alone or in combination, and GS in older adults receiving home care services in 11 European countries and one Canadian province.
Methods: Participants were cross-sectionally evaluated with the multidimensional assessment instrument RAI HC. We assessed 14 different diagnoses and 8 GS (pain, urinary incontinence, falls, disability, dizziness, weight loss, pressure ulcers and delirium). Adjusted mean number of GS per participant was calculated for groups of participants with each disease when occurring alone or with comorbidity.
Results: The mean age of the 6903 participants was 82.2 ± 7.4 years and 4750 (69%) were women. Participants presented with an average of 2.6 diseases and 2.0 GS: pain (48%), urinary incontinence (47%) and falls (33%) were the most prevalent. Parkinson's disease, cerebrovascular disease and peripheral artery disease were associated with the highest number of GS (2.5, 2.3 and 2.2, respectively). Conversely, hypertension, diabetes, dementia, cancer and thyroid dysfunction were associated with the lowest number of GS (2.0 on average). For 9/14 examined diseases (hypertension, diabetes, dementia, COPD, heart failure, ischemic heart disease, atrial fibrillation, cancer and thyroid dysfunction) the number of GS increased with the degree of comorbidity.
Conclusions: Comorbidity and GS are prevalent in older adults receiving home care. Different diseases have a variable impact on occurrence of GS. Comorbidity is not always associated with an increased number of GS.

1. Introduction

The aging process is often accompanied by the occurrence of multiple diseases, a condition known as comorbidity [1,2]. Indeed, comorbidity is an important determinant of health outcomes in older adults, responsible for a high treatment burden and for an increased risk of hospitalization and death [3–5]. In addition, adults with multiple chronic conditions represent the major users of health care services, accounting for more than two-thirds of resource use [6].

Despite the traditional idea that specific symptoms are uniquely characteristic of a single disease, the co-occurrence of multiple diseases and of other age-associated conditions in older individuals leads to additional clinical phenotypes known as geriatric syndromes. Geriatric syndromes, are defined as "multifactorial health conditions that occur when the accumulated effects of impairments in multiple systems render an older person vulnerable to situational challenges", and include pain, falls, incontinence, and delirium [7]. Geriatric syndromes are highly prevalent in the older population and are associated with poor quality of life and negative health outcomes. Their management is today challenging, so that recognizing pathophysiological mechanisms and associated factors might help physicians to deal better with them [8,9].

Comorbidity may lead to additional impairments that may thus contribute to the development of geriatric syndromes. The extent to which individual disease or comorbidity contributes to the development of geriatric syndromes is still unknown. The aim of the present study was to investigate the potential association of diseases, alone or in combination, on the occurrence of geriatric syndromes in older adults.

2. Methods

2.1. Data sources

Data were obtained from provincial repositories at the University of Waterloo (UW), Canada and from data collected during the Aged in Home Care (AdHOC) project in Europe [10,11].

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The Canadian sample comprised data from Ontario, Canada's most populous province with a population of approximately 12,000,000 people. The Canadian Institute for Health Information (CIHI) receives home care data collected using the interRAI Home Care (RAI HC) instrument and ensures that reporting standards are met, checks data quality and creates unique identifiers to de-identify individuals from interRAI data submissions. CIHI then contributes the anonymized data back to the UW repository. For the present study, data from initial RAI-HC assessments performed between 2010 and 2012 were used.

The European sample was based on the data collected by the AdHOC study. Methods of the study and sample selection have been previously described [11]. Briefly, the sample included 3,785 individuals receiving home care services in 11 European countries (Denmark, Finland, Iceland, Italy, the Netherlands, Norway, United Kingdom, Czech Republic, France, Sweden and Germany). AdHOC data were collected at baseline and at six and twelve month follow-ups. Only baseline data were used in the current study.

2.2. Data collection

Data were collected using European and Canadian versions of the RAI HC instrument. The RAI HC is a well-established, standardized assessment tool containing more than 300 items that capture the strengths, preferences and needs of individuals [12,13]. The RAI HC comprehensively describes individual characteristics, including socio-demographic and clinical variables, physical and cognitive status, medical diagnoses, major health problems and symptoms, current service use and medication use. Embedded in the instrument are several standardized functional scales to assess domains such as physical functioning, cognitive status, and overall health status. (www.interrai.org) Data collection is standardized and usually done by nurses who are specially trained to verify all information with sources including home care recipients and family members, and review of physician reports or medical records. All assessors followed a standardized training procedure. Ethical approval was obtained in accordance with protocols in place in all participating countries in the AdHOC Study. The Office of Research Ethics at the University of Waterloo approved the use of the anonymized Canadian home care data.

2.3. Sample

This retrospective cohort study explored geriatric syndromes and comorbidity among individuals receiving home care services in Ontario and Europe. In the AdHOC study, individuals with no diseases and no geriatric syndromes recorded and those with a remaining life expectancy of less than 6 months to live were excluded (n = 382). This left a sample of 3403 individuals. In the Ontario sample, a random sampling method was used to select 3500 individuals, applying the same exclusion criteria used for the AdHOC sample. The total sample resulted in 6903 individuals.

2.4. Measuring geriatric syndromes, comorbidity and diseases

The geriatric syndromes of interest to this study were pain, urinary incontinence, disability, falls, dizziness, weight loss, pressure ulcers and delirium [9,12–14,16]. These were measured using the relevant items of the RAI HC. Pain was defined as presence of daily pain. Individuals who were not always continent (including those with catheters) were considered incontinent. The Activities of Daily Living (ADL) Hierarchy scale was used to determine physical disability [14]. The scale ranges from 0 to 6, with higher scores meaning more severe impairment; for this study, a score of two or more was used to define disability. Weight loss was defined as loss of more than 5% of body weight in the last 30 days or more than 10% in the past 180 days. Pressure ulcers were defined as any area of persistent skin redness to breaks in skin exposing muscle or bone. Falls were defined as any fall occurring in the 90 days before the assessment. Finally, delirium was defined as any acute confusional mental state presented in the three days before the assessment. Data on clinical diagnoses were collected through a list of common or important diseases relevant to care, embedded in the RAI HC. Diagnoses of hypertension, osteoarthritis, heart failure, ischemic heart disease, diabetes, dementia, cerebrovascular disease, atrial fibrillation, chronic obstructive pulmonary disease (COPD), cancer, glaucoma, thyroid dysfunction and Parkinson's disease were determined. The item for Parkinson's disease includes parkinsonism and the item for COPD also includes asthma and emphysema. Information on disease diagnoses was verified by many sources including home care recipients, attending physicians and review of patient clinical documentation and previous medical history. Assessment of diseases by interRAI instruments has proven to be reliable and accurate when compared to administrative records [15]. Multimorbidity was defined as the co-occurrence of 2 or more or three or more disease.

2.5. Other measures

Data on age, gender and current smoking status were assessed by items of the RAI HC. The Cognitive Performance Scale (CPS) was used to assess cognitive status [16]. This scale ranges from 0 to 6, with higher scores representing increasing levels of impairment.

2.6. Statistical analysis

Descriptive statistics were calculated for the European and Ontario samples. Frequencies of the co-occurrence of diseases of interest and geriatric syndromes were also calculated separately for men and women. Adjusted means of geriatric syndromes were calculated for groups of participants with each disease occurring: alone (not associated with any of the examined diseases); or in association with 1 of the examined diseases; or in association with ≥2 other diseases. Analysis of covariance (ANCOVA) with Bonferroni correction (among different comorbidity groups) was used to this aim, adjusting for age, gender and geographic site. Eventually, a sensitivity analysis was carried out in order to confirm our main results. Specifically, we excluded from analyses the most prevalent diseases (>10%) not associated with an increased number of geriatric syndromes in the presence of comorbidities (namely osteoarthritis, cerebrovascular disease and peripheral artery disease). P values of <0.05 were considered statistically significant. All analyses were conducted using SAS software (version 9.4, SAS Institute Inc., Cary, NC.).

3. Results

Among the 6903 participants entering the study, mean age was 82.2 (±7.4) years and 4750 (69%) were women. The main characteristics of study sample, according to region of enrollment, are presented in Table 1. Participants suffered from 2.6 diseases, on average, with 5098 (74%) suffering from 2 or more diseases and 3091 (45%) from 3 or more. The most prevalent diagnoses were hypertension (52%), osteoarthritis (27%), and diabetes (25%). The mean number of geriatric syndromes was 2.0; pain (48%), urinary incontinence (47%) and falls (33%) were the most prevalent. Participants in Europe were more likely to be women and presented with more severe cognitive impairment, a higher level of ADL dependency, and slightly fewer diseases compared to the Ontario sample. Such differences may reflect different eligibility criteria to provide home care services in different countries. The number of geriatric syndromes was similar in the two subsamples.

Table 2 shows the occurrence of the geriatric syndromes within specific index-disease groups. Interestingly, there was no difference in the number of geriatric syndromes between those suffering from two or more diseases and those suffering from three or more diseases (2.0 vs 2.1). Cardiovascular diseases (ischemic heart disease, peripheral artery disease and atrial fibrillation) had the highest number of