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Original Article

Coexisting chronic conditions in the older population: Variation by health indicators

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ABSTRACT

Background: This study analyzes the prevalence and patterns of coexisting chronic conditions in older adults.
Design: Cross-sectional.
Participant and setting: A sample of 3363 people ≥60 years living in Stockholm were examined from March 2001 through August 2004.
Measurements: Chronic conditions were measured with: 1) multimorbidity (≥2 concurrent chronic diseases); 2) the Cumulative Illness Rating Scale, 3) polypharmacy (≥5 prescribed drugs), and 4) complex health problems (chronic diseases and/or symptoms along with cognitive and/or functional limitations).
Results: A total of 55.6% of 60–74 year olds and 13.4% of those ≥85 years did not have chronic conditions according to the four indicators. Multimorbidity and polypharmacy were the most prevalent indicators: 38% aged 60–74 and 76% aged ≥85 had multimorbidity; 24.3% aged 60–74 and 59% aged ≥85 had polypharmacy. Prevalence of chronic conditions as indicated by the comorbidity index and complex health problems ranged from 16.5% and 1.5% in the 60–74 year olds to 38% and 36% in the 85+ year olds, respectively. Prevalence of participants with 4 indicators was low, varying from 1.6% in those aged 60–74 to 14.9% in those aged ≥85 years. Older age was associated with higher odds of each of the 4 indicators; being a woman, with all indicators but multimorbidity; and lower educational level, only with complex health problems.
Conclusions: Prevalence of coexisting chronic conditions varies greatly by health indicator used. Variation increases when age, sex, and educational level are taken into account. These findings underscore the need of different indicators to capture health complexity in older adults.

1. Introduction

Despite 30 years of intensive research in the field of geriatrics, it is only in the last few years that clinicians and health care planners have started to consider the need for a "geriatric approach" when examining the health status of older adults [1]. Health care systems are currently challenged by the increasing number of people over 65 years and the aging of older populations, and the challenge will grow in coming decades. Because of the high prevalence of chronic disorders in those of advanced age, older people are already the main users of health care services and account for the majority of health care spending [2,3]. For these reasons, promoting health, preventing diseases and disability, and optimizing care have become major goals in most industrialized countries. To achieve these goals, we need to develop instruments that can help researchers and clinicians capture the complexity of health status in older people [4].

Researchers have found that the main characteristics of older people's health are a high prevalence of disabling chronic diseases (such as heart failure, stroke, and dementia) and the co-occurrence of such chronic diseases in the same person [5,6]. To date, studies have used a variety of indicators to describe the multiple health problems of older people; indicators have been chosen on the basis of the studies' aims, the information available, and the sample setting. We have identified 4 health indicators that have been frequently used in epidemiological, clinical, or care science research [6]: multimorbidity, polypharmacy, cumulative indexes, and complex health problems. *Multimorbidity* is characterized by the concurrent presence of chronic diseases. This definition is mostly used in epidemiological studies and includes both individuals who, with the help of medications, may live relatively unaffected by disease burden and those who face severe functional loss. Multimorbidity was recently recognized as the "most

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common chronic condition in the elderly" [7]. *Polypharmacy*, defined on the basis of the number of drugs a person uses, has also been used as a good indicator of coexisting chronic diseases. Like those with multimorbidity, people with polypharmacy may live independently and actively or may be affected by severe and disabling conditions. *Cumulative indices*, on the other hand, evaluate both the number and severity of coexisting chronic conditions. These indices have mainly been used in clinical studies that aimed to identify people at risk for adverse health outcomes and who might benefit from specific interventions. The most commonly used indices are the Charlson Comorbidity Index [8], the Index of Coexistent Diseases [9], and the Cumulative Illness Rating Scale [10]. Finally, Meinow et al. have proposed an indicator of complex health problems that takes into account not only the cumulative effect of coexisting diseases, but also other factors, such as somatic symptoms and cognitive and/or functional impairment. This indicator has mainly been used to identify older people who need not only medical, but also social services, usually provided by a number of health care professionals [11].

Given the large variability in the indicators used to describe the coexistence of chronic conditions, we applied 4 indicators to the same community-based population, aged 60 years and over, to 1) estimate the prevalence of coexisting chronic conditions in older adults and 2) verify to the extent to which the different indicators overlap or identify people of different health statuses and consequently different health care needs.

2. Methods

2.1. Study population

The study population was drawn from the Swedish National study on Aging and Care in Kungsholmen (SNAC-K). SNAC-K is one of 4 subprojects in a national survey established by the Swedish Ministry for Social Affairs that aims to monitor and evaluate the eldercare system in Sweden [12]. The study population consists of a random sample of people 60 years and older living at home and in institutions in the Kungholmen area of central Stockholm. Baseline examinations were carried out from March 2001 through August 2004. A sample was randomly selected from 11 specific age cohorts with 6-year intervals between the younger cohorts (those 60–78 years) and 3-year intervals between the older cohorts (≥78 years). Of the original 5111 selected, 521 were not eligible. Contact information was unavailable for 50%, 38% died before start of the study, 6% had moved, 4% did not speak Swedish, and 0.8% were deaf. Among the remaining 4590, 1227 people (26.7%) declined to participate, which left a study population of 3363 (73.3% participation rate). Data on multimorbidity were missing for 10 participants, data on polypharmacy for 15, Cumulative Illness Rating Scale scores for 128, and data on complex health problems for 80, which left a population of 3155 people in this study.

2.2. Data collection

Baseline data were collected through interviews, clinical examinations, and psychological testing. All staff (nurses, physicians, and psychologists) working in SNAC-K (an ongoing study) are trained in data collection [13]. At baseline, a nurse gathered information on sociodemographic factors, living arrangements, education, current and past occupation, and current and past socioeconomic statuses. Education was assessed as the highest educational level achieved. In the present study, educational level was divided into 2 main categories: a low level of education (2 to 7 years: 6 years of primary school and, in some cases, 1 year of practical vocational training) and a high level of education (≥8 years, secondary and university levels). The clinical examination included family and past clinical history; current and past use of drugs; geriatric, neurological, and psychiatric examination. The participants were also asked whether they had experienced any symptoms during the last 3 months (chest pain, back pain, pain in legs/joints, stomach pain, breathlessness, fatigue/sleeping problems, or unintended weight loss). Diagnoses were made on the basis of standardized criteria and were recorded using the International Classification of Diseases—10th revision (ICD-10) [14]. The number of prescribed drugs was recorded and classified in accordance with the Anatomical Therapeutic Chemical Classification System [15].

2.3. Indicators of health status

Using the data collected, we derived 4 indicators, which we operationalized as follows:

1. *Multimorbidity*: This indicator was defined as the co-occurrence of 2 or more chronic diseases in the same individual [5,16]. On the basis of the literature [17], we defined a condition as chronic if it was prolonged in duration; left residual disability; worsened quality of life; or required a long period of care, treatment, or rehabilitation. We also defined disability following an acute disease (eg stroke or polio) as a chronic condition. Each disease in the ICD-10 codebook was examined to verify whether it met the study criteria for chronic disease.
2. *Polypharmacy*: the use of 5 or more medications drugs is one of the best predictors of medication-related adverse effects, frailty, disability, mortality, and falls [18]. We thus chose to use this number of medications as the definition of polypharmacy in the current study.
3. *A comorbidity index*: A comorbidity index was defined using the Cumulative Illness Rating Scale [19], which was completed by physicians after the examination. For each patient, disease and impairment of each major organ system were given one of 5 grades: 1, absent (no impairment in that organ/system); 2, mild (impairment does not interfere with normal activity, treatment may or may not be required, and the prognosis is very good); 3, moderate (impairment interferes with normal activity, treatment is needed, and the prognosis is good); 4, severe (impairment is disabling, treatment is urgently needed, and the prognosis is guarded); or 5, extremely severe (impairment is life-threatening, treatment is urgently needed or not available, and the prognosis is bad). In the analysis of baseline characteristics, people were divided into 3 categories on the basis of the number of organ systems with a severity grade of 3 or higher: those with no organ systems with a severity grade of 3 or higher were given a comorbidity index score of 0; those with 1 affected system, a score of 1; and those with 2 or more affected systems, a score of ≥2. Finally, participants were also divided into 2 groups using a comorbidity index score of 2 as the cutoff: low comorbidity index score (score of 0 or 1) and high comorbidity index score (score of ≥2).
4. *Complex health problems*: a person was considered to have complex health problems when they met 2 or more of the following criteria. 1) Serious chronic diseases/somatic symptoms—people with 3 or more chronic diseases/somatic symptoms were defined as having serious chronic diseases/somatic symptoms. 2) Mobility problems—mobility was assessed with 4 tests: walking 100–200 m at normal speed, walking up and down stairs without problems, standing without support, and rising once from a chair without using one's arm. People with at least 3 limitations were considered to have serious mobility problems. 3) Cognitive impairment—people who scored less than 24 of the 30 points on the Mini-Mental State Examination [20] were considered to have cognitive impairment.

2.4. Ethical issues

All phases of SNAC-K have been approved by the Ethics Committee at Karolinska Institutet or by the Regional Ethical Review Board in Stockholm, and all participants provided written informed consent. If the participant was severely cognitively impaired, consent was obtained from a proxy, such as a close family member.