Health care utilization of patients with multiple chronic diseases in the Netherlands: Differences and underlying factors☆

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ABSTRACT

Purpose: To examine health care utilization of people with multiple chronic diseases in The Netherlands compared to people with a single chronic disease, and to identify subgroups of multimorbid patients according to health care utilization.

Methods: All patients diagnosed with one or more chronic diseases in 2008–2009 (N = 54,051) were selected from the nationwide NIVEL Primary Care Database, and data on their GP contacts and medication in 2010 were retrieved. Data on hospital admissions, household size and income were added. Chi-square-tests and multivariate regression analyses were performed to analyze differences between multimorbid patients and patients with a single chronic disease, and between subgroups of multimorbid patients derived from cluster analysis.

Results: Multimorbid patients (37% of all patients) had more GP contacts, prescribed medications, and hospital admissions (all $p < .0001$) than patients with a single chronic disease. The largest cluster of multimorbid patients (57%) had a relatively low level of health care utilization, a smaller cluster (36%) had higher levels of health care utilization, and 7.6% of patients were heavy health care users ($p < .0001$ for all variables). The latter were older, more often female, had a lower income, lived in a smaller household, had more chronic diseases, and more often had specific chronic diseases such as COPD, diabetes and heart failure.

Conclusions: The majority of multimorbid patients have only slightly higher health care utilization than patients with a single chronic disease. Extensive health care utilization among multimorbid patients seems to be related to patient characteristics as well as chronic disease numbers and patterns.

1. Introduction

Due to rapid aging and greater longevity of the population as well as increasing improvement of medical care, a growing number of people are living with a chronic disease [1]. Thirty percent of the population of the European Union (EU) is living with a chronic disease [2] and this percentage is expected to further increase in the next decades [3]. An increasing proportion of people with a chronic illness suffers from multimorbidity [4,5], which refers to the co-occurrence of multiple chronic diseases within a person [6,7]. The total number of people with multimorbidity in the EU is conservatively estimated at about 50 million [8]. Especially among older people the prevalence of multimorbidity is very high: among people over age 65 the proportion of individuals with multiple chronic diseases is estimated at about 65%; among people over age 85 at about 85% [9,10].

Multimorbidity is associated with a poor functional status [11], poor quality of life [12–14], more psychological distress [15], and mortality [16]. Multimorbidity may also be associated with higher levels of health care utilization, not only in comparison to people without a chronic disease but also to people with a single chronic disease [12]. Since health care systems are under pressure (not the least as a result of the growing number of people with [multiple] chronic diseases and the consequential burden on financial and human resources), the innovation of chronic illness care/management in order to provide good quality care (with limited resources) is urgently needed. Integrated care has the potential to meet the complex needs of people with multiple chronic conditions, while making more efficient use of resources [8]. To allocate resources as efficiently as possible, it may be helpful to identify the subgroup of multimorbid patients who are most care and support demanding. This would allow the health system to better respond to the needs of specific subgroups of multimorbid patients, for instance by developing targeted integrated care programs [17–19].

It is, however, hard to identify multimorbid patients with extensive or complex health care needs merely based on particular combinations

of chronic conditions. Sinnige and colleagues, who studied multimorbidity patterns in an elderly general practice population, argued that multimorbidity is "far more complicated than merely the presence of two co-occurring diseases within a person", and that the knowledge on comprehensive disease patterns should be taken into account when providing care for multimorbid patients. [20] Moreover, apart from illness-related factors, needs might also relate to individual patient characteristics such as socio-demographic and social characteristics (e.g. age, gender, education level, and living situation). The identification of profiles of groups of multimorbid patients with extensive health care needs will allow the health and social care system to better respond to their needs, for example by developing and implementing integrated care programs, or providing case management [8,17–19].

The aim of this study was therefore to gain more insight into the (differences in) health care utilization of multimorbid patients. More specifically, the current research addresses the following research questions:

1. How does health care utilization of patients with multimorbidity differ from health care utilization of patients with a single chronic disease?
2. Which subgroups of multimorbid patients can be distinguished on the basis of their health care utilization?
3. Which patient and illness characteristics are associated with these subgroups of multimorbid patients?

2. Methods

To answer these research questions we combined data on morbidity, health care utilization and personal characteristics of three databases.

2.1. Databases

2.1.1. NIVEL Primary Care Database
NIVEL Primary Care Database (formerly known as LINH) is a nationally representative database that holds longitudinal data derived from patients' electronic medical records (EMR) on consultations, morbidity, drug prescriptions, and referrals. [21] In 2010, about 130 Dutch general practices provided data [22]. General practitioners (GPs) code diagnoses using the International Classification of Primary Care (ICPC-1) [23].

2.1.2. Dutch Hospital Data
The Dutch Hospital Data (DHD) database contains information on all day care and inpatient admissions for approximately 88% of all hospitals in the Netherlands [24].

2.1.3. Integrated Income Data — Households database
The Integrated Income Data — Households database, from Statistics Netherlands, contains information on the disposable income and size of each household in the Netherlands [25]. This is mainly derived from tax administration.

2.1.4. Linkage
Data from the three databases were linked using postal code, gender, and date of birth. Linkage was performed by a Trusted Third Party (TTP) and researchers only had access to anonymized data. To perform this linkage, patients had to be uniquely identifiable, i.e. no other persons with the same combination of date of birth, gender, and postal code should be present.

2.2. Study population

From the NIVEL Primary Care Database, we selected patients aged 18 years and older who had at least one chronic disease according to their medical record. For this study, we used a list of 29 chronic diseases which had been selected for previous studies based on their high prevalence among the general Dutch population and their chronic and severe character [26,20] (see Appendix A). In the Netherlands, all non-institutionalized inhabitants are listed in a general practice, and all consultations with the GP are fully reimbursed by the mandatory health insurance. The GP is usually the first professional to be consulted for health problems, and acts as a gatekeeper to secondary care. As medical records in primary care practice are generally complete and representative of the entire population, these are especially suitable for estimating prevalence of chronic diseases.

To be included in this study, patients were required to be registered in the same practice during the full period 2008–2010. By using a minimal period of three years, diagnoses were determined more accurately, as for some chronic diseases patients do not necessarily visit their GP each year. The data quality was assessed at practice level. Patient data were only used from practices who met the quality criteria for recording morbidity data in 2008–2009 and for health care utilization data in 2010.

This study was executed according to the precepts of the Dutch legislation on privacy and the regulations of the Dutch Data Protection Authority. According to Dutch legislation, studies using this kind of observational data do not require medical ethical approval, or informed consent.

2.3. Patient and illness-related characteristics

Data about age, gender, number and type(s) of chronic diseases were derived from NIVEL Primary Care Database. Disposable income (in Euros, over the year 2010) and household size (in the year 2010) were derived from the Integrated Income Data — Households database. Disposable income is defined as gross income minus: inter-household transfers paid, income insurance premiums, health insurance premiums, and capital income and gain taxes.

2.4. Health care utilization

2.4.1. GP care utilization
Data on the number of GP contacts in the year 2010 were derived from NIVEL Primary Care Database. Based on this number, we calculated an additional variable 'having had ≥1 GP contact in 2010' (yes = 1, no = 0).

2.4.2. Medication use
Data on the number of prescribed medications in the year 2010 were derived from NIVEL Primary Care Database. The number of different medications was calculated at ATC3-level. Based on this number, we calculated an additional variable 'polypharmacy' (yes = 1, no = 0), which reflects whether patients were prescribed ten or more different types of medications in 2010 on ATC3-level.

2.4.3. Hospital admission
Data on the number of *day care* and *inpatient* admissions to Dutch hospitals in 2010 were derived from the Dutch Hospital Data (DHD) database. Based on these numbers, we calculated two additional variables: 'with ≥1 *day care* admission (yes = 1, no = 0) to the hospital in 2010' and 'with ≥1 one *inpatient* admission (yes = 1, no = 0) to the hospital in 2010' (both: yes = 1, no = 0). Outpatient hospital care was not included in the analyses.

2.5. Data analysis

First, we compared patients diagnosed with a single chronic disease with those diagnosed with more than one chronic disease (multimorbidity) on the aforementioned patient and illness-related characteristics and health care utilization (research question 1). Differences between the two groups were tested with logistic regression analysis and Chi-square-tests, except for the number of GP contacts, which was tested using multivariate negative binomial regression analyses