Comorbidity and its relationship with health service use and cost in community-living older adults with diabetes: A population-based study in Ontario, Canada

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ABSTRACT

Aims: This study describes the comorbid conditions in Canadian, community-dwelling older adults with diabetes and the association between the number of comorbidities and health service use and costs.

Methods: This retrospective cohort study used multiple linked administrative data to determine 5-year health service utilization in a population-based cohort of community-living individuals aged 66 and over with a diabetes diagnosis as of April 1, 2008 (baseline). Utilization included physician visits, emergency department visits, hospitalizations, and home care services.

Results: There were 376,421 cohort members at baseline, almost all (95%) of which had at least one comorbidity and half (46%) had 3 or more. The most common comorbidities were hypertension (83%) and arthritis (61%). Service use and associated costs consistently increased as the number of comorbidities increased across all services and follow-up years. Conditions generally regarded as nondiabetes-related were the main driver of service use. Over time, use of most services declined for people with the highest level of comorbidity (3+). Hospitalizations and emergency department visits represented the largest share of costs for those with the highest level of comorbidity (3+), whereas physician visits were the main costs for those with fewer comorbidities.

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Conclusions: Comorbidities in community-living older adults with diabetes are common and associated with a high level of health service use and costs. Accordingly, it is important to use a multiple chronic conditions (not single-disease) framework to develop coordinated, comprehensive and patient-centred programs for older adults with diabetes so that all their needs are incorporated into care planning.

1. Introduction

1.1. Background

Diabetes is a global health concern. Approximately 150 million people worldwide were diagnosed with diabetes in 2000, rising to 371 million in 2012 and expected to reach 552 million by 2030 [1]. Of the three types of diabetes (gestational, type 1, type 2), type 2 comprises 90–95% of all diabetes cases in Canada [2] and worldwide [3]. In Canada, diabetes prevalence in adults aged 65 years and older ranges from 14–33%, with higher rates generally seen in older adults, certain provinces, and/or aboriginal populations [4,5]. As with most chronic conditions, the prevalence is higher in older adults, with the majority of people with diabetes in developed countries being older adults [6]. Population aging is considered one of the primary drivers of the increasing prevalence of diabetes, as well as rising levels of inactivity and obesity [7,3].

For older adults with diabetes, comorbidity is common, with the majority having more than one comorbidity and an estimated 40–50% having 3 or more [7–9]. People with multiple chronic conditions (MCC) have been found to have reduced health status, decreased quality of life, increased healthcare use and associated costs, and increased mortality compared to people with one condition [10–13]. Studies focused on people with diabetes have also found that comorbidity intensifies healthcare utilization and increases medical care costs [14]. Diabetes is associated with a range of diabetes-related conditions (concordant conditions), including microvascular (e.g., retinopathy, nephropathy, neuropathy) and macrovascular (e.g., cardiovascular disease, stroke) complications [15]. Many diabetes studies have found that these conditions have a high prevalence [16], account for a substantial portion of patient costs [17–24], and can result in costs almost double those of patients without these conditions [25]. Some studies have looked at the broader range of comorbidities, including those not believed to be related to diabetes (discordant conditions), and have found that these too are highly prevalent [26] and associated with a significant increase in healthcare use [14,27,28], particularly specialist services [29]. Certain discordant conditions common in people with diabetes may negatively impact self-management behaviour – e.g., musculoskeletal diseases can have an antagonistic effect on physical exercise [30], mental health conditions such as depression can limit the willingness to undertake and/or sustain self-management activities [26].

The existing research on healthcare use in people with diabetes has a number of limitations: most studies have focused on a small selection of diabetes-related comorbidities, a limited number of (often acute) care settings, or self-reported rather that healthcare registration (administrative) data [31–35]. These limitations apply to the majority of Canadian studies [8,19,20,22]. This study, by examining the Canadian context, contributes to our understanding of whether patterns are similar across different countries, populations and health delivery systems. We use a comprehensive administrative database to examine service use and its relationship with comorbidity in a large population-based cohort of older adults with diabetes (Ontario, Canada). This study builds on our prior work [36] by examining service use over a longer period of time, including costs, and employing more robust algorithms to identify comorbid conditions. Service use, while a poor proxy for 'need' [37], offers a measure of healthcare system burden. A better understanding of this burden can inform resource allocation decisions and the design of integrated diabetes management programs that address common comorbidities. This study was supported by, and coordinated from the Aging, Community and Health Research Unit (ACHRU), which is mandated by its funders to design, evaluate, and translate innovative community-based programs to improve access to healthcare, quality of life, and health outcomes in older adults with MCC, while reducing costs.

1.2. Study goal and objectives

The overall goal of this study was to use health administrative data to describe the comorbid conditions in Canadian, community-dwelling older adults with diabetes and to explore the association between the number of comorbidities and healthcare service use and cost. The specific objectives were: 1) to describe the type and prevalence of comorbid conditions in community-dwelling older adults with diabetes, 2) describe their health service use for diabetes-related and non-diabetes-related reasons over a 5-year period, and 3) estimate the associated costs over this period.

This paper presents the methods and results of the study in accordance with the STROBE Statement for the reporting of observational studies [38].

2. Methods

2.1. Study design, setting and cohort

This retrospective cohort study used multiple linked administrative data to conduct a 5 year follow up of a population-based cohort of older adults with diabetes.

The setting is Ontario, Canada's most populous province with approximately 13.7 million people and 2.1 million people