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Continuity of ambulatory care and health outcomes in adult patients with type 2 diabetes in Korea

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ABSTRACT

Objectives: Continuity of ambulatory care in chronic disease affects the quality of care and the efficiency of healthcare spending. We assessed the relationship between initial continuity of ambulatory care and subsequent health outcomes (hospitalization, mortality and healthcare costs).
Methods: This was a retrospective cohort study of 68,469 patients enrolled in the Korean National Health Insurance Program, who were 20 years of age or older and first diagnosed with type 2 diabetes in 2004. Patients were followed for 4 years using claims data to measure continuity of ambulatory care for the initial 3 years after first diagnosis and to investigate hospitalization, mortality, and healthcare costs in the fourth year of follow-up.
Results: In the group of patients with COCI < 0.4, the risk of hospitalization for all causes was higher (odds ratio: 1.37, 95% CI: 1.28–1.47) and healthcare costs increased ($\beta = 0.037$, $P < 0.001$) compared with the reference group (COCI = 1.0), after adjusting for patient risk factors, such as age, gender, and comorbidity index.
Conclusions: Policies that promote a continuing relationship with the same physician seem to enhance the quality of care and the efficiency of spending in the treatment of diabetic patients.

1. Introduction

New treatments, high specialization, and consumerism can induce patients to see a variety of different types of healthcare providers in a variety of places to ensure their rapid recovery or to keep them healthy [1].

However, the fragmentation or discontinuity of care among patients with chronic disease may have a significant negative impact on healthcare expenditures. To spend limited resources more efficiently, policymakers have been paying more attention to continuity of care, especially focusing on a continuing relationship with the same physician over time [2].

In the Korean National Health Insurance (KNHI) scheme, most practitioners are specialists. Indeed, 91% of medical practitioners in clinics were specialists in 2009 [3]. Clinical practitioners publicize their specialty and patients opt to visit a clinic with the specialty to which they think their symptoms are related. Patients experience almost no restriction in selecting a healthcare provider within the KNHI [4].

Given these circumstances, the concept of continuity of care has attracted Korean health policymakers' attention as a fundamental issue for designing more efficient strategies for managing patients with chronic diseases who receive care from multiple medical institutions by their preference.

Previous studies have found that enhanced continuity of ambulatory care for patients with chronic diseases, such as diabetes mellitus, can result in more efficient expenditures

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or better health outcomes in terms of lower hospitalization and mortality [4–13]. Especially in the treatment of type 2 diabetes mellitus, a cooperative relationship between the patient and healthcare provider is considered to be a crucial factor, and thus enhancing continuity of care is important for improving the quality of care and the efficiency of expenditures [14–18].

In the KNHI scheme, annual medical care costs for diabetic patients aged 20–79 were estimated at 3185.3 billion Korean Won (KRW), representing 19.2% of the total medical expenditures for those 20–79 years of age [19]. As the Korean healthcare system is characterized by a rapidly aging population, a Westernized diet, and reimbursement on a fee-for-service basis, experts expect a continued increase in the prevalence of diabetics and their medical care costs. Thus, a need for active plans to induce more effective care and more efficient expenditures for diabetics exists.

Although the conceptual framework of continuity of ambulatory care is spreading, it is still uncertain whether continuity of ambulatory care is in fact associated with patient health outcomes or financial efficiency because continuity of care is concerned with those over a longitudinal timeframe [20].

In this study, we examined the effects of continuity of ambulatory care on the health outcomes of adult patients who were newly diagnosed with type 2 diabetes mellitus throughout 4 years of follow-up. Our results can be used as empirical evidence on which policymakers should base a more efficient delivery system for managing and treating chronic diseases, including diabetes.

2. Materials and methods

2.1. Study data and design

This study used the KNHI claims database for 2004–2008. It was a retrospective cohort study of new adult-diabetes patients to examine the relationship between continuity of ambulatory care and hospitalization, mortality, and healthcare costs through follow up for 4 years. In this study, "new adult-diabetes patients" refers to patients who were 20 years of age or older and newly diagnosed with type 2 diabetes (International Classification of Disease, 10th edition [ICD-10], E11) according to the KNHI 2004 guidelines [21]. A patient's first diagnosis was confirmed by the lack of a claim for type 2 diabetes as a primary or a secondary disease between December 1994 and December 2003 [21]. Patients were investigated for continuity of ambulatory care for the first 3 years of the 4-year follow up and for hospitalization, mortality, and healthcare costs in the last year. The age of adulthood, 20 years, was based on the criteria used to calculate the prevalence of diabetes in OECD countries by the International Diabetes Federation [22].

2.2. Study population

In total, 246,991 outpatients were first diagnosed with type 2 diabetes in the year 2004; of them, 14,338 patients under 20 years of age were excluded. Additionally, 21,846 patients who died or were hospitalized and 142,338 patients who visited medical institutions fewer than four times as an outpatient during the period of 3 years in which the continuity of ambulatory care had been measured since first diagnosis were excluded. Finally, 68,469 patients were selected for analysis (Fig. 1). The exclusion of patients who died in the first 3 years after diagnosis was because of insufficient observation time for continuity of care. Additionally, patients who were hospitalized during this period were excluded because the experience of being hospitalized could have affected their continuity of ambulatory care [4,10,21,23]. The restriction on the number of ambulatory visits was intended to ensure the accuracy of diagnosis and to allow the calculation of the continuity of care index (COCI) in a structurally reasonable and meaningful manner [4,10,24].

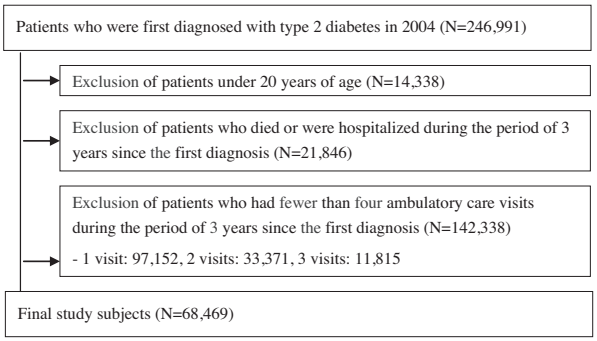

Fig. 1. Flowchart of selected study subjects.

2.3. Measures

2.3.1. Independent variable: COCI

We used the COCI as our major independent variable. The COCI is a measure to assess the extent to which a patient concentrated his or her outpatient visits with the same healthcare provider during the study year [25]. The index ranges from 0 to 1. If all visits are to the same provider, the patient's COCI is 1. The COCI is a widely used measure that incorporates the idea that personal continuity of care is affected by both the total number of providers and the total number of ambulatory care visits [4,26,27].

$$\text{continuity of care index (COCI)} = \frac{\sum_{j=1}^{M} n_j^2 - N}{N(N-1)}$$

N is the total number of ambulatory care visits; n_j the number of visits to provider j and M is the total number of providers.

In the formula, n_j is the number of visits to provider j and N is the total number of visits in a defined period. COCI is higher and close to 1 as the number of all providers (M) seen is fewer and the concentration at the same provider (n_j) increases. For example, if a patient visited two different providers (A and B) nine times, seven of which were with provider A and two with B, COCI is calculated as 0.61 $(=(7^2+2^2)-9)/9\times(9-1)$. In another case, if a patient visited three different providers (A–C) nine times in total, with seven visits, one visit, and one visit for providers A–C,