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Greater continuity of care reduces hospital admissions in patients with hypertension: An analysis of nationwide health insurance data in Korea, 2011–2013

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ABSTRACT

Objectives: To measure the association between time-dependent COC and recurrent hospital admissions in patients with hypertension.
Data sources: Korean National Health Insurance Claims Database (KNHI), between 2011 and 2013.
Methods: We used Korean National Health Insurance Claims Database (KNHI) during 2011–2013 to evaluate the association between continuity of care and hospital admission in adult patients with hypertension. We performed a recurrent event survival analysis analyzing the effect of COC on hospital admissions via Cox proportional hazard regression analysis.
Results: The adjusted risk of hospital admission for individuals with less COC (COC index <0.75) increased 42% (HR 1.42; 95% CI, 1.10–1.83) relative to the reference group (COC index ≥ 0.75). Relative to individuals with a medication possession ratio (MPR) of ≥0.75, the adjusted hazard ratio for hospital admission was 2.09 (95% CI, 1.31–3.35) for those with an MPR of 0.00–0.24, 2.10 (95% CI, 1.30–3.39) for those with an MPR of 0.25–0.49, and 1.40 (95% CI, 0.82–2.39) for those with an MPR of 0.50–0.74. After 12 months, the cumulative incidence of hospital admissions was 0.42% for those with less COC and 0.25% for those with greater COC.
Conclusions: Greater COC was associated with a decreased risk of hospital admission in patients with hypertension.

1. Introduction

Ambulatory care sensitive conditions (ACSCs), such as hypertension, diabetes, chronic heart failure, chronic obstructive pulmonary disease, and asthma, are conditions that can be managed with timely and effective outpatient care, thus reducing the need for hospitalization [1]. In Korea, elevated blood pressure is an especially important

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public health concern, and its prevalence has continued to rise, from 24.6% in 2007 to 28.5% in 2011 [2]. In addition, the incidence of heart and cerebrovascular diseases, the second and third leading causes of death, respectively, were influenced by hypertension [3]. Hypertension increased the risk of mortality more than two-fold in patients with stroke [4], and individuals with coronary heart disease and systolic blood pressure >140 mmHg have a three-fold mortality rate relative to patients with lower blood pressure [5]. Considering this, as even small improvements in blood pressure may result in widespread cardiovascular benefits, management of hypertension is very important.

Policymakers worldwide are beginning to recognize the magnitude of this problem. Modification of chronic disease management system was inevitable because the personal and economic burden of chronic disease and illness was a serious challenge for Korean.

The Korean health care delivery system is classified into three steps based on fee-for-service as the reimbursement mechanism: clinics function as primary care institutions, hospitals function as secondary care institutions, and general hospitals and tertiary general hospitals function as third tier care institutions. All of these can provide outpatient services. Korea's system is quite different from the managed care delivery system of the US where a patient's selection of health care provider is regulated and restricted. Above all, because most clinical practitioners in Korea are specialists, they do not perform the function of a primary care physician as seen in the US. In Korea, 91% of clinics were sole practices in 2006 [6]. In terms of outpatient services, clinics compete against other clinics, hospitals, and some general hospitals. Given the context, to efficiently manage chronic diseases with limited resources, policymakers are becoming interested in continuity of care (COC), which can reduce the risk of complications [7], improve preventive care [8,9], increase patient satisfaction [10] and compliance [6,11], and decrease emergency and inpatient medical services and care costs [12–17]. In primary care, especially, COC is being introduced to improve quality and to cope with the increased workload associated with chronic diseases [18]. And a system for managing chronic disease based on primary care clinics was introduced in Korea in April 2012. This system can reduce copayments for patients who are managed by a single primary-care institution based on clinics [19]. The Chronic Care Model (CCM) and Patient-Centered Medical Home are now being recommended as the model to achieve all five of the attributes that define primary care: accessibility, comprehensiveness, continuity, accountability, and coordination. However, this system focuses on improving continuity of those five attributes [20–22].

Many previous studies have shown an association between COC and health outcomes such as inpatient/emergency department visits. A previous study found (1) the percentage of preventable hospitalizations due to hypertension after controlling for individual-level characteristics was 8.4% and (2) a greater number of patients for each primary care physician (PCP) and less PCP access and fewer medical visits in the previous year were associated with preventable hospitalizations [23]. Also, most previous studies used the random intercept model for statistical analysis, which had a binary distribution with a logit link for the dependent variable. To determine definite causality, there needs to be a temporal association between COC and hospitalization. However, this model concurrently handled COC and hospital admissions although one patient may be repeatedly admitted to the hospital, and one event may influence the next, most studies have merely analyzed the presence or absence of hospital admissions during the follow-up period.

2. Methods

2.1. Data and study design

This study analyzed data from the Korean National Health Insurance (KNHI) claims database for 2011–2013. These data are representative of the country's population and stratified random sample data. We selected 50,785 patients with hypertension based on 2009 according to stratified sex, age in 5-year interval and use of outpatient/inpatient medical service. 50,785 patients correspond to 1% of entire patients with hypertension in 2009. We followed up 50,785 patients to 2013. They provide information from healthcare claims for about 50,785 patients with hypertension, or 1% of the total sample, including participants' entire medical history from 2011 to 2013, age, sex, medical costs, prescription history, diagnostic tests, and other factors. We used sampling weights to estimate population characteristics.

We conducted a longitudinal study of hypertension patients to investigate the association between continuity of ambulatory care and hospital admission. We included participants ≥20 years of age with hypertension who did not experience a hospital admission due to hypertension in 2011, code I10-I13 (International Classification of Disease, 10th edition [ICD-10]). We measured ambulatory COC for 2 years, 2011 and 2012, and then observed hospital admissions from 2012 to 2013.

2.2. Study population

The total number of individuals with hypertension in 2011 was 50,785. Of these, 421 patients were excluded: 30 were <20 years, 287 experienced a hospital admission due to hypertension in 2011, because we should measure COC index using data before 1 year which hospital admission occurred, and 104 did not have insurance or medical aid, we determined that they relied on some other type of health security, like that available to veterans, the homeless, and foreigners.

We defined medical usage as cases in which patients visited an outpatient clinic and received a primary diagnosis of I10-I13 or were prescribed antihypertensive agents. We excluded 15,757 patients with hypertension who made fewer than four outpatient visits during the year. This criterion was intended to facilitate calculation of the COC index in a structurally reasonable and meaning manner [24]. Using these criteria, the final study sample included 34,607 participants (Fig. 1).