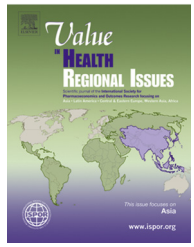
VALUE IN HEALTH REGIONAL ISSUES 6C (2015) 103–110

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/vhri



Supplier-Induced Demand for Chronic Disease Care in Japan: Multilevel Analysis of the Association between Physician Density and Physician-Patient Encounter Frequency

Miho Sekimoto, MD, MPH, PhD[1,2,*], *Masako Ii, PhD*[3]

[1]*Health Policy Unit, Graduate School of Public Policy, the University of Tokyo, Tokyo, Japan;* [2]*Department of Community and Family Medicine, Fukushima Medical University, Fukushima, Japan;* [3]*School of International and Public Policy, Hitotsubashi University, Tokyo, Japan*

ABSTRACT

Background: There are currently large regional variations in the frequency of physician-patient encounters for the treatment of chronic lifestyle diseases in Japan. These variations may be influenced by competition among physicians, and supplier-induced demand (SID) in health care can occur when physicians manipulate their patients' demand for medical services to increase the use of health care. **Objectives:** To analyze patient data to investigate the presence of SID in the treatment of chronic diseases at the regional level in Japan. **Methods:** We tested the hypothesis that clinic and hospital physicians in areas of high competition (high physician density) are more likely to recommend a sooner follow-up consultation than do those in areas of lower competition (lower physician density). Using random-effects multilevel models, we analyzed patient survey data and administrative claims data to estimate the effects of physician density on encounter frequency and medical charges. In the analysis of claims data, we used the mean drug administration period as a proxy for the frequency of physician-initiated encounters. **Results:** Our analysis showed that encounter frequency was significantly associated with clinic physician density, but there were no consistent associations with hospital physician density. Increases in physician density were significantly associated with increases in both clinic and hospital medical charges, and these associations were independent from encounter frequency. **Conclusions:** The results of our study indicate the presence of SID in Japan. Further studies should investigate whether more frequent physician-patient encounters provide clinical advantages to patients.

Keywords: competition, diabetes, hypertension, multilevel modeling, office visits, primary health care.

Introduction

In Japan's unique health care system, primary care can be provided by physicians in both clinics and hospitals. Most of the clinic-based physicians have experience working at hospitals in various clinical disciplines [1]. After several years of practice at hospitals, these physicians proceed to open their own clinic, usually as a solo practitioner, without any formal training in primary care. Because Japan has no nationally accredited training program in any medical and surgical specialty, physicians are free to open their own clinics in any discipline of their choice [2]. In comparison to the overwhelming number of specialized clinic physicians, there are relatively few physicians who have had formal training in primary care. Many patients with lifestyle diseases are therefore treated by specialists in hospitals, such as diabetes specialists and cardiologists.

Japanese patients are free to seek care at any medical institution irrespective of location or insurer. Furthermore, medical fees are largely fixed, regardless of the skills and expertise of the attending physician. Some patients may hold assumptions that hospitals provide higher quality of care than do clinics, and prefer to be treated at hospitals even if their conditions are treatable at clinics. Many clinics have therefore equipped themselves with various advanced medical devices to attract patients and maintain a competitive edge with hospitals.

The number of physician visits in Japan is extremely high compared with other developed countries. The average number of physician consultations per capita in Japan in 2009 was 13.2, whereas the Organisation for Economic Co-operation and Development average was less than half that figure at 6.5 [3]. Currently, there are large variations in the frequency of physician-patient encounters among different regions, as well as between clinics and hospitals for the treatment of lifestyle diseases in Japan; the intrinsic variations in patient attributes and disease distribution have been unable to explain these variations [4].

Conflict of interest: The authors have indicated that they have no conflicts of interest with regard to the content of this article.

* *Address correspondence to:* Miho Sekimoto, Health Policy Unit, Graduate School of Public Policy, the University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-0033, Japan.

E-mail: m-sekimoto@umin.ac.jp.

2212-1099$36.00 – see front matter

http://dx.doi.org/10.1016/j.vhri.2015.03.010

These regional and interinstitutional variations in physician-patient encounter frequency may suggest the overuse or underuse of health care.

In the health care setting, *supplier-induced demand* (SID) refers to the concept where physicians manipulate their patients' demand for medical services to increase the utilization of health care [5]. Because patients do not have sufficient expertise to judge the necessity and quality of the services provided, physicians have considerable influence on the type and quantity of these services. Physicians, however, should ideally supply services on the basis of each patient's medical need, and the provision of health care should not be driven by their private economic interests [6].

Many studies have been conducted to test the existence and extent of SID in health care. The most commonly used approach in these studies is the use of physician/population ratios, or physician density. These studies have examined the changes to the utilization or price of medical services in response to changes in the number of physicians in a specified region [7,8]. An Australian study found that a 10% increase in the supply of general practitioners (GPs) was associated with an increase of between 4.6% and 5.1% in provided services [9]. Wilensky and Rossiter [10] reported that physician densities were significantly correlated with increased physician-initiated consultations and higher price of care. In contrast, a study on SID in primary care physician services in Norway reported that physicians did not increase their output in response to increased physician density [6]. Scott and Shiell [11] found that GPs in areas of high competition (areas with high GP/population ratios) were more likely to recommend a follow-up consultation than were GPs in areas of lower competition.

Studies in Japan have shown mixed results: some studies have demonstrated the presence of SID in Japan [12–15], whereas others have not [16–17]. Most of these previous studies, however, have used regional aggregated data, and are therefore susceptible to ecological fallacy. In addition, many of these studies have failed to control for the risk for health care utilization in patients. Furthermore, few studies have addressed differences in medical services utilization between hospitals and clinics, or have analyzed the association between physician density and frequency of medical expenditure in Japan. There is therefore a need to investigate these themes to improve understanding of variations in health care utilization and costs.

Lifestyle diseases and their complications are major causes of morbidity and mortality in Japan, with an estimated 9.5 million patients with diabetes [18] and 43 million patients with hypertension [19]. Because physician visits are more frequent in Japan than in other developed countries, there is a need to carefully evaluate the impact of SID in the treatment of these diseases.

In this study, we analyzed individual patient data to examine the possible effects of SID in the treatment of chronic diseases, with a focus on hypertension and diabetes. Our research hypothesis is that physician-patient encounter frequency is influenced by physician density, as well as by payment systems for medical services. To test this hypothesis, we used multilevel models to examine whether a significant proportion of the between-area variation in the utilization of physician services is attributable to the area-level factor of physician density. Multilevel modeling is appropriate for data with nested sources of variability, that is, involving units at a micro level (patients) nested within those at a macro level (regions) [20]. We also investigated the influence of SID on medical charges using a model that accounts for patient characteristics. Because of anticipated differences in encounter frequencies between clinics and hospitals, our analyses were conducted separately for the two institutional types.

Methods

Data Sources and Study Population

We used two data sources for this analysis: the first comprised data from patient surveys conducted by Japan's Ministry of Health, Labour, and Welfare in fiscal year (FY) 2005 and FY2011, and the second comprised administrative claims data provided by the Japan Health Insurance Association.

The Ministry of Health, Labour, and Welfare conducts patient surveys every 3 years on outpatients who visit randomly sampled medical institutions. Information collected includes type (hospital or clinic) and location of the institution (municipality) where care is obtained, patients' demographic characteristics, primary diagnosis (*International Classification of Diseases 10th Revision* codes), and the time interval from the previous visit to the index visit. The data include patients of all ages according to the distribution in Japan, although the data lack information to identify visits for the treatment of lifestyle diseases from the others. In this study, we considered encounter interval as a proxy for encounter frequency. From the survey database, we selected patients who were at least 20 years old and whose principal diagnosis was either hypertension (*International Classification of Diseases, 10th Revision* codes: I10, I11, I12, I13, and I15) or diabetes (E11, E12, E13, and E14).

Administrative claims data were obtained from a computerized database of medical bills issued by medical institutions to insurers for the purpose of reimbursement. The Japan Health Insurance Association primarily provides employees' health insurance, and its enrollees are mainly salaried employees of small and medium businesses. Therefore, most of the enrollees are younger than 65 years.

For this study, we analyzed claims data from between April and July 2013. The data included age, sex, diagnoses, medical charges, prescription records, and type and location of the medical institutions. The study subjects were patients who were at least 20 years old, were enrolled in the target health insurance system between April and July 2013, had a documented diagnosis of hypertension or diabetes, and were prescribed antihypertensive drugs or diabetes drugs. Patients who were undergoing hemodialysis, receiving home-based care, or hospitalized during the study period were excluded from the analysis. Because Japan's health care system does not allow refill prescriptions in the treatment of hypertension and diabetes, the main purpose of outpatient visits is to obtain regular drug prescriptions. Physicians are therefore able to arbitrarily increase the number of encounters by shortening each drug administration period. For this reason, we were able to use the encounter interval (given by the average drug administration period) as a proxy for the frequency of physician-initiated visits.

Statistical Analysis

Multilevel models were developed to examine the effects of physician density on physician-patient encounter frequency. In the absence of SID, patients' demographic factors and medical conditions would be expected to be the primary determinants of encounter frequency. In addition to these patient-level factors, we aimed to identify the extent to which area-level determinants (physician density) would influence physician-patient encounter frequency and medical charges.

Patient-Level Variables

The patient-level variables included age and sex in the patient survey data and age, sex, and number of comorbidities in the administrative claims data. Patients' age was stratified into three