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Effects of diagnosis-related group payment system on appendectomy outcomes

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ABSTRACT

Background: The voluntary diagnosis-related group (DRG) payment system was introduced in 2002. Since July 2013, the Korean government has mandated DRG participation for all hospitals. The main purpose of this study was to examine the effects of mandatory DRG participation on various outcome metrics for appendectomy patients.

Materials and methods: We collected inpatient DRG data for 280,062 appendectomy patients between 2007 and 2014 using the Health Insurance Review and Assessment database. We examined patient outcome metrics such as length of stay (LOS), total medical cost, spillover, and readmission rate, according to hospital size.

Results: As a result of DRG participation, the average LOS for patients decreased (adjusted ratio: 0.83 [large hospitals], 0.83 [small hospitals]; 95% confidence interval [CI]: 0.82-0.84, 0.82-0.84), the total medical costs of patients increased (adjusted ratio: 1.23 [large hospitals], 1.35 [small hospitals]; 95% CI: 1.22-1.24, 1.34-1.36), the spillover of patients increased (adjusted ratio: 2.10 [large hospitals], 2.30 [small hospitals]; 95% CI: 2.03-2.18, 2.16-2.45), and the readmission rates of appendectomy patients decreased (adjusted ratio: 0.85 [large hospitals], 0.49 [small hospitals]; 95% CI: 0.77-0.94, 0.42-0.57).

Conclusions: The mandatory implementation of the DRG payment system in South Korea has led to significant reductions in LOS and readmission rates for appendectomy patients. However, any resulting expansion of outpatient services may result in unnecessary resource usage rather than improving medical quality. Policy makers should consider the various implications reflected by these results when considering DRGs for other diseases.

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Introduction

The United States reformed the way hospitals were reimbursed for treating admitted patients by changing to a diagnosis-related group (DRG) payment system in 1983.[1] Since then, DRGs have become more common, gradually becoming the basis for reimbursing hospitals in most developed countries, particularly in Europe.[2]

Korea introduced socialized health insurance in 1977 and achieved universal coverage of the population by 1989. Health care providers were initially reimbursed by a fee-for-service (FFS) payment system, under which they had incentives to increase the volume and intensity of medical services to insured and uninsured patients and to avoid government regulation.[3] The average real growth in health expenditures under the FFS payment system was 8.9% per year from 1999 to 2004, which was greater than the average for other Organization for Economic Cooperation and Development countries.[4] To reduce this rapid growth rate in health expenditures, the government implemented a pilot program for a new DRG payment system from 1997 to 2002. Since then, the government had initiated a voluntary DRG system for seven disease groups and approximately 61% of all hospitals participated nationally. Starting in July 2012, the government mandated participation in the DRG payment system, beginning with clinics and smaller hospitals and followed by the larger general and tertiary hospitals in July 2013.

Previous study results from the DRG pilot program have shown that the average length of stay (LOS) and total medical costs declined by an average of 3.0% and 8.3%, respectively. In addition, there was also some evidence that the number of outpatient visits increased at the participating institutions because of the DRG payment system. The DRG pilot program has shown that the DRG payment system has not had a negative effect on medical quality, as measured by complications and reoperations.[3] Among voluntarily DRG-participating hospitals from 2004 to 2011, the number of surgical operations was significantly increased compared to the number of operations reimbursed by FFS. In addition, the results showed that the DRG payment system resulted in reduced LOS, and the costs for medical tests and antibiotics were transferred from inpatient to outpatient accounts because DRGs apply to inpatient accounts alone.[5] However, these study results may be alternately explained by only examining the effects of the DRG program in voluntarily participating hospitals, which are likely to operate more efficiently than other providers. Significantly, no prior study has analyzed the effects of DRG policy using nationwide claim data from mandatorily participating hospitals. Although a few previous studies on the effects of a mandatory DRG payment system on appendectomy outcomes have been presented recently, we suggest that because that analysis was based on a single institution, the results may not be generalizable to other institutions because the analysis data are based on a single institution.[6,7]

Therefore, we sought to examine the independent effects of mandatory participation in the DRG program on LOS, total medical costs, spillover, and the readmission of appendectomy patients, using nationwide hospital claims data from 2007 to 2014.

Methods

Data sources

We used the Health Insurance Review and Assessment database which contains the medical information for all Korean patients.[8] Korean hospitals submit their claims data for outpatient and inpatient care, including procedures, diagnoses, prescription records, direct medical costs, and patient demographic information, to Health Insurance Review and Assessment to qualify for reimbursement of medical costs from the government.

Study sample

We collected DRG data records from 280,062 appendectomy inpatients (Korean DRG codes: G081, G082, G083, G084) from the database, excluding outpatient data because the DRG program only applies to admitted patients. We excluded new DRGs such as diagnosis procedure combination in Japan, and Medical Aid claim data because the DRG system only covers patients with national health insurance. After excluding subjects aged younger than 20 y or with an LOS of 0 d, the final study group was selected (Figure). The patient data were derived from 722 hospitals which were classified into two size levels; clinics and hospitals functioning as primary care centers including inpatient services, and general hospitals and tertiary hospitals which maintain more than 100 beds and treat relatively more seriously ill patients.[9,10] We combined these institutions into two groups by type (small hospital: hospitals + clinics or large hospitals: tertiary hospitals + general hospitals) in our study and grouped them by their establishment date, relative to when the mandatory DRG policy was implemented (before DRGs: 232,851, after DRGs: 47,211). Finally, we performed a subgroup analysis of procedural complications and surgery types (open *versus* laparoscopic).

Dependent variables

We examined four patient outcome metrics (LOS, total medical cost, spillover, and readmission rate) in our study. We measured LOS using the admission and discharge dates. We calculated the total medical costs as the sum of FFS and DRG claims for each patient's hospitalization and used each year's negotiated medical price growth rate to adjust these medical costs to 2014 levels. Spillover was defined as an individual visiting an outpatient facility within 14 d before or after hospitalization, based on the date of admission or discharge, respectively. Finally, we used the readmission rate within 30 d of discharge as an outcome variable by first identifying the dates of the patient's first hospitalization and discharge in the calendar year. Next, we determined if readmission occurred within 30 d after the discharge date to the same hospital or