

# 行政院國家科學委員會專題研究計畫成果報告

預估支付制度與住院率：對浮報心臟病住院費用之檢定

## **The Prospective Payment System and Hospital Admission Rates:**

### **Testing the DRG Creep on Heart Disease**

計畫編號：NSC88-2415-H-032-018

執行期限：87年8月1日至88年7月31日

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#### 中文摘要

預估支付制度 (Prospective Payment System) 所形成的金融誘因可能誘發浮報案例。本研究以「似乎不相關迴歸 (Seemingly Unrelated Regressions) 模型」為基本架構，發展一分析方法，目的在於協助政府以低廉成本過濾該浮報行為。運用 SPARCS 資料為例，本研究首先分析各類心臟病的住院人次趨勢圖，發現似乎部分「心絞痛(ICD-9-CM 413)」住院人次已被浮報為「其它慢性缺血性心臟病(ICD-9-CM 414)」，以獲取較高額給付。繼而，本研究使用所發展的方法檢定該浮報行為，發現上述浮報行為實非肇因於預估支付制度所形成的金融誘因。

#### **Abstract**

Based on the model of seemingly unrelated regressions, this paper develops an approach which can help the government screen disease codes for upcoding behavior driven by the financial incentives due to the Prospective Payment System (PPS) without causing much expense. Using mainly the SPARCS

data, this paper examines specific categories of heart disease based on the frequency of assignment of codes first and shows that the hospitals may have relabeled the cases of angina pectoris (ICD-9-CM 413) as other forms of chronic ischemic heart disease (ICD-9-CM 414) so that they may receive more reimbursement. It then uses the approach, which it develops, to show that the “upcoding” is in fact not due to the PPS financial incentives.

**Key Words :** Prospective payment system; Diagnosis-related groups; Seemingly unrelated regressions; DRG creep

#### **Motivation and Purpose**

The Prospective Payment System (PPS) was implemented in the United States of America in 1983. Taiwan also began to phase in the PPS system in 1995. The Prospective Payment System is a system for price control based on diagnosis-related groups (DRGs). Because it shifts the payment system from a per-service to a per-case basis, it may affect admissions. Some observers

predict that hospital admissions would increase; others believe they would decrease. The coexistence of these two extremes may occur if providers upcode discharges, which is an opportunity offered by DRG, as Zimmerman (1984) observed.

There were three research projects focusing on examining DRG "creep." Two of them appeared in 1990. The Office of Inspector General (1990) found that 20.8 percent of 1985 Medicare Part A bills contained coding errors that changed the DRG and that 61.7 percent of these errors over-reimbursed the hospitals. In contrast, Carter et al. (1990) re-abstracted a nationally representative sample of 7,887 Medicare charts to determine how much of the change in Medicare's Case Mix Index between 1986 and 1987 was true change in the complexity of cases and how much was upcoding or "DRG creep." They concluded that most of the additional \$1 billion paid to hospitals because of the Case Mix Index change appeared justified by the additional complexity of patients hospitalized. The most recent research was done by Assaf et al. (1993). They examined the assignment of discharge diagnosis for coronary heart disease in Pawtucket, Rhode Island, and a city in Massachusetts from 1980 to 1988. They found that the frequency of codes for the acute forms of coronary heart disease (which entailed higher reimbursement) rose from 35.2 percent to 48.4 percent among discharged patients

with cardiac disease and the chronic forms of coronary heart disease (which entailed lower reimbursement) decreased reciprocally, from 64.8 percent to 51.6 percent. These occurred after the institution of DRGs. However, they had difficulty in distinguishing whether hospitals began to assign more precise diagnoses with the advent of the PPS system, or whether they began to favor diagnoses of acute conditions solely for financial reasons.

This paper hence attempts to develop an approach to help us clarify the issue regarding whether the "DRG creep" was driven by the financial incentives due to PPS. The approach can help the government measure how severe it was and can help the government screen disease codes for upcoding behavior without causing much expense. Moreover, it tests the DRG creep on heart disease in New York State as an example.

## **Data**

Our data are mainly the number of cases admitted for categories of heart disease for each county of New York in calendar years 1986 to 1989, which comes from data tapes from the Statewide Planning and Research Cooperative (SPARCS) System of New York. Variables for gender, race, age, and education are estimated by using census data collected from *County and City Data Book* of 1983 and 1994 and

various issues of *New York State Statistical Yearbook*. The data for cardiologists come from the *Area Resource File* of 1989 and 1991. The data for county population and the percent of urban population for each county come from the *Area Resource File* of 1993. The relative weights of the Diagnosis Related Groups are collected from various issues of *Federal Register*.

### **Methodology**

This research proceeds as the following. First, it constructs two models for a typical hospital's decision-making process, which let the proportion of low-reimbursement discharges that are relabeled be a choice variable. A comparative static shows that the proportion of low-reimbursement discharges that are relabeled increases in the size of gain from relabeling a code and decreases in the amount of monetary equivalent of punishment. Second, it examines number of cases admitted for categories of heart disease during 1986-89 in New York State and investigates how the New York Prospective Hospital Reimbursement Methodology (NYPHRM) and the Prospective Payment System of Medicare affect the admission of patients with ischemic heart diseases. Third, it develops an approach based on the seemingly unrelated regressions to estimating the PPS effect on relabeling behavior. Fourth, it applies its approach to the

SPARCS data.

### **The Results from Raw Data**

The frequency for angina pectoris (ICD-9-CM 413) had a negative trend while the total admissions for the chronic forms had a positive trend. For chronic forms, the only component that increased across the four-year period was ICD-9-CM 414. The relative weights for category 414 were higher than the relative weights for category 413. All cases of 413 were reimbursed according to DRG 140. The relative weight for DRG 140 was the lowest relative weight among the categories of ischemic heart disease in 1986 and 1987, and it was one of the lowest three relative weights in 1988 and 1989. Hence, hospitals may have carefully labeled or even relabeled the cases of 413 as 414 after PPS in order to receive more reimbursement; however, these new labels must be attested to by cardiologists. The trends for average length of stay and for average age are also consistent with this explanation.

### **The Results from the Seemingly Unrelated Regressions**

The empirical results come from the seemingly unrelated regressions. The explained variables are the admission rates. The explanatory variables include the NYPHRM dummy variable, the size of gain, the variables representing population characteristics

and lifestyle, and cardiologists per 10,000 persons.

The sign of variable of gain ( $g$ ) is surprising. It indicates that a typical hospital relabels less when the gain from relabeling the case of 413 as 414 increases, although the parameter of  $g$  is insignificant in both equations. Since none of the parameter of variable  $g$  is significant, we expect that the cross-equation restriction will hold.

The testing of the parameters of the seemingly unrelated regressions does not require the normality assumption when the sample size converges to infinity [Zellner (1962)]. However, for small samples there is some question about how to proceed. In this case, the sample size is 248, which seems to be large enough. By taking logarithm, the admission data have better normality, and the sign of the variable  $g$  does not change. We furthermore convert the admission data to the data with zero skewness. Using the zero-skewness data, we still get the same qualitative result for the variable  $g$ .

In sum, using our approach, the results show that the “upcoding” is due to morbidity instead of PPS financial incentives.

## Discussions

Since the U.S. attempted to make law more effective, a typical hospital could be deterred from relabeling disease.

The government established Peer Review Organizations to monitor physicians and hospitals in 1985. To prevent fraud, the U.S. designed a control mechanism.

Fearing that the medical profession could not be trusted---out of either concern for patients or self-interest---to follow the new guidelines strictly, Congress next created Peer Review Organizations (PROs) to serve as watchdogs for the DRG system. Unlike the failed Professional Standards Review Organization, the PROs were to be private companies that hired physicians to evaluate health-care related practices and determine whether services are reasonable and medically necessary, meet professionally recognized standards, and are provided economically. Up through 1987 the government had approved sixty-five PRO sanctions, mostly against physicians.

In 1986, the False Claims Act (31 U.S.C. §3729 et seq.) passed. One aspect of the False Claims Act makes it unique among health care fraud statutes, and virtually unique among federal laws in general--private persons may enforce the Act on behalf of the United States. If successful, shares in the recovery--a form of judicial bounty hunting. Therefore, it is possible that the PPS financial effect was cancelled out by the deterrence effect due to more effective law.

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