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Short report

The failure of financial incentive? The seemingly inexorable rise of cesarean section

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ABSTRACT

Two policy interventions in Taiwan aiming to slow the growth of cesarean delivery utilization were respectively implemented in 2005 and 2006. The first policy provided financial incentives to encourage vaginal delivery by setting a global fee for obstetric services and in essence increasing the reimbursement for vaginal delivery up to the same level of cesarean section. The second policy aimed to reduce the demand for elective cesarean procedure by employing a copayment when cesarean section is not medically indicated. This paper examines the impact of financial incentives of both the supply and the demand side on the use of utilization of cesarean section using data from the 2003–2008 National Health Insurance Research Database. We found that while the overall trend of cesarean utilization did not seem to respond to the interventions, the policies did have significant impact on its elective use. Financial incentives for the providers do matter, and policy interventions, such as a fee change, are still important strategies to consider in reducing the over-utilization of cesarean section.

Introduction

The rapid increase of cesarean delivery, despite the inconclusive findings on its benefits and an improvement in the patient risk profile (Bailit, Love, & Mercer, 2004), has led to serious public health and healthcare cost concerns. Many previous studies on this topic attributed the increase of cesarean births to financial incentives on part of the providers, as cesarean sections are reimbursed more generously than the conventional vaginal deliveries in most health systems (Grant, 2009; Spetz, Smith, & Ennis, 2001).

Given the likely role of favorable reimbursement for cesarean delivery in the growth of its use, physician payment has been a common strategy adopted by many insurers and governments to deter the escalation of the cesarean section rate. In most cases, fees for cesarean and vaginal births are equal, but policy interventions of this type have been met with mixed results and in cases where an impact was found, many of them only yielded modest effects (Walker, Turnbull, & Wilkinson, 2002). This non-intuitive finding raises the question of whether financial incentives may actually fail. If the answer to this question is yes, then the implication is profound—not only would payers have to revamp the design of their interventions to address the issue, but the economic theory of provider behavior would have to be revisited.

One common limitation of prior studies on this subject is that researchers were often unable to distinguish between medically indicated and elective cesarean sections. In fact, although primary cesarean section use is the target of utilization reduction, evidence documenting the trend of elective use is surprisingly lacking. Policy interventions are not supposed to affect physicians' decisions on patients whose medical conditions require cesarean delivery. Moreover, because an elective cesarean section only accounts for a small portion of the overall use, an impact evaluation based on aggregate data on the overall cesarean section use may fail to statistically detect the effects and offers very limited insights.

Despite the predominant emphasis on the providers, recently there is also a growing interest and equally important argument made on the role of the demand side, especially women's attitude and preferences toward the mode of delivery (Lobel & DeLuca, 2007). Cesarean delivery is preferred by some, because of the fear of any adverse physical consequences from vaginal delivery, or the belief that equates cesarean sections with modernity and better quality of care. Yet, some researchers refute this women's attitude to be an important factor driving the rising rate of elective cesarean section and keep the questions still very much open for debate (Lee,

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Khang, & Lee, 2004). Nevertheless, few studies have examined whether financial incentives on the demand side could help to reduce the utilization of elective cesarean section. This paper examines the impact of financial incentives on both the supply and demand sides on the utilization of cesarean section.

Background

The National Health Insurance system was implemented in March 1995 in Taiwan and provides a comprehensive benefit package that covers most medical services. However, medical expenditures have increased rapidly since 1995 and the program began running a financial deficit in 1998. In order to contain health expenditure inflation, the Taiwanese government put in place a global budget system in 2002 for all hospitals, which in essence imposed an expenditure cap for the whole sector. The fee schedule turned into a point system that indicates the relative prices of different services. The actual price of any service is determined by the point of the service and point value, which is derived by dividing the budget by the sum of all services provided by all hospitals. Furthermore, hospitals prefer patients to pay out of pocket since those services are fully reimbursed. In contrast, point value could drop as service volume increases, and hospitals are reimbursed only partially by the Bureau of National Health Insurance (BNHI) for services covered by NHI.

Taiwan is among the countries with the highest rates of cesarean section as a percentage of total birth deliveries, which has increased fast from 25.40% in 1996 to 30.56% in 2004. Under the universal health system, women in Taiwan are fully insured against birth-related medical costs except those requesting for elective cesarean section without medical indications. Prior to 2004, for vaginal delivery the providers were reimbursed NT$15,188–18,268 (about US$506–609) by the BNHI, assuming that 1 point value equals NT$1, depending on the type of the facilities, and NT$27,000–31,500 (about US$900–1050) for medically indicated cesarean.

In response to the escalating cesarean section utilization, BNHI set a global fee for the obstetric services, or NT$27,139–33,969 (about US$905–1132) at different levels of medical institutions, regardless of the mode of delivery in May 2005. In the following year in 2006, BNHI further implemented a demand-side intervention where BNHI instituted partial reimbursement for elective cesarean deliveries where mothers had to pay a co-payment similar to the price differentials between vaginal delivery and medically indicated cesarean section. With this intervention, physicians still receive the same total payments for elective cesarean, but their payments come from two components: BNHI's reduced reimbursement and the mother's copayment, instead of full reimbursement by BNHI. In medical centers, physicians obtain payments of NT$33,969 (US$1132), which include the reimbursement of NT$18,268 (US$609) for vaginal delivery and the copayment of NT$15701 (US$523), paid by the BNHI and mothers, respectively.

The global fee policy in 2005 as a supply-side intervention and the subsequent demand-side measures in 2006 presented an interesting natural experiment to investigate the role of financial incentives in the rise of cesarean delivery rate. Therefore, we target our impact evaluation on elective use to address the issue that prior research has discussed above.

Methodology

Data

This study uses pooled claims data from May 2003 to April 2008 from the National Health Insurance Research Database (NHIRD). The data used in this study consist of de-identified secondary data released to the public for research purpose, so the study was exempt from full review by the Taipei University Institutional Review Board. The sample subjects were identified from the database by DRG-code: vaginal deliveries are coded as 0371A, medically indicated cesarean sections are coded as 0373A, and those requested by the mothers in the absence of obstetric indications are coded as 0373B. During the period of study from May 1 2003 to April 30 2008, there were a total of 1,003,412 hospital admissions for delivery by mothers aged between 18 and 45, with approximately one-third of them as cesarean sections. Among the cesarean sections, approximately 5.6% of them were elective. To assess the respective impact of the two policy interventions implemented in 2005 and 2006, we define deliveries during May 2003 to April 2005 as the pre-policy I period, deliveries during May 2005 to April 2008 as the post-policy I period, deliveries during May 2003 to April 2006 as the pre-policy II period, and deliveries during May 2006 to April 2008 as the post-policy II period.

Empirical model

We first perform descriptive analyses on the data, including the percentage of each mode of delivery based on maternal ages. We then carry out logistic regression analyses to investigate the effect of policy interventions on the overall utilization of cesarean sections and, more importantly, the elective use for women with different ages while adjusting for the characteristics of the health facilities, geographic location and time trend. The estimation model is shown as follows:

$$Delivery_i = \alpha_0 + \alpha_1 age_i + \alpha_2 polI_i + \alpha_3 polII_i + \alpha_4 age_i{}^{*} polI_i + \alpha_5 age_i{}^{*} polII_i + \alpha_6 X_i + \alpha_7 T_i + u_i$$

The dependent variable (*Delivery*) is mode of delivery, where 1 indicates cesarean section and 0 vaginal delivery. Two dummy variables of policy intervention are created. Policy I (*polI*) is 0 before May 2005 and 1 afterwards. Policy II (*polII*) is 0 before May 2006 and 1 afterwards. The variable of *age* represents maternal age in years. *age*polI* and *age*polII* are interaction terms. Other covariates included in the model are a vector of institution type, institution ownership and geographic location (X) along with time trend in years (T). u is the error term.

As documented in the literature, the likelihood of cesarean section use increases with advancing maternal age, because of the higher medical risks associated with vaginal birth, and the use of cesarean section among older women is hence most likely to be driven by the perceived higher risks. Since women aged above 40 would be more likely to undergo cesarean section, we hypothesize that the policy intervention would not have a significant impact on the utilization of cesarean birth in the sample population of those aged above 40. Moreover, because the introduction of supply-side intervention was designed to encourage the adoption of vaginal delivery by physicians for those young and healthy women with the increase in reimbursement for vaginal delivery, we hypothesize that women aged below 30 are less likely to utilize the cesarean section with this intervention. To test this hypothesis, we include an interaction term between maternal age and policy intervention, *age*polI*, in our estimation model in order to examine any differential effect of supply-side intervention across women of different age groups. To evaluate the impact of demand-side intervention in pregnant women of different ages, we also similarly create another maternal and policy interaction variable in the estimation model: *age*polII*. Since the establishment of the copayment for elective cesarean section aims to dis-incentivize the request for elective cesarean section, we expect to see a decline in the cesarean section