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Impacts of drug reimbursement reductions on utilization and expenditures of oral antidiabetic medications in Taiwan: An interrupted time series study

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ABSTRACT

Objectives: To control increasing pharmaceutical expenditures, Taiwan's National Health Insurance has implemented a series of drug reimbursement price reductions since 2000. This study examined changes in use and expenditures of oral antidiabetic medications following the price regulation in November 2006.
Methods: We obtained claims data between January 2006 and August 2007 from Taiwan's National Health Insurance Research Database. We categorized oral antidiabetic products as affected by the reimbursement reduction ("targeted") or not ("non-targeted"), by level of relative price reduction, and by manufacturer type (international vs. local manufacturers). We used an interrupted time series design and segmented regression models to estimate changes in monthly per capita prescribing rate, volume, and insurance reimbursement expenditures following the policy.
Results: The majority (129/178; 72.5%) of oral antidiabetic products were targeted by this round of price reductions. There was a relative reduction of 9.5% [95%CI: −12.68, −6.32] in total expenditures at ten months post-policy compared to expected rates. For targeted products, there were 2.04% [95%CI: −4.15, 0.07] and 13.26% [95%CI: −16.64, −9.87] relative reductions in prescribing rate and expenditures, respectively, at ten months post-policy. Non-targeted products increased significantly (22% [95%CI: 10.49, 33.51] and 22.85% [95%CI: 11.69, 34.01] relative increases in prescribing rate and expenditures respectively). Larger reimbursement cuts led to greater reductions in prescribing rate, volume, and insurance reimbursement expenditures of targeted products. Prescribing rates of both targeted and non-targeted products by international manufacturers declined after the policy while rates of prescribing non-targeted products by local manufacturers increased.
Conclusions: While total government expenditures for oral antidiabetic medications were contained by the policy, our results indicate that prescribing shifted at the margin from targeted to non-targeted products and from international to local products. Further research is warranted to understand how changes in medication use due to price regulation policies affect medication adherence and patient health outcomes.

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1. Introduction

The rapid growth of health care expenditure, especially pharmaceutical costs, is a challenge for many countries [1,2]. Aging populations, escalating drug prices, increasing rates of drug use, and new pharmaceutical products contribute to rising pharmaceutical expenditures [3,4]. In Taiwan, pharmaceutical expenditures accounted for 25% of total health care expenditures paid by the Bureau of the National Health Insurance (BNHI) in 2009. Outpatient drugs were a major component of expenditures in medical centers (50%), regional hospitals (38%), and district hospitals (30%).

To control increasing pharmaceutical expenditures, the BNHI has implemented seven waves of reimbursement rate adjustments since 2000 to close the gap between procurement and BNHI reimbursement prices for prescription drugs. These were implemented in April 2000, April 2001, March 2003, September 2005, November 2006, September 2007, October 2009, and December 2011. Because institutions procure large quantities of medicines, procurement prices are typically lower than the amount reimbursed by BNHI and the differences constitutes a profit for hospitals [5].

To assess procurement prices, the BNHI conducted surveys and obtained drug wholesale prices from pharmaceutical companies and procurement prices from hospitals. Reimbursements were adjusted if there was a difference of 30% or more between the average procurement price and the BNHI reimbursed price. Prices were subsequently monitored and adjusted on an annual basis for a maximum of five years.

Some information exists about effects of drug reimbursement price reductions in Taiwan. Lee et al. examined the effects of six drug price policies and found that they reduced pharmaceutical expenditures, especially for outpatient medications and for hospitals (compared with clinics) [6]. Chen et al. found that reimbursement price adjustments reduced the daily medical use and expenditures for targeted cardiovascular medications, but did not affect non-targeted products [5]. Chu et al. focused on anti-hypertensive drugs and found that reimbursement price adjustments may have created an incentive for physicians to prescribe drugs with higher profit margins, and to increase prescription duration or the number of drug items per prescription [7]. Hsiao et al. did not find a significant association between reimbursement price adjustments and drug utilization and expenditures during 2001–2004 [8]. Chu et al. studied the short-term effects of reimbursement price reductions on outpatient hypertension treatment among the elderly. They found that the average cost per prescription increased slightly, and that physicians tended to substitute drugs whose prices were not reduced for those subject to price reductions [9].

Little is known, however, about changes in use following price adjustments of targeted (affected by the policy) and non-targeted (not affected by the policy) products, differential effects due to the magnitude of price changes, and changes in use of products made by international versus local manufacturers. This longitudinal study examines the effects of drug reimbursement price adjustments on the utilization and expenditures of oral antidiabetic medications in Taiwan. We focused on oral antidiabetic medications because diabetes is one of the most common chronic illnesses in Taiwan. We chose to focus on the fifth price reduction, implemented in 2006, because a large number of oral antidiabetic drugs were affected by this policy, including products from all drug classes of oral antidiabetic medications. Within each drug class, there were non-targeted products clinically interchangeable with targeted products. Similarly, clinical substitutes existed between small and large price cut products, and between products made by international and local manufacturers. We examined impacts of the price regulation policy separately within each class of oral antidiabetic medication. We also compared policy impacts between targeted and non-targeted groups, by relative price reduction, and between products from international versus local manufacturers. We hypothesized that reimbursement price reductions would be associated with changes in prescribing rates, drug utilization and expenditures because institutions or physicians would change some procurement or prescribing decisions in response to the policy in order to maintain profits.

2. Methods

2.1. Data source

We obtained a 0.2% random sample of monthly claims for all antidiabetic drugs in the ambulatory care setting from the Taiwan National Health Insurance Research Database (NHIRD).

2.2. Outcome measures

We analyzed 51,109 prescriptions for 178 oral antidiabetic drug products. We categorized oral antidiabetic drugs based on the World Health Organization's Anatomical Therapeutic Chemical (ATC) drug classification system into biguanides (BG), sulfonylureas (SU), alpha glucosidase inhibitors (AGI), thiazolidinediones (TZD), fixed-dose combination products, dipeptidyl peptidase 4 (DPP-4) inhibitors, and others. The first four classes (BG, SU, AGI, and TZD) accounted for 96.8% of volume and 93.3% of oral antidiabetic expenditures in November 2006, and the study focused on these classes. The products were divided into targeted and non-targeted groups. We also divided targeted products into those experiencing small (<20%) versus large (≥20%) price reductions. We also categorized all products by manufacturer type (local vs. international, non-Taiwanese pharmaceutical manufacturers).

We used the monthly number of diabetes-related doctor visits as the denominator for all outcome measures. Study measures were prescribing rate (number of prescribed medicines per patient visit per month), volume in defined daily doses (DDDs per patient visit per month) [10] and insurance reimbursement expenditures (amount reimbursed per patient visit per month) for each class of oral antidiabetic drugs.