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## Key Components of Increased Drug Expenditure in South Korea: Implications for the Future

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### ABSTRACT

**Background:** The cost of pharmaceuticals has increased rapidly in Korea in recent years. Expenditure is likely to grow further with the policy of expanding National Health Insurance coverage for the following four disease areas: cerebrovascular and cardiovascular disease, rare diseases, and cancer. Consequently, there is a need to analyze the different components leading to this increased expenditure as a basis for suggesting future reforms in Korea. **Objective:** To quantify the impact of new and established drugs on the growth of total drug spending in South Korea in recent years, specially focusing on the differentiated components of drug spending. These include treatment expansion and drug-mix effects (switching from cheaper drugs to expensive ones and vice versa). **Methods:** A model was proposed and used to assess the impact of both new and existing drugs on changes in price, quantity, and drug mix over the 5-year period in Korea from 2006 to 2010. The database used was the National Health Insurance claims data, which covers about 97% of the total population of Korea. **Results:** Overall drug spending increased 1.43-fold from 2006 to 2010. Drug-mix effect ( $\epsilon_t = 1.32$ ) was the main factor contributing to increased drug spending, followed by increased drug utilization ( $Q_t = 1.26$ ). For existing drugs, treatment expansion ( $Q_t$ ) and drug-mix effect ( $\epsilon_t$ ) were measured at 1.28 and 1.24, respectively, while those of new drugs were 1.02 ( $Q_N$ ) and 1.03 ( $\epsilon_N$ ).

Therefore, existing drugs have a much greater effect on drug spending than do new drugs. According to the Anatomical Therapeutic Classification, drug spending rose most significantly for the “sensory organs” class of drugs ( $E_t = 1.78$ ) followed by the “various” class ( $E_t = 1.68$ ). For existing drugs in the sensory organs class (S), drug-mix effect ( $\epsilon_t$ ) was measured at 0.96. This implies that expensive drugs among existing drugs were replaced by cheaper ones. However, the quantity prescribed ( $Q_t$ ) substantially increased by 1.88-fold. New drugs within this class that were more expensive than existing ones were also prescribed ( $\epsilon_N = 1.09$ ), further increasing drug expenditure in Korea. **Conclusions:** We found contrasting results from previous studies. The drug-mix effect and existing drugs made the largest contribution to drug spending growth rather than new drugs. Policies targeting drug mix, such as promoting cost-effective prescription and rational use of drugs, including the use of cheaper cost generics without compromising care, should be primarily considered to help contain future drug expenditure.

**Keywords:** drug mix, established drugs, Korea, new drugs, pharmaceutical expenditure.

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### Background

Pharmaceutical expenditure in South Korea is of particular interest to health care system regulators. Over the last decade, pharmaceutical expenditure in Korea increased 3.05-fold, while total health expenditure increased 2.45-fold [1]. South Korea spent 21.6% of its total health care expenditure on pharmaceuticals in 2010 [1]. This compares to Organization for Economic Cooperation and Development countries, which spent approximately 18% to 19% in 2009 [2]. However, in 2010, pharmaceutical expenditure actually fell among some European Union member states [3]. This may be due to various reforms and initiatives including stricter regulations for granting premium prices for new drugs and managing their entry,

compulsory price cuts for existing drugs as well as a range of demand-side measures to enhance the prescribing of low-cost generics versus premium priced patented products in a class or related class [4–8]. Aging populations, the increased prevalence of chronic diseases, early adoption of expensive new drugs, and doctors’ preference for prescribing high-cost drugs are often cited as explanations for the growth of pharmaceutical expenditure in Korea [9,10]. This is set to continue with the policy to expand National Health Insurance (NHI) coverage for four disease areas—cerebrovascular and cardiovascular disease, rare diseases, and cancer—that has been initiated by the new ruling government [11].

Understanding which factors contribute to increased pharmaceutical expenditure is important to the Ministry of Health and

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Welfare and the National Health Insurance Service (NHIS), which are responsible for the financial management of NHI. A decomposition analysis is often used to identify factors that contribute to the increase in drug spending. Drug expenditure is usually broken down into price, quantity, and drug mix using an index method, such as Laspyeres, Paasches, and Fisher's Ideal [12–26]. However, this methodology has been criticized because it could not show the contribution of new drugs to the growth of drug spending on each component of drug spending [24–26]. New drugs are usually more expensive than incumbents (existing drugs) and are consequently considered one of the key drivers of increases in pharmaceutical expenditure [4,26,27]. Switching from cheaper to more expensive drugs, the so-called drug-mix effect, is one of the effects induced by the introduction of new drugs. Unless demand-side measures are in place, new premium priced drugs could replace cheaper incumbents, increasing the cost of treatment. New drugs can also induce demand from those who could not be treated appropriately with existing drug therapies, also referred to as the “treatment expansion effect” [24,26–28].

In this study, we adopted a modified model of the decomposition analysis to assess the impact of new and established drugs on the dynamics of drug cost, and to identify policy implications for drug cost containment. Our analytical approach followed on from the model of Gerdtham et al. [20], Gerdtham and Lundin [21,22], and Addis and Magrini [23], but we aim to quantify drug-mix effect and treatment expansion effect of both new and existing drugs, respectively. The remainder of this article is organized as follows: an overview of the Korean pharmaceutical market and the introduction of new drugs; limitations of the decomposition analysis that has been applied in previous studies; details of our approach applied in this study; and conclusions drawn from our analysis.

### The Korean Pharmaceutical Market and the Introduction of New Drugs

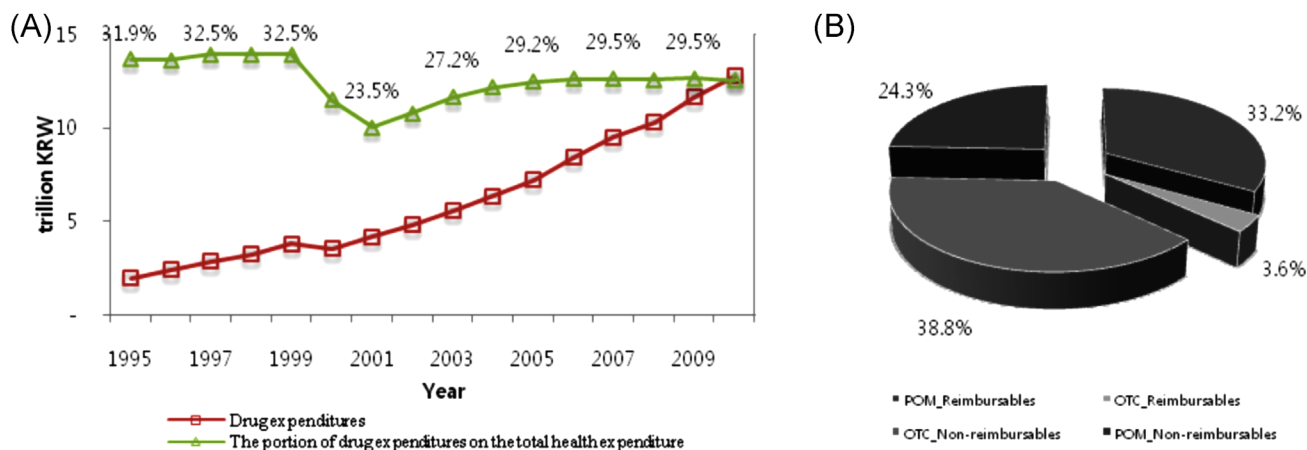
Drug expenditure in Korea has grown steeply after the implementation of the Separation of Drug Dispensing and Prescribing policy in 2000 (Fig. 1). The market size for pharmaceuticals in 2011 was 16,402 trillion Korean won (US \$14.325 billion), and pharmaceutical expenditure by the NHI amounted to 81.9% of the total market [29]. Most medicines available on the market were consumed under the NHI scheme, although the number of reimbursable drugs accounted for only 36.8% of all drugs approved by the Ministry of Food and Drug Safety (Fig. 1).

Most new chemical entities (NCEs) were supplied by multinational companies. Approximately 270 local companies supplied generic drugs. Few local companies have the potential to develop NCEs, and to date only 18 NCEs have been developed by local companies [29].

The entry of new drugs is regulated by the Positive List System and through price negotiations with the NHIS, the single payer. A list of reimbursable drugs has been established in accordance with the introduction of the Positive List System in 2007. Subsequently, manufacturers have had to submit new drugs to the Ministry of Food and Drug Safety for marketing approval, and then to the Ministry of Health and Welfare to have a drug covered by the NHI. The Drug Reimbursement Examination Committee, part of the Health Insurance Review and Assessment Service, then makes a final decision. The criteria used to determine reimbursement eligibility for new drugs include clinical usefulness, cost-effectiveness, budget impact, current status of reimbursement, and price in other countries [9,26,30–32]. Once a drug has been assessed as reimbursable, the manufacturer must enter into price negotiations with the NHIS before the drug can be listed in the formulary. Since 2007, the average number of newly introduced NCEs per year has dropped significantly to 27.6, as compared with 36.8 introduced between 2003 and 2006 [33].

### Limitations of Previous Decomposition Studies

Several studies have analyzed drug expenditure by separating it into constituent elements, including price and quantity [12–26]. Gerdtham et al. [20] and Gerdtham and Lundin [21,22] examined total drug expenditure in Sweden and emphasized the importance of residual (in other words, “drug mix”). Without changing price and quantity, drug costs can increase as a result of switching from a cheaper drug to an expensive one in a class or related class; this is the so-called drug-mix effect. They pointed out that standard price indices do not reflect price changes resulting from changes in drug consumption, especially changes resulting from the introduction of new drugs. Several studies have examined the drug-mix effect and identified it as major factor in drug spending growth [20–24]. Dubois et al. [25] tried to quantify the impact of new drugs by calculating price and volume factors including changes in average price per day, the number of prescriptions per person, and the number of days per prescription. Their results indicate that prescribed days, prescriptions, and the number of patients were significant factors in expenditure growth.



**Fig. 1 – A glimpse of Korean pharmaceutical market. (A) Evolution of drug expenditures (in trillion Korean won [KRW]) and portion of drug expenditures on the total health expenditure in South Korea (1995–2010). Source: Ministry of Health Welfare (2011). (B) Categorization of pharmaceuticals. Source: Korea Pharmaceutical Information Center [55]. OTC, over the counter; POM, prescription-only medicine.**

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