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The discrepancy in attention deficit hyperactivity disorder (ADHD) medications diffusion: 1994–2003—A global pharmaceutical data analysis

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ABSTRACT

Objective: The purpose of this paper was to examine the patterns of spending, price, and the utilization of ADHD medications during the 10-year period, from1994 to 2003 among 4 different per capita GDP group countries.
Methods: This study used the IMS Health database and included both branded and generic ADHD medications. We examined the changes in quantity and price as well as the mixed effects of these changes in the U.S.A. and 3 other groups of countries classified according to their level of per capita GDP.
Results: During this study (1994–2003), the U.S. expenditures for ADHD medications increased 594%; sales volume rose by 80%; and price increased by 285%. In other high GDP countries, expenditures increased 493%, sales volume 328%, and price increased by 39%. In the middle GDP countries, expenditures increased 164%, sales volume 141%, and price increased by 9%. In the countries with a lower per capita GDP, expenditures increased 149%, sales volume 464%, however price decreased by 37%.
Conclusions: The launch of long-acting ADHD medications has dramatically increased the total medication expenditure in the U.S. as well as in other high GDP markets. In the other countries quantity was the most important growth factor.

1. Introduction

Attention deficit hyperactivity disorder (ADHD), the most commonly diagnosed behavioral/mental health disorder in children, affects 3–12% of world's children [1]. It was defined in the diagnostic and statistical manual of mental disorders (DSM-III) as attention deficit disorder with hyperactivity (ADD-H) in 1980 [2] and was renamed ADHD in the 1987 edition of the DSM-manual (DSM-III-R) [3]. The 2000 edition (DSM-IV-TR) [4] provides very similar lists of symptoms as the ICD-10 [5] criteria but recommends different ways of establishing a diagnosis. The ADHD prevalence rates based on DSM-IV are far higher than those of the hyperkinetic disorder of ICD-10 [6,7].

Comparing prevalence rates of ADHD is not straightforward because diagnostic criteria vary over time, and strongly affects the estimates of the number of children with and without ADHD. In addition, a number of variables including the assessment methods as well as the individuals reporting the behavioral symptoms, the population sampled, the diagnostic criteria applied, and the sex of the affected individual may affect the estimates. To look at the prevalence of ADHD internationally, Faraone et al.

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[8] systematically reviewed 50 papers published between the years 1982 and 2001 and found no significant difference between the prevalence of this disorder in the U.S. compared to most other countries or cultures (most were European countries and cultures) if they applied the DSM diagnosis criteria. The latest broad and systematic review by Polanczyk confirmed that after adjusting for methodological differences, there were no significant differences in the ADHD/HD prevalence rates between North America and Europe [9].

Few studies have explored the factors that determined the growth in U.S. pharmaceutical expenditures. Dubois et al. [10] were pioneers in analyzing the spending on prescription drugs. They disaggregated the total spending between 1994 and 1997 into several price and volume factors, identifying substantial spending increases ranging from 43% to 219% for seven disease categories. They found that, although prices rose in every case, the growth in volume greatly exceeded price in its impact on spending. In fact, the relative ratios of increased volume to increased price ranged from a low of 2.5:1 for hormone replacement therapy to over 10:1 for gastrointestinal agents and lipid-lowering drugs. Berndt's study [11,12] of the growth in annual U.S. pharmaceutical spending between 1994 and 2000 reached conclusions that were consistent with those of Dubois. Berndt found a 12.9% growth in spending. Of this, 20% was directly attributable to price increases, while nearly 80% was related to increased utilization. He found that price increases were relatively less important than the growth in the quantity being used, the primary driver behind the increase in expenditures.

Despite public attention and the controversy surrounding the increased use of ADHD medications, there is no published research that compares global expenditures, pricing, and usage. The purpose of this paper was to examine the patterns of spending, price, and utilization of ADHD medications for the 10-year period, 1994–2003 in different wealthy countries around the globe. We categorized the countries in this study as U.S., high GDP countries, middle GDP countries and low GDP countries and compared their ADHD expenditures over time in order to determine the relative extent to which expenditures are to be attributed to price, quantity, or to a mix of price and quantity among those groups.

2. Methods

2.1. Data

Data from the IMS Health database was employed to analyze ADHD medication trends from a global perspective during the study period. IMS Health is the world's leading provider of market intelligence to the pharmaceutical and healthcare industries. The company receives data from more than 139,000 data suppliers covering 730,000 individual dispensing sites, in more than 100 countries for the past 50 years. Data sources include drug manufacturers, wholesalers, retail pharmacies, hospitals, long-term care facilities and healthcare professionals, http://www.imshealth.com/portal/site/imshealth. To extract the drugs used, we adapted the three-digit anatomical therapeutic chemical classification (ATC) system. ADHD medications include those in the ATC = N6B psychostimulants category, along with the non-amphetamine-like stimulants modafinil (Provigil) and atomoxetine HCL (Strattera). Both branded and generic drugs within those categories were retrieved from the database. The medications from the IMS dataset were further examined by clinical experts using the molecular formula, international product name, and local product name to define the medications and remove any that were not used in ADHD treatment. The international product name is defined by IMS Health. It matches products from different countries if they have the same manufacturer or brand-name, and eliminates licensed products from the originator sold under a different brand-name. Countries with at least one standard unit of sales of the defined medications were included in the study.

2.2. Measures

The range and mix of the dosage form, strength, and pack size differs significantly across countries. In this study a standard unit (SU) was adopted to determine the sales volume. The standard unit is the number of standard dose units sold. It is determined by taking the total number of counting units sold and divide it by the standard unit factor, which is the smallest common dose of a product form as defined by IMS Health. Using a standard unit is the best way to compare drugs within a therapeutic class that has a mixture of forms (solids, liquid, injectable, etc.). One SU is equivalent to one 5-mg tablet, 5 mL of a liquid, or one injectable vial. For example, a 20-mg tablet is counted as four SUs (Table 1).

The study used the standard unit average price (price per dose) at the ex-manufacturer level (wholesale purchase level). The average price in a country was defined as the volume-weighted average price per SU for all products. All non-U.S. currency was converted to U.S. dollars, using the current exchange rates. To eliminate the inflation effect over the study's 10-year period, we deflated the dollars by each country's Consumer Price Index (CPI 2000 = 100), which was extracted from the World Bank Group WDI online database http://devdata.worldbank.org/dataonline/.

Since countries across the globe vary substantially in their GDP (gross domestic product), we divided the countries in our study into four groups by per capita GDP. The U.S. which dominates the market in ADHD medications (accounting for more than 80% of the world sales volume) [13] was treated as a single group. The other countries were divided into three groups according to their per capita GDP adjusted by PPP (Purchasing Power Parity; World Bank data). For those countries that have a per capita GDP higher than USD 30,000 were categorized as high GDP countries, of which there were 21. For those countries with a per capita GDP less than USD 10,000, they were categorized as low GDP countries, of which there were 14. The other 15 countries belonged to the middle GDP countries (see Appendix 1).