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Chronic catastrophes: Exploring the concentration and sustained nature of ambulatory prescription drug expenditures in the population of British Columbia, Canada

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ABSTRACT

Previous research has shown that a small proportion of the population accounts for a substantial proportion of spending on physician and hospital services. Much less is known about the high-cost users of ambulatory prescription medicines. We investigate the concentration and sustained nature of ambulatory prescription drug expenditures among residents of British Columbia, Canada in 2001 and 2004. Linking person-specific administrative data from several sources, we examine the demographics, socio-economic status, and health status of high-cost ambulatory pharmaceutical users and the extent that high-cost pharmaceutical use was sustained, at the individual level, from 2001 to 2004. The top 5% of users were responsible for 48% of ambulatory prescription expenditures in the province. A significant burden of morbidity, as well as sustained high expenditures, characterized these users. They were older, more likely to be female, more likely to be of low income, and more likely to be hospitalized and die within the year of study than other pharmaceutical users and non-users.

Our results suggest that careful consideration should be given to the long-term financial burdens and access barriers created by pharmaceutical insurance policies that rely heavily on private payments by individuals. Our focus is on costs associated with ambulatory prescription drug use, however, had we included information on the cost of prescription drugs used in hospitals, we would likely have detected an even stronger relationship between high-cost pharmaceutical use and poor health status.

Health services researchers have long studied the concentration of health care expenditures, showing that a small proportion of the population accounts for a large proportion of total health care expenditures (Anderson & Knickman, 1984; Berki et al., 1985; Densen, Shapiro, & Einhorn, 1959; Reid et al., 2003; Shapiro, Wilson, Griffith, & Oseasohn, 1986). This concentrated health care spending tends to result from an often equally concentrated burden of illness, and is one of the motivations for health insurance systems, whether private or public (Arrow, 2001; Hurley, 2000). Much of the research on "high-cost" users of health care focuses on those who use high levels of physician and hospital services, as well as their influence on overall health care spending and trends. Perhaps because drugs have historically been a much smaller component of health care spending in many countries, high-cost users of pharmaceuticals have not been studied as closely (Kozyrskyj, Lix, Dahl, & Soodeen, 2005). Times have changed. Pharmaceuticals are now a major component of health care spending in many countries—surpassing physician services in some (such as Canada)—meaning that policy-makers and payers have an increased incentive to understand the characteristics of high-cost pharmaceutical users as well as the nature of their high-cost use over time.

Understanding high-cost pharmaceutical users becomes that much more important in light of the fact that many countries have pharmaceutical coverage policies that differ significantly from the often comprehensive coverage they provide for physician and hospital services. For example, across G-8 countries (excluding the Russian Federation and the UK due to lack of comparable data) private payments for hospital care accounted for 16% of total expenditures on such services in 2003 (Organisation for Economic Co-operation and Development [OECD], 2006). In contrast, private payments for pharmaceuticals accounted for 47% of total pharmaceutical expenditure in G-8 countries in 2003 (OECD, 2006). Owing to the increasing use of pharmaceuticals for long-lasting chronic illness, high-cost pharmaceutical needs may impose a significant financial burden associated with ill health under certain financing mechanisms—particularly in North America, where public drug

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benefit programs often require significant private contributions from patients.

For example, Canada's federal, provincial, and territorial governments have recently recommended that provincial pharmacare programs be income-based (National Pharmaceuticals Strategy, 2006). Under such programs, patients (or their private insurance plans) pay for all drug costs below deductibles that are equal to given percentages of income—on the order of 3–6% of household income. US Medicare Part D also involves significant private contributions for individuals with high costs (United States of America, 2004; Mallya & Bazemore, 2006). Individuals pay the annual deductible of $250, 25% of costs between $250 and $2250, 100% of costs between $2250 and $5100 (the range often referred to as the "doughnut hole"), and 5% on costs exceeding $5100 (Stuart, Simoni-Wastila, & Chauncey, 2005). Given the level of private payments involved in public pharmacare programs such as these, it is important for policy-makers to understand high-cost users of ambulatory prescription medicines in order to best develop policies that will ensure that these individuals can access essential medicines without facing undue financial hardship.

This study shows variation in ambulatory pharmaceutical costs across the population of British Columbia (B.C.), Canada, describing the level of total outpatient pharmaceutical expenditures that can be attributed to the top 5% of pharmaceutical users—"high-cost" users. We focus on the costs associated with ambulatory pharmaceutical use in order to illuminate the potential implications of the funding mechanisms for out-patient prescription medicines. We exclude inpatient drug costs from this analysis because costs associated with inpatient pharmaceutical use are generally covered as part of separate hospital insurance programs (e.g., universal, first-dollar public insurance programs in Canada), and also because these costs are not accounted for under deductibles and co-payment policies for ambulatory drug benefit programs. We then characterize these high-cost ambulatory users by examining their demographics, health status, and incomes. We also examine the sustained nature of high-cost pharmaceutical use by following the population's ambulatory prescription drug expenditures over a four-year period or until death, in order to determine how often high-cost users remain high-cost versus transitioning to more modest expenditure levels.

Methods

Data

This population-based study draws on anonymized data from person-specific administrative data describing prescription drug use, demographics, household income, mortality, and diagnostic information. Different records (e.g., health plan registration, medical, hospital, prescription drug use, and death) have been made linkable, with a linkage rate over 95%. Anonymized data for the calendar years from 2001 and 2004 were extracted with the permission of the B.C. Ministry of Health and the B.C. College of Pharmacists. Ethics approval was obtained from the Behavioural Research Ethics Board at the University of British Columbia.

Prescription data were obtained from PharmaNet, B.C.'s drug information system, into which every prescription dispensed outside of hospital must be entered by law. Information extracted for this study included an anonymized but patient-specific identification number, the total cost of the prescription (including what amount was paid publicly or privately), date of drug dispensation, and drug type. We aggregated each individual's annual prescription drug costs, and counted the number of different types of drugs the individual filled prescriptions for in each year. Drug types were defined by chemical subgroup of the World Health Organization's Anatomical Therapeutic Chemical (ATC) drug classification system (WHO, 2004).

Diagnostic codes were obtained from administrative records of physician visits and hospital discharges. These diagnostic codes were used to construct Aggregated Diagnostic Groups (ADGs) of the Adjusted Clinical Group case-mix classification system. ADGs map ICD9, ICD9CM, and ICD10CM diagnoses onto 32 groups that are similar in terms of average severity, persistence, and health care resource requirements. The health status of individuals is gauged by the sum of the ADGs that their 2004 diagnoses indicate. The ADG system has been shown to be predictive of concurrent hospital and physician use in the Canadian provinces of Manitoba and B.C. (Reid, MacWilliam, Roos, Bogdanovich, & Black, 1999; Reid, MacWilliam, Verhulst, Roos, & Atkinson, 2001; Reid, Roos, MacWilliam, Frohlich, & Black, 2002). Specifically, they have been shown to explain approximately 51.9% of concurrent physician costs in the B.C. data (Reid et al., 2001). B.C. Vital Statistics data are used to track individuals who died at any time between January 1, 2001, and December 31, 2004.

Finally, income information, validated using income tax returns filed with the Canada Revenue Agency, was obtained from the registration files of B.C.'s income-based public drug benefit program (Fair PharmaCare). However, owing to the voluntary registration process of this program, it is only available for 78% of B.C. households for which at least one member is registered. For all individuals not registered for Fair PharmaCare, income is approximated using the average household income from 2002 tax returns filed in the Census Dissemination Area (each comprising 400–700 persons) in which the individual lived in 2004.

Study population

This study employs a cohort study design, with cohorts comprising all B.C. residents who were alive and registered for benefits under the universal medical coverage plan in the province (the B.C. Medical Services Plan) for at least 275 days in 2001 and all of those satisfying this condition in 2004. Our study population is therefore dynamic. Registration for this program is required under the universal public health insurance program in B.C. and thus allows us to identify all permanent residents of the province. We impose the 275-day restriction to ensure that we have an accurate picture of our cohort's diagnostic and prescription drug use information. The B.C.'s Medical Services Plan does, however, exclude the roughly 4% of the B.C. population that is covered under specific population-targeted federal health insurance programs (i.e., beneficiaries of the Federal government health plans for Aboriginals and First Nations, Royal Canadian Mounted Police, veterans, and federal inmates).

Descriptive analyses

Descriptive analyses were performed for 2001 and 2004, and the characterization of high-cost users of ambulatory prescription drugs was very similar for both years. For simplicity, descriptive analyses of the high-cost user population are presented for 2004. The results are available for 2001 upon request.

We divided the population into four categories, according to ambulatory drug expenditure in 2004: non-users, low-cost users, medium-cost users, and high-cost users. Non-users are individuals who had no prescription drug expenditure in the given year (i.e., they did not fill a prescription in the outpatient setting). As PharmaNet includes information on every prescription dispensed in the province (outside of hospital), non-users are the individuals who met our study inclusion criteria (were registered for the province's universal medical plan for $\geq$275 days) but did not fill a prescription