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# The Good News:

## Pharmaceuticals and the Cost of Medical Care

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### Introduction

In March 2004, economist Gary Becker wrote in his column in Business Week magazine that "it is important to get a well-crafted system of drug coverage integrated into the Medicare system" (2004, 32). What is notable about this statement is that Becker is one of the best-known members of the University of Chicago school, whose adherents are probably the quintessential free market economists. A column by a Chicago economist is not where one would normally expect to find a call for the expansion of a government program.

Becker's argument is based on solid economic reasoning, however, and applies as much to the Canadian public health system as to the US Medicare system. His point, quite simply, is that, thanks to recent advances in pharmacology, drugs are often the cheapest way to treat a disease. Becker refers specifically to an article in the Journal of Clinical Psychiatry that finds that, between 1990 and 2000, while the annual cost of antidepressants per patient rose from $385 to $1319, hospital costs per in-patient fell from $2738 to $1217, so that total direct treatment costs per patient fell from $4072 to $3309 (all in US dollars; Greenberg et al. 2003, 1471).

In Canada, we are not used to hearing about cost savings from drug treatment, since so much of the public policy debate focuses on increases in drug costs and disputes about drug pricing (see, for example, Priest 2006). The result is that we have tended to lose track of

*Members of the Canadian Health Care Consensus Group (CHCCG) have come together to provide a platform for bold, reasoned and practical plans for genuine reform of the health system and to demonstrate that there is an emerging consensus among reform-minded observers about the direction that real reform must take. The CHCCG, coordinated by the Atlantic Institute for Market Studies (www.aims.ca), includes medical practitioners, former health ministers, past presidents of the Canadian Medical Association and provincial medical and hospital associations, academics, and health care policy experts, all of whom are signatories to the Statement of Principles.*

*This paper is one in a series of papers prepared for the CHCCG, which are intended to contribute to that new debate. These papers do not represent official positions of the Consensus Group, and are not themselves consensus documents, but rather are intended to act as starting points for debate, some of which will occur on the Consensus Group's website (www.consensusgroup.ca). The first few papers will deal with aspects of the "public" versus "private" debate, while later ones will consider other issues which were raised in the Consensus Group's first official document.*

the contributions that advances in pharmacology have made to medical care. Dramatic episodes such as the first trials of the polio vaccine in the 1950s are largely forgotten, while more recent discoveries - for example, that stomach ulcers can be treated with antibiotics rather than with a combination of buttermilk and surgery - though worthy of a Nobel Prize,[1] have not redounded to the credit of the drug sector. Nor do drug companies seem to get much credit for the tremendous advances in AIDS pharmacotherapy, including the recent announcement of the development of an AIDS multi-drug, which requires AIDS patients to take just one drug, once a day (see Pollack 2006). Indeed, some commentators were implicitly critical of the development of better AIDS treatments, concerned that they would make people lose their fear of HIV through what economists term a "moral hazard effect".

… the coverage of drugs by the public health system can actually save the system money …

Several factors are at play here. One is that, when people think of the benefits of drugs, they often recall episodes, such as the discovery of penicillin or the polio vaccine, that had an impact on the population at large. Today's drugs, however, are much more likely to be targeted at specific groups, rather than at the mass of the population, which tends to create the impression that drug development has been stagnant. Additionally, much of the investment in pharmaceuticals today is aimed at improving adverse medical symptoms and patients' quality of life, which does not have the same large-scale effects as did the discovery of, say, the polio vaccine.

The major factor contributing to the limited media coverage of pharmacological advances, however, is the way payment for medical care is structured in most countries. As a result, the public hears much more about cost increases associated with drug therapy than about cost savings. Accordingly, this paper addresses the way in which increasing the coverage of drugs by the public health system can actually save the system money by treating diseases early, and thus preventing the serious, and expensive, consequences of advanced disease.

There is clear evidence that drug use reduces hospitalizations. Despite this evidence, however, drugs are often underused due to their cost. Moreover, in a health care system where budgets for physicians, hospitals, and drugs are managed separately, increasing spending on drugs, even if it would reduce costs within the system as a whole, is difficult because of the need to justify such an increase within the budget for drugs alone. What is needed instead is a more holistic approach to health care, one that combines budgets to optimize health outcomes rather than cost containment within the budgets of individual areas of the health care system.

## The Benefits of Drug Treatment

It may seem intuitively obvious that pharmaceuticals are effective in treating adverse health conditions and improving health outcomes. This intuition is, however, supported by solid research. Miller and Frech (2002), for example, using international data from the early 1990s, find that a 10 percent increase in pharmaceutical consumption increases life expectancy at age 60 by about 6 percent and disability-adjusted life

[1] The press release that accompanied the announcement of the 2005 Nobel Prize in Physiology or Medicine to Barry J. Marshall and J. Robin Warren noted: "This year's Nobel Laureates...made the remarkable and unexpected discovery that inflammation in the stomach (gastritis) as well as ulceration of the stomach or duodenum (peptic ulcer disease) is the result of an infection of the stomach caused by the bacterium Helicobacter pylori." See the web site: http://nobelprize.org/nobel_prizes/medicine/laureates/2005/press.html.

expectancy at age 60 by about 9 percent. In other words, drugs have a positive effect both on length of life and on health-related quality of life. Not surprisingly, Miller and Frech also find that the effects of pharmaceuticals vary by disease and age, with the greatest benefits occurring on mortality rates due to circulatory diseases.

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In terms of reducing hospitalization and other health care expenditures, drugs are also highly effective in the area of chronic disease management, although much more could be achieved. In the Canadian context, for example, Rachlis (2004) finds that more than 70 percent of people with high blood pressure and 60 percent of asthmatics do not have their condition controlled properly, 60 percent of diabetics did not have an eye exam in 2003, and more than 20 percent of patients discharged from hospital with congestive heart failure are readmitted within 60 days. Whether or not this is because patients do not comply with medication requirements due to the cost of pharmaceuticals or some other reason, chronic diseases are a huge economic burden to the health care system - costing more than $80 billion annually, according to the Chronic Disease Prevention Alliance of Canada - and many of their serious consequences are likely preventable with the appropriate drug therapy.

Perhaps the most prolific researcher in this field is Frank Lichtenberg of Columbia University's Graduate School of Business. Lichtenberg has looked at the benefits of new pharmaceuticals from a number of angles; we refer to some of his cost studies below, but here we note several studies in which he looks at the effects of drugs on life expectancy. In one paper (Lichtenberg 2002b), he notes that, between 1960 and 1997, life expectancy at birth in the United States increased from 69.7 to 76.5 years. He concludes that the average new drug approval increased the life expectancy of people born in the year of the release by about 5 days and that, in current dollars, it took US$1345 in drug research and development to increase life expectancy by about a year. In an earlier paper (Lichtenberg 1998), he estimates that, on average, each new drug approved in the United States during the 1970-91 period had saved 11,200 lives by 1991. In Lichtenberg (2003), using international data, he reports that, between 1986 and 2000, the average life expectancy of the populations of his sample countries increased by almost 2 years. He also finds that "new chemical entity launches" accounted for about 40 percent of the increase in longevity.[2]

Thus, although there may be debate about the particular benefits of particular drugs - that is, on quality of life as opposed to just longevity - there is no doubt that drugs have increased significantly the survival rates of individuals with certain diseases.[3] Saying that drugs have increased life expectancy, however, is not the same as saying they have cut the costs of care.

## Drugs and Health Care Costs

There are, inevitably, a number of ways to look at the issue of drugs and the cost of care. One relates to what is known as "cost-effectiveness analysis," which is just another way of asking whether we get enough bang for the bucks we spend on various drugs. Cost-effectiveness analysis looks at the effect of, say, a new drug on health out-

[2] One should note, however, that substantial advances were made in managing heart disease during those years; similarly large benefits probably will be much more difficult to achieve in future as development levels off.

[3] Of course, their effects vary by disease - lung cancer, for example, remains stubbornly resistant to treatment.

comes and compares that effect with the cost of the drug. These health outcomes are frequently measured in quality-adjusted life years (QALYs), which state the equivalent of one year with a specific disease to some smaller amount of time in perfect health. As such, QALYs measure the quality of life improvement that a certain drug has, but they do not necessarily reflect an increase in life expectancy. The Canadian Agency for Drugs and Technologies in Health - formerly the Canadian Coordinating Office for Health Technology Assessment - uses cost-effectiveness analysis when it publishes a health technology assessment report on a new drug.[4]

In most cases, cost-effectiveness studies find that new drugs improve survival, or health-related quality of life, or both, relative to an existing treatment. Such studies also usually find, however, that new drugs also cost more; in other words, new drugs allow us to get better health outcomes from the health care system but total costs go up. The question then becomes: is the improvement in outcome worth the extra cost? To make this decision, cost-effectiveness studies often use a "cut-off" point that sets a limit on how much money should be spent per additional QALY gained. This amount tends to be around $50,000 per QALY, implying that any amount greater than $50,000 per additional QALY gained is "too expensive". There are, however, two main problems with this approach. First, $50,000 is a somewhat arbitrary figure; another amount could have been chosen just as well. Second, cost-effectiveness analysis might not fully include all sectors that could be affected by a new drug. For example, long-term improvements in hospitalization costs, particularly if they are indirect, might not be reflected in the calculation of the benefits of a new drug.

There is no doubt that many new drugs are expensive. Several new cancer drugs - for example, bevacizumab (Avastin) and cetuximab (Erbitux) for the treatment of advanced colon cancer - have cleared the hurdles needed to be approved for use in a number of countries. Yet, despite the proven effectiveness of such drugs, they have run up against cost-effectiveness analyses that suggest they are not necessarily worth the cost of purchase by government drug programs. Indeed, even US oncologists, who might be expected to place less weight on cost as a factor in prescribing such drugs, regard them as not being good value for money (see Nadler, Eckert, and Newmann 2006).

At the same time, such expensive new drugs might be treated unfairly by a simple application of cost-effectiveness analysis. Many of these drugs represent new approaches to treatment, and costs are likely to come down as the field advances and the new approaches prove useful. Cost-effectiveness analysis also neglects the role of brand-name drugs in attracting generic competition: if these approaches pay off, generic competitors will, once brand-name patents expire, enter the market with lower-cost equivalents. An example is Tamoxifen, a breakthrough drug in the treatment of breast cancer, which today faces so many generic competitors that its original manufacturer is dropping out of the market.[5]

Our interest here, though, is in drug therapies that actually reduce the cost of treatment, which tend not to make the headlines that cost-increasing drugs do. For the most part, such therapies act as substitutes for other types of treatment - most commonly,

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[4] See the web site: <http://www.cadth.ca/index.php/en/hta/faq>. For the agency's guidelines for the economic evaluation of drugs, see: <http://www.cadth.ca/media/pdf/186_Economic-Guidelines_e.pdf>.

[5] See the web site: <http://www.fda.gov/cder/drug/shortages/Nolvadex_Discontinuation.pdf>.

in-patient treatment. That means, of course, that the cost savings attainable by substitution will depend on the cost of the type of treatment being replaced.

…the use of newer drugs tends to lower all types of non-drug medical spending …

Frank Lichtenberg has also done work in this area. In a 1996 paper, he finds a strong inverse relationship between increasing total hospital bed days and increasing drug mentions (that is, drugs prescribed). The number of hospital bed days declines most rapidly for those diagnoses with the greatest increase in the total number of drugs prescribed and the greatest change in the distribution of drugs. He finds that, holding new drugs, surgical procedures, and the number of outpatient visits constant, an increase of 100 prescriptions is associated with 16.3 fewer hospital days. Also, a 10 percent increase in drug mentions is associated with a 6.4 percent reduction in hospital care costs, which implies that (in 1996 US dollars), a $1 increase in drug costs is associated with a $3.65 reduction in hospital care costs - a figure that would be 20 percent higher if indirect costs are also accounted for. This finding also implies that a $1 increase in drug costs reduces total health care costs by $2.65. Looking at the relationship between office visits and drug mentions, however, Lichtenberg finds that a 10 percent increase in drug costs increases the cost of physicians' services by 6.6 percent - in other words, a $1 increase in drug costs is associated with a $1.54 increase in the cost of physicians' services - which offsets 42 percent of the estimated reduction in in-patient costs. Lichtenberg's findings suggest, therefore, that drugs seem to be substitutes for hospital bed days but complementary to ambulatory physician care. It makes sense to think that, when a new drug therapy allows patients to be treated on an ambulatory basis, visits to the doctor's office will go up even as visits to the hospital go down. Given the relative price of the two types of visits, the substitution can still be cost reducing, depending on the price charged for the drug.

In a 2001 paper, using data from the US Medical Expenditure Panel Survey, Lichtenberg finds that individuals who took newer drugs were significantly less likely to have died by the end of the survey and significantly less likely to lose work days than individuals who took older drugs. Moreover, he finds that the use of newer drugs tends to lower all types of non-drug medical spending, which results in a substantial net reduction in the total cost of treating a condition. This has implications for cost-control strategies that target the use of specific drugs and for the speed at which potential users can gain access to new drugs on the market.[6]

Lichtenberg is not the only researcher in the field, of course, although he may be the most prolific. Goldfarb et al. (2004) review the evidence on pharmaceutical therapy in the treatment of four chronic conditions; asthma, diabetes, heart failure, and migraine. Although the results differ across diseases, they find evidence in the literature that appropriate pharmacological therapy can reduce other health care costs. Kass-Bartelmes and Bosco (2002) also cite other examples of cost reduction associated with pharmaceutical treatment.

Much of the evidence on drug substitution is from what are sometimes referred to as "negative studies" - studies of what happens to the treatment costs of groups that lose

[6] See also Lichtenberg (2002a), in the abstract of which he concludes:
*In the Medicare population, a reduction in the age of drugs utilized reduces non-drug expenditure by all payers 8.3 times as much as it increases drug expenditure; it reduces Medicare non-drug expenditure 6.0 times as much as it increases drug expenditure. About two-thirds of the non-drug Medicare cost reduction is due to reduced hospital costs. The remaining third is approximately evenly divided between reduced Medicare home health care cost and reduced Medicare office-visit cost.*

some or all of their drug coverage. For example, Lichtenberg (2005) looks at the effect of the US Department of Veterans Affairs' adoption in 1997 of a "closed" drug formulary that lists the specific drugs the VA will cover. He argues that, by discouraging access to newer drugs in an effort to control costs, the VA's use of older drugs actually reduced the life expectancy of patients relative to that associated with the use of newer drugs. He also says that "demographic data published by the VA indicate that the life expectancy of veterans increased substantially before the National Formulary was introduced (during 1991-97) but did not increase, and may even have declined, after it was introduced (1997-2002)."

… increased compliance with prescribed pharmaceutical therapy is associated with a decrease in the use of medical services …

A number of studies have looked at the effect of the introduction of drug co-payments on other medical costs. Some segments of the population are very price sensitive in their demand for prescription drugs, and respond to increases in co-payments by cutting back on drug use. Goldman, Joyce, and Karaca-Mandic (2006), for example, examine the effect of an increase in co-payment from $10 to $20 on the behaviour of patients who take cholesterol-lowering drugs. They find that the fraction of fully compliant patients - that is, those who adhere to the drug therapy prescribed by their physicians - fell by six to ten percentage points as a result of the increase in cost, and that both hospitalizations and emergency department use declined as compliance rates increased. The authors cite the case of Pitney Bowes in the United States, which "lowered cost-sharing for diabetes and asthma medications to increase access and compliance. Overall spending among these employees fell by about 12%, primarily due to large reductions in [emergency department] use and hospitalizations."

Kozma, Reeder, and Lingle (1990) observe that the numbers of prescriptions, physician visits, and out-patient visits per person increase as the number of in-patient hospital admissions declines. Theoretically, they conclude, "an association of a reduction in inpatient hospital use and expenditures following the elimination of drug formulary restrictions is particularly noteworthy." Hepke, Martus, and Share (2004) find that increased compliance with prescribed pharmaceutical therapy is associated with a decrease in the use of medical services, but not with lower costs. Braunwald (1991) finds that every dollar spent on angiotensin converting enzyme inhibitors saves $6 in hospital costs for patients with chronic heart failure. According to the Virginia Health Outcomes Project (Williamson Institute et al. 1997), every $3 spent on asthma medications saves $17 in emergency room costs. Dor and Encinosa (2004) conclude that increasing diabetic patients' co-payments by $6 to $10 would reduce drug spending for diabetes in the United States by US$125 million, but that the increase in patients' lack of compliance with prescribed drug therapies that would follow would lead to complications resulting in an additional US$360 million in treatment costs.

In a dynamic simulation of the effects of insurance on medical care use and health outcomes, Yang, Gilleskie, and Norton (2004) find that, although an increase in prescription drug benefits indeed increases the demand for prescription drugs, it is unlikely to do so by as much as static models predict. Moreover, the increase in demand for drugs also lowers mortality rates without increasing the demand for hospital care as more people live longer; thus, the benefits of proper pharmaceutical use are again reflected in longevity. Overall, this might represent an increase in the cost of Medicare in the United States, but this is due to longer life expectancy, rather than to the rising cost of drugs themselves. And Hsu et al. (2006) find that, although the beneficiaries of group medical care packages whose drug benefits were capped had pharmacy costs that were 31 percent lower than those whose benefits were not capped, the savings in drug costs were offset by increases in emergency department and in-patient care.

Finally, in what may be the best known studies of this type, Soumerai and co-authors (1987, 1991) look at the effect of a prescription cap under New Hampshire's Medicaid program, which, at the time, limited beneficiaries to three prescriptions per month. They find that, although prescription drug costs did fall, the cap resulted in an increase in admissions to nursing homes, which were exempt from the cap, and the increased nursing home costs wiped out the benefits of the cap.

… the better the coverage for pharmaceuticals, the more likely that drugs will be used properly …

## Conclusion

It is clear from the literature that, properly used, pharmaceuticals can improve health outcomes at higher cost, and they can also reduce the cost of attaining current health outcomes. This result is clearest in a few fields, such as AIDS and cardiovascular diseases, but one can reasonably expect it to extend in the not-too-distant future to diseases such as variants of cancer.[7] In many ways, the biggest obstacle to efficient drug use is that the costs and benefits of better pharmaceutical use do not necessarily fall on the same groups - or even on groups that are in a position to do deals with each other. If drug and hospital budgets remain strictly separated, new drugs that increase pharmaceutical costs but reduce hospital costs simply impose costs on the drug budget while yielding benefits for the hospital budget. Thus, unless some of the savings on the hospital side can be transferred over to the drug budget, a strict limit on drug spending could thwart efforts to cut costs overall.

Moreover, it is not just health care budgets that are affected by these savings. Wyatt et al. (1995) estimate that, in 1991, schizophrenia cost the United States US$19 billion in direct expenditures and US$46 billion in indirect costs (in the form of lost productivity). In the Canadian context, Goeree et al. (1999) estimate that, in 1996, schizophrenia cost the economy $1.12 billion in direct health and non-health costs and another $1.23 billion in lost productivity. This is a huge financial burden, most of which comes from indirect costs that largely occur outside the health care system.

It is possible, however, to obtain substantial reductions in the cost of health care through better disease management. Nykamp and Ruggles (2000) report on an example of what can happen when budgets are not strictly separated. They look at the case of a 346-bed urban hospital in Atlanta, Georgia, that implemented a program to provide free medical and prescription drug care to a population of 36 indigent patients. In-patient admissions fell by 39.5 percent and out-patient visits by 64.4 percent. Moreover, the program's drug costs of US$27,558 were outweighed by savings of US$378,183. Obviously, not all programs would have this kind of ratio, but the chances of finding cost savings that do not compromise patient care are greatest when the incentives are right. The literature suggests that the better the coverage for pharmaceuticals, the more likely that drugs will be used properly, which then realizes savings in other health care sectors.

Although much of the current policy debate is about the increasing cost of drugs and drug pricing, considerable research suggests that more attention should be paid to access to drugs. The benefits of better drug coverage are many-fold, among them the opportunity for more-than-offsetting decreases in hospital and emergency department

[7] The recent approval of Gardasil as a vaccine for cervical cancer raises the possibility of skipping the treatment stage altogether and jumping directly to prevention, at least in that case. See the web site: http://www.cbc.ca/story/science/national/2006/06/29/cervical-cancer.html.

costs through improvements in health and better disease management, improved compliance because people are better able to afford their medications, and new and better drugs to replace old ones.

On a larger scale, by making a substantial investment in including comprehensive drug coverage under public health insurance programs, savings in other areas of medical care - quite possibly larger than the cost of better drug coverage - could be realized. Moreover, this would not even include the benefits of improving the quality of life of those affected by it. The first step toward such a holistic approach is to get away from so-called silo budgeting, so that costs in one sector may be offset against savings in another.

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