and LeBaron did the data collection; and all authors contributed to the writing of the manuscript.

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**Health Care Reform**

**Cost Control in a Parallel Universe: Medicare Spending in the United States and Canada**

As the United States was implementing Medicare in 1966, Canada was phasing in its own Medicare program, which covered all Canadians under provincially administered plans. While these provincial plans varied, all incorporated significant payment reforms—global budgeting of hospitals and stringent capital expenditure controls—and banned copayments and deductibles.

Before the mid-1960s, the 2 nations' health care financing systems were similar, and health care costs were comparable. Since then, overall US costs have grown more rapidly, but no study has compared spending for the elderly—the populations covered by Medicare in both nations.

**Methods.** We obtained official figures for Medicare spending for persons older than 64 years in Canada and the United States for 1971 (when Canadian Medicare became fully operational) through 2009. Since available Canadian data for 1971 through 1979 are less detailed, we focus principally on changes since 1980.

We adjusted Canadian figures for minor changes in government accounting. To avoid distorting time trends, we excluded Medicare Part D (which began in 2006).

We calculated percentage changes in inflation-adjusted spending per elderly enrollee and compared actual US Medicare expenditures in each year since 1980 (and 1971) with the projected level of expenditure had US Medicare spending increased at Canada’s rate. See the eAppendix for further details (http://www.archinternmed.com).

**Results.** US Medicare spending per elderly enrollee rose from $1215 in 1980 to $9446 in 2009 (an inflation-adjusted 198.7% increase). The comparable increase for Canada was 73.0% (from $2141 to $9292). Canada's higher base-year spending reflects its more comprehensive benefits, covering about 80% of seniors' total health costs, vs about 50% in US Medicare.

The Table lists actual US Medicare spending from 1980 through 2009 and projected spending and savings had US costs risen at the lower Canadian rate. Projected savings totaled $154.2 billion in 2009 and $2.156 trillion for 1980 through 2009.

Medicare hospital spending per elderly enrollee grew 44.7% in Canada vs 81.9% in the United States. Physician spending grew 100.7% in Canada vs 274.3% in the United States. Hospitals’ share of total Medicare spending fell from 49.6% to 41.5% in Canada and from 68.4% to 41.5% in the United States. Spending for other services (eg, home, hospice, and skilled nursing facility care) rose from 3.9% to 23.6% of spending in the United States and from 39.7% to 44.3% in Canada.

For the 1971-2009 period, US costs rose 374.1% vs 126.3% for Canada, and estimated foregone savings were $2.9024 trillion (eFigure).

**Comment.** Medicare spending has grown nearly 3 times faster in the United States than in Canada since 1980. Had US Medicare costs risen at Canadian rates, rather than a deficit of $17.1 billion in 2009, the Medicare Hospital Trust Fund would have realized a $32.3 billion surplus. Savings on Medicare Part B would have been even larger. By 2009, the $2.156 trillion in excess spending attributable to US Medicare’s faster growth was equivalent to more than one-sixth of the national debt.

Several features of Canada’s program help constrain costs. First, the single-payer system has simplified administration, holding administrative costs to 16.7% of overall spending vs 31.0% in the United States. Although US Medicare’s internal overhead costs are low, it remains one among many payers. Hence providers’ administrative costs are inflated by having to deal with a multitude of payers and track eligibility, attribute costs, and bill for individual patients and services.

Second, Canadian hospitals receive prospectively determined global operating budgets, removing incentives to provide unnecessary care while simplifying billing and administration. However, unlike accountable care organization payment schemes in the United States, capital costs are not folded into the global budgets but distributed separately through an explicit health-planning process. Canadian hospitals cannot use operating surpluses to fund new buildings or equipment but must request separate capital appropriations. Hence, they cannot expand by overproviding lucrative services, gaming the payment system through upcoding, avoiding unprofitable patients, or cost shifting.

Third, 51% of Canada’s physicians are primary care practitioners vs 32% in the United States.
centered health systems are generally thriftier.4 Canada’s outpatient fee schedules are also less technology skewed than in the United States.

Fourth, Canada’s provincial plans have used their concentrated purchasing power to limit drug and device prices. Finally, litigation and malpractice costs have remained relatively low in Canada.

Life expectancy at age 65 years is longer and has grown faster in Canada than in the United States since 1980 (and 1971),5 offering reassurance that cost control has not compromised quality. A meta-analysis suggests that clinical outcomes are, if anything, better for Canadians than for insured Americans.6

To some, US Medicare’s grim financial health suggests an even grimmer conclusion: it can no longer keep its promise of all needed care for the elderly population.7 Some would replace it with vouchers that seniors could use to purchase private coverage. Others suggest upending the current payment system by inverting volume-based incentives, offering instead profits to organizations that limit utilization. Yet the efficacy of these drastic solutions remains unproven.8 Canada’s road-tested cost-containment methods offer an alternative.

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Online-Only Material: The eAppendix, eFigure, and eReferences are available at http://www.archinternmed.com.

Body Mass Index vs Cholesterol in Cardiovascular Disease Risk Prediction Models

Traditional modifiable risk factors for cardiovascular disease (CVD) are smoking, high blood pressure, and unfavorable blood lipid concentrations. Models combining these factors predict CVD more accurately than models considering CVD risk factors in an isolated manner.1,2 Combined risk prediction models include the Framingham Risk Score or, from Europe, the SCORE (Systematic Coronary Risk Evaluation).3,4 One disadvantage of these assessments is that they require blood sampling for lipid measurements. This precludes the estimation of the 10-year risk of a CVD event, eg, from self-reports. In electronic health records, the lack of information on cholesterol was the most common reason why CVD risk could not be calculated.3 In contrast, body height and weight are available in virtually all health data sets. On the basis of the SCORE method and using a population sample from Switzerland, we aimed at comparing the traditional prediction model using total cholesterol with a version in which we replaced cholesterol body mass index (BMI).1

Methods. Subjects. Risk factor data stem from 17,791 men and women older than 16 years who participated in either of 2 CVD studies: the National Research Program 1A (NRP1A), a community health promotion initiative focused on CVD prevention, and the Swiss MONICA (Monitoring of Trends and Determinants in Cardiovascular Disease) population survey, an international project of the World Health Organization. We obtained mortality follow-up by anonymously linking the data from the CVD studies with the Swiss National Cohort (SNC), which encompasses all residents of Switzerland enumerated in the national 1990 or 2000 censuses as well as data from death and emigration registries until the end of 2008. Linkage success was 94% (NRP1A) and 97% (MONICA). The 95th percentile of follow-up was 31.2 years, during which 2170 men and 1761 women died (749 and 630 from CVD, respectively).5,6 Measures. Blood sampling and cholesterol measurement were described.5,6 Body mass index was calculated from measured (without shoes) height and weight (calculated as weight in kilograms divided by height in meters squared). We defined smoking as smoking 1 cigarettte or more per day. Nonsmokers include former and never smokers. Systolic blood pressure was recorded as the mean of 2 measurements. Fatal CVD events were defined according to the Eighth Revision International Classification of Diseases codes 390 to 458 (until 1994) and International Statistical Classification of Diseases, 10th Revision codes 100 to 199.

Statistical Analysis. Risk models were calculated with Weibull proportional hazards regression as previously described.1 To compare the prediction abilities of the cholesterol and BMI model, we calculated the mean cross-validated (leave-one-out) Brier score,7 which measures the mean squared difference between the risk score and the actual outcome. The lower the difference, the better the respective risk prediction model. The Brier score covers both calibration and sharpness of a prediction model.7

Results. Compared with cholesterol (eFigure; http://www.archinternmed.com), the BMI model (Figure) showed higher risks at all ages and could better discriminate persons at high and low CVD risk. Moreover, the synergistic effects in combination with smoking and in particular with blood pressure were stronger than with cholesterol. Body mass index, but not cholesterol, was significantly associated with mortality. The prediction ability of BMI was better based on the lower Brier score (eTable 1). Because explanatory variables (age, sex, smoking, and blood pressure) other than BMI or cholesterol remained the same in the 2 models, the difference between the Brier scores was small. In a common model with cholesterol, BMI remained significant, while cholesterol did not (eTable 2). Thus, cholesterol did not contribute to the explanation of the association between risk factors and mortality when BMI was included in the same model.

Comment. Using BMI instead of cholesterol in CVD risk prediction models may provide more accurate estimates. Traditional models such as Framingham or SCORE include cholesterol or total to high-density lipoprotein cholesterol ratio but do not consider BMI in their equation.1,2 In line with our results, Green et al8 found that using BMI instead of cholesterol allowed at least equivalent CVD risk estimation based on electronic health records and that the use of BMI could reduce unnecessary laboratory testing. The fact that BMI renders blood sampling unnecessary leads to a substantial increase of population-based samples available for CVD risk estimation. The use of BMI may not only ease CVD risk assessment but could have further advantages. Compared with dyslipidemia screening, screening for obesity has a stronger scientific foundation and is unconditionally recommended.4 Furthermore, lifestyle changes (diet and physical activity) promoting weight loss or preventing weight gain may improve health more strongly than lipid-lowering treatment. In contrast, knowledge of cholesterol may not lead to behavioral changes, and there are also doubts concerning the effectiveness and safety of statin treatment for primary prevention of CVD.4,8

In conclusion, our results suggest that BMI may be a valuable alternative to cholesterol in CVD risk predic-