PERSPECTIVE

Preventing Chronic Disease: An Important Investment, But Don't Count On Cost Savings

An overwhelming percentage of preventive interventions add more to medical costs than they save.

by Louise B. Russell

ABSTRACT: Over the four decades since cost-effectiveness analysis was first applied to health and medicine, hundreds of studies have shown that prevention usually adds to medical costs instead of reducing them. Medications for hypertension and elevated cholesterol, diet and exercise to prevent diabetes, and screening and early treatment for cancer all add more to medical costs than they save. Careful choices about frequency, groups to target, and component costs can increase the likelihood that interventions will be highly cost-effective or even cost-saving. [*Health Affairs* 28, no. 1 (2009): 42–45; 10.1377/hlthaff.28.1.42]

TODAY'S LEADING causes of death are chronic diseases—heart disease, cancer, and diabetes—that develop in later adulthood and often last for years. Their importance and long lead time has generated great interest in preventing them, and medical research has discovered ways to do so, with medications to reduce blood pressure and cholesterol, screening and early treatment for cancer, and other means. Many believe that prevention can reduce medical costs at the same time that it improves health.

Evidence on the cost issue has accumulated since the 1970s, when cost-effectiveness analysis (CEA) was first applied to health and medicine. CEA shows that contrary to common belief, prevention usually increases medical spending.[1] Here I review the evidence, focusing on important examples to identify features that make interventions more or less costly.

How CEA Counts Savings

The purpose of CEA is to compare the costs and health outcomes of two or more interventions, as illustrated in Exhibit 1. Guided self-management for asthma reduced some costs (drugs, physician visits, and hospital stays) but increased others (counseling and peak-flow meters). Despite savings in some categories, self-management cost more than traditional care. It also produced better health outcomes. The net cost was $3,380 (1997 dollars) for each healthy year gained from self-management—about $5,000 today.[2]

Cost per healthy year is the cost-effectiveness ratio. If an intervention is considered worth the extra cost, it is cost-effective. If it is cost saving, a cost-effectiveness ratio is not calculated.

CEA typically focuses on medical costs, which is the right focus for evaluating whether or not prevention reduces medical spending.

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EXHIBIT 1
Annual Costs (1997 Dollars) And Healthy Days Per Patient: Guided Self-Management And Traditional Care For Asthma

Cost item/health effect	Self-management	Traditional	Difference
Counseling	$ 348	$179	$169
Peak-flow meter	32	0	32
Drugs	613	623	−10
Physician visits	47	80	−33
Hospital stays	33	52	−20
Total costs	1,074	935	138
Healthy days	359.2	344.3	14.9

SOURCE: A. Lahdensuo et al., "Randomised Comparison of Cost Effectiveness of Guided Self Management and Traditional Treatment of Asthma in Finland," *BMJ* 316, no. 7138 (1998): 1138–1139.

NOTES: Cost-effectiveness ratio: $3,380 per healthy year. To convert the net cost of $138 for 14.9 additional healthy days per year to the cost-effectiveness ratio, divide 365 by 14.9 to get 24.4966, the multiple necessary to convert 14.9 days to one healthy year. Then multiply the annual net cost ($138) by 24.4966 to get the cost per healthy year, $3,380 ($3,381 using the rounded values in this exhibit). Figures were converted from 1994 Finnish marks to 1997 U.S. dollars with the 1994 mark-dollar exchange rate and the medical Consumer Price Index (CPI).

Costs and savings outside the medical sector are not relevant, nor is the possibility that healthier people may work more. Although extra wages can be viewed as compensation for prevention's higher medical costs (as is better health itself), the issue under debate is what happens to medical costs.

Preventing Chronic Disease

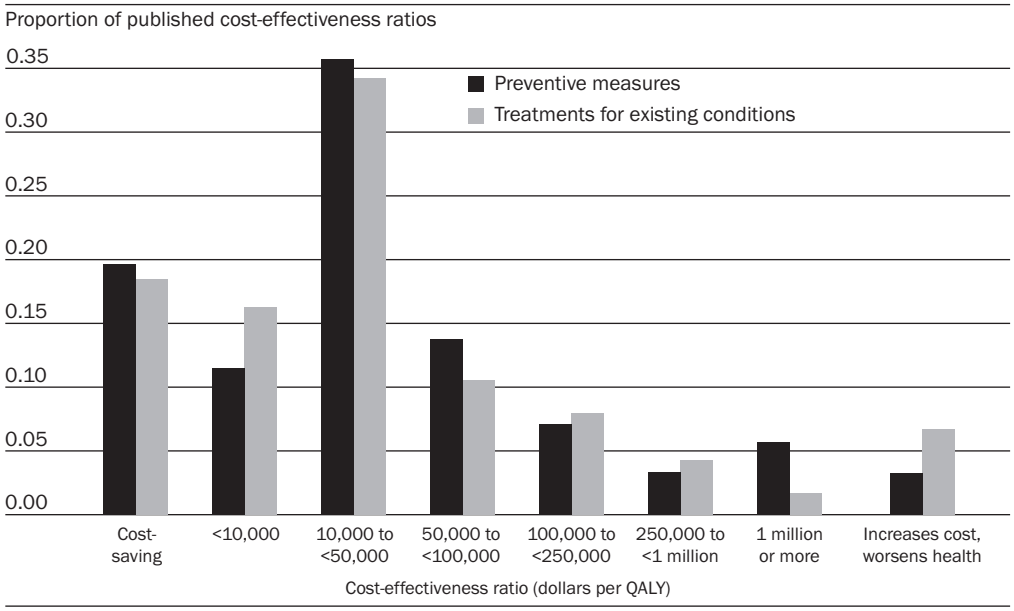
■ **Heart disease and stroke.** Hypertension (elevated blood pressure) increases the risk of heart disease and stroke. Reducing elevated pressures with medication reduces the incidence and associated treatment costs of these conditions. An early CEA, now a classic, shows that the accumulated costs of treating hypertension are nonetheless greater than the savings, because many people, not all of whom would ever suffer heart disease or stroke, must take medication for many years.[3] Antihypertensive medication is more cost-effective—that is, costs less per healthy year gained—for people whose initial blood pressure is higher. A more recent analysis shows that cost-effectiveness varies by type of medication, although no drug reduces medical spending.[4] Diuretics, currently the first line of therapy, are among the most cost-effective.

Statins to reduce cholesterol, another risk factor for heart disease, also add to medical costs. The amount varies with patients' risk profiles, since treatment savings are greater for people at higher risk.[5] For low-risk men ages 45–54 with LDL cholesterol between 160 and 189 mg/dL, the additional cost of statins in 1997 was $270,000 per healthy year, or about $400,000 today. For smokers ages 45–54 with LDL above 190 mg/dL, high blood pressure, and poor HDL cholesterol, cost per healthy year is much less: $57,000 in 1997, or $85,000 today. For men with established heart disease, statins are highly cost-effective: under $10,000 per healthy year in 1997, or $15,000 today.

Aspirin to prevent heart disease and stroke can reduce medical costs for some patients.[6] Medical savings exceed costs in initially healthy middle-aged men whose ten-year risk of disease is at least 5 percent. Savings grow as ten-year risk rises. For women, aspirin appears to reduce risk of stroke but not heart attack; it is not cost saving and, because of side effects, might not even improve health.

■ **Diabetes.** The Diabetes Prevention Study showed that lifestyle changes can prevent diabetes. The program provided diet and exercise plans, backed by nutritionist visits and physical training sessions, to middle-aged overweight people whose oral glucose tests

EXHIBIT 2
Distribution Of Cost-Effectiveness Ratios For Preventive Measures And Treatments For Existing Conditions



SOURCE: Data from the Tufts–New England Medical Center Cost-Effectiveness Registry, as published in J.T. Cohen, P.J. Neumann, and M.C. Weinstein, "Does Preventive Care Save Money? Health Economics and the Presidential Candidates," *New England Journal of Medicine* 358, no. 7 (2008): 661–663
NOTE: QALY is quality-adjusted life-year.

put them at high risk. Over four years, only 11 percent of those in the program developed diabetes, compared with 23 percent in the control group.[7] Even so, the program adds to medical costs: $143,000 per healthy year in 2000, or $192,000 today.[8]

■ **Screening.** Effective screening has two parts: the screening test must detect a condition before symptoms appear; and treatment must be more effective when the condition is caught early. Another classic CEA showed that screening for cervical cancer adds to medical costs.[9] Screening frequency is a major determinant of cost-effectiveness: screening every three to five years is cost-effective compared with no screening, but costs rise rapidly with more frequent screening. Compared with screening every two years, annual screening cost $1 million per healthy year in 1985, or more than $3 million today. Screening for colorectal cancer and breast cancer also costs more than it saves.[10]

Screening and treatment for osteoporosis are cost-effective for women ages 65–84 and may be cost saving for older women.[11] In men, whose rate of fracture is lower, intervention is more expensive, but if the annual cost of bisphosphonates were to fall from $1,000 to $250 when patent protection ends, screening and treatment would be cost saving for men age eighty-five or older.[12]

■ **Prevention in disease management.** Prevention can be a cost-effective, sometimes cost-saving, component of managing established chronic conditions. For example, at $16 per person (1995 dollars), or about $25 today, vaccination against pneumococcal pneumonia reduces medical spending for adults ages 50–64 with congestive heart failure, chronic lung disease, diabetes, and other chronic conditions.[13] The 2008 cost per dose, excluding administration costs, is $16–$19 for the Centers

for Disease Control and Prevention (CDC) and $29–$32 for private purchasers.[14]

■ **Overwhelming evidence.** Over the past four decades, hundreds of studies have shown that prevention usually adds to medical spending. Exhibit 2 summarizes 279 cost-effectiveness ratios for preventive interventions (and 1,221 ratios for treatments) from 599 CEA studies published between 2000 and 2005. Less than 20 percent of the preventive options (and a similar percentage for treatment) fall in the cost-saving category—80 percent add more to medical costs than they save. Careful choices about frequency, groups to target, and component costs can increase the likelihood that interventions will be highly cost-effective or even cost saving.

NOTES

1. L.B. Russell, *Is Prevention Better than Cure?* (Washington: Brookings Institution, 1986); L.B. Russell, *Educated Guesses: Making Policy about Medical Screening Tests* (Berkeley: University of California Press, 1994); L.B. Russell, "Prevention's Potential for Slowing the Growth of Medical Spending," October 2007, http://www.nchc.org/nchc_report.pdf (accessed 15 October 2008); and J.T. Cohen, P.J. Neumann, and M.C. Weinstein, "Does Preventive Care Save Money? Health Economics and the Presidential Candidates," *New England Journal of Medicine* 358, no. 7 (2008): 661–663.
2. Years of healthy life adjust for poor health, summarizing health outcomes as an equivalent number of years of good health. "Today's dollars" (2007) were updated from each study by the medical Consumer Price Index (CPI). Except for this number, they also appear in Russell, "Prevention's Potential."
3. M.C. Weinstein and W.B. Stason, *Hypertension: A Policy Perspective* (Cambridge, Mass.: Harvard University Press, 1976).
4. J.T. Edelson et al., "Long-Term Cost-Effectiveness of Various Initial Monotherapies for Mild to Moderate Hypertension," *Journal of the American Medical Association* 263, no. 3 (1990): 407–413.
5. L.A. Prosser et al., "Cost-Effectiveness of Cholesterol-Lowering Therapies According to Selected Patient Characteristics," *Annals of Internal Medicine* 132, no. 10 (2000): 769–779.
6. M. Pignone et al., "Aspirin, Statins, or Both Drugs for the Primary Prevention of Coronary Heart Disease Events in Men: A Cost-Utility Analysis," *Annals of Internal Medicine* 144, no. 5 (2006): 326–336; and M. Pignone et al., "Aspirin for the Primary Prevention of Cardiovascular Disease in Women," *Archives of Internal Medicine* 167, no. 3 (2007): 290–295.
7. J. Tuomilehto et al., "Prevention of Type 2 Diabetes Mellitus by Changes in Lifestyle among Subjects with Impaired Glucose Tolerance," *New England Journal of Medicine* 344, no. 18 (2001): 1343–1350.
8. D.M. Eddy, L. Schlessinger, and R. Kahn, "Clinical Outcomes and Cost-Effectiveness of Strategies for Managing People at High Risk for Diabetes," *Annals of Internal Medicine* 143, no. 4 (2005): 251–264. Medical costs are termed "health plan" costs in this study.
9. D.M. Eddy, "Screening for Cervical Cancer," *Annals of Internal Medicine* 113, no. 3 (1990): 214–226.
10. M. Pignone, L.B. Russell, and J. Wagner, eds., *Economic Models of Colorectal Cancer Screening in Average-Risk Adults* (Washington: National Academies Press, 2005); K.K. Lindfors and C.J. Rosenquist, "The Cost-Effectiveness of Mammographic Screening Strategies," *Journal of the American Medical Association* 274, no. 11 (1995): 881–884; and J. Mandelblatt et al., "The Cost-Effectiveness of Screening Mammography beyond Age Sixty-five Years: A Systematic Review for the U.S. Preventive Services Task Force," *Annals of Internal Medicine* 139, no. 10 (2003): 835–842.
11. J.T. Schousboe et al., "Universal Bone Densitometry Screening Combined with Alendronate Therapy for Those Diagnosed with Osteoporosis Is Highly Cost-Effective for Elderly Women," *Journal of the American Geriatrics Society* 53, no. 10 (2005): 1697–1704.
12. J.T. Schousboe et al., "Cost-Effectiveness of Bone Densitometry Followed by Treatment of Osteoporosis in Older Men," *Journal of the American Medical Association* 298, no. 6 (2007): 629–637.
13. J.E. Sisk et al., "Cost-Effectiveness of Vaccination against Invasive Pneumococcal Disease among People Fifty through Sixty-four Years of Age: Role of Comorbid Conditions and Race," *Annals of Internal Medicine* 138, no. 12 (2003): 960–968.
14. CDC Vaccine Price List, updated 8 October 2008, http://www.cdc.gov/vaccines/programs/vfc/cdc-vac-price-list.htm#adult (accessed 15 October 2008).