The Need for Economic Evaluation in Primary Prevention of Cancer

Dear Editor:

Cancers, a leading cause of death in Canada, have substantial disease and economic burden.^{1,2} At least one third of cancer cases are preventable,³ but does prevention represent good value for money? Few studies have assessed this for cancer prevention interventions.⁴ Cost-utility analysis (CUA) is an established method for assessing “value for money” of a health care intervention using an incremental cost-effectiveness ratio (ICER) – dividing the costs incurred by the additional quality-adjusted life-years (QALYs) gained.⁵

To identify CUAs of cancer prevention in Canada in the context of the cancer control continuum, we searched the Tufts Medical Center Cost-Effectiveness Analysis Registry for studies published between 1976 and 2011 using the key words “malignant neoplasms” and “Canada” in the “disease” and “country of study” categories.⁶ The Registry identifies CUAs from MEDLINE, and has been used as a data source in peer-reviewed publications.⁴ To include prevention interventions that addressed risk factors common to other chronic diseases but implemented in the context of those diseases, we expanded the search to include all prevention interventions using key words related to cancer risk factors: tobacco, alcohol, overweight and obesity, physical inactivity, unhealthy eating, exposure to ultraviolet radiation, exposure to occupational and environmental carcinogens, and exposure to infections.³ We categorized the relevant studies by stages in the cancer control continuum: prevention, early detection, diagnosis, treatment and survivorship.

Between 1976 and 2011, 210 CUAs conducted in Canada were found in the Registry, of which 45 pertained to cancer-related interventions (Figure 1). Only 4 studies evaluated the cost-effectiveness of primary prevention;⁷⁻¹⁰ most studies focused on cancer treatments. Among the 4 cancer prevention studies, 2 evaluated vaccination programs, 1 evaluated a hepatitis B screening program and 1 evaluated a technology to reduce transfusion-related adverse events, which included hepatitis diseases that lead to a higher risk of liver cancer (Table 1).⁷⁻¹⁰ The ICERs varied from \$18,672 to \$3.6 million per QALY gained.

While it has been suggested that prevention is the most cost-effective long-term solution,³ few studies have evaluated the cost-effectiveness of specific prevention interventions in Canada. Also,

Figure 1. Distribution of published cost-utility analyses in Canada (1976 to 2011)

Of the 210 studies, 21.5% pertained to cancer, where 4 studies evaluated primary prevention interventions; no study evaluated interventions related to the diagnosis of cancer.

not all prevention strategies are cost-effective. Even within one study, a hepatitis B screening program could cost \$69,000 per QALY using one strategy or cost \$3.6 million per QALY using another.⁹ Although more than one third of cancer cases are preventable, there are many prevention interventions competing for resources with diagnosis and treatment programs. Economic evaluation can identify interventions that provide relatively good value for money, and the most cost-effective way to implement these interventions. Of the four studies identified, only two would have been captured in the prior study of cancer-related CUAs,^{8,10} because hepatitis-related interventions would not have been categorized under “cancer”.⁴

We only included CUAs in MEDLINE; therefore, our search missed economic evaluations that used other health outcome measures or published results in reports not in MEDLINE. Nevertheless, our findings highlight the lack of published evidence about the cost-effectiveness of cancer primary prevention in Canada.

In summary, not all prevention interventions and strategies are cost-effective. Our results highlight the need for more resources being directed toward economic evaluations of cancer prevention in Canada.

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Table 1. Interventions and Evaluation Results in Cost-utility Analysis of Cancer Prevention in Canada

Study	Intervention	Comparator	Incremental Cost-effectiveness Ratio (\$/QALY*)
Brisson, 2007 ⁸	Vaccinating 12-year-old girls against HPV-16/18 and HPV-6/11/16/18	No vaccination	\$21,000 to \$31,000 per QALY
Anonychuk, 2009 ¹⁰	Vaccinating 12-year-old girls against HPV-16/18	No vaccination	\$18,672 to \$31,687 per QALY
Custer, 2010 ⁷	Adding pathogen reduction technology to current screening practice in transfusion	Current screening practice in transfusion in Canada	\$1.3 million to \$1.4 million per QALY
Wong, 2011 ⁹	Hepatitis B screening	No screening	\$69,209 to \$3,648,123 per QALY

* QALY = quality-adjusted life-years.

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