Appendix 2– Costing Methodology

Chemotherapy

We used 3 sources to determine chemotherapy use: the Ontario Health Insurance Plan (OHIP), the New Drug Funding Program (NDFP) and the Ontario Drug Benefit (ODB) program databases. We used physicians' billings for chemotherapy injections from the OHIP database to identify the number of chemotherapy visits. This database only includes the cost of chemotherapy administration by the physician; other costs associated with chemotherapy visits (drugs, supplies, nursing services) were estimated from the Canadian Institute for Health Information (CIHI) National Ambulatory Care Reporting System (NACRS) data (available from 2002/03 onwards) using the resource intensity weight (RIW) methodology (1, 2, 3). RIWs are estimated annually by the CIHI and represent the relative costs of different types of patient. We multiplied the RIW associated with each chemotherapy visit by the average provincial cost per weighted case to obtain the total cost for all visits from 2003 onwards and applied the average 2003 value to all chemotherapy visits that occurred in the pre-2003 period. We also obtained data on the dosages and costs of expensive chemotherapy drugs covered under the NDFP and oral anti-neoplastic drugs covered under the ODB program from their respective databases.

Radiation Therapy

We obtained information on RT using the Activity Level Reporting data from CCO. Each record has a National Hospital Productivity Improvement Project (NHPIP) code. We estimated the cost per NHPIP unit as $8.03 in 1995/96 from published Ontario data (4); this includes salaries and benefits for secretaries, nurses, physicists, therapists, and the cost of equipment, supplies, and services.

Inpatient Hospitalizations

The frequency and type of inpatient hospitalizations were obtained from the CIHI Discharge Abstract Database (DAD). We used the Canadian Classification of Diagnostic, Therapeutic, and Surgical Procedures (CCP) codes (before March 31st 2002 inclusive) and the Canadian Classification of Health Interventions (CCI) codes (after April 1st 2002 inclusive) (13) to select all cancer-related surgeries during a patient's hospitalization. All other inpatient stays that did not include a cancer-related surgery ("other hospitalizations") were also obtained from the DAD. The costs of all hospitalizations were estimated using the RIW methodology (1, 2, 3). As the CCP and CCI codes are not comparable, we were not able to obtain reliable estimates of cancer-related surgeries and other hospitalizations for the 2002 calendar year.

Home Care

We estimated the frequency, duration and type of home care service from the Ontario Home Care Administrative System (pre-April 2005) and the Home Care Database (post-April 2005). Unit costs were obtained from the Community Care Access Centres, Toronto (5).

Appendix to: de Oliveira C, Bremner K, Pataky R, et al. Trends in use and costs of initial cancer treatment in Ontario. *CMAJ Open* 2013. DOI:10.9788/cmajo.20130041.

Ambulatory Care (Same-day Surgery and Emergency Department Visits)
The NACRS contains administrative, clinical, financial, and demographic data for hospital-based ambulatory care, including same day surgery (SDS), emergency department (ED) visits, medical day/night care, and high-cost ambulatory clinics, and is available from 2002/03 onwards. We used the NACRS data to estimate utilization from 2002/2003 onwards for SDS and ED visits and the RIW methodology to estimate costs (1, 2, 3). For the pre-NACRS period, the number of SDS was determined from the DAD while the number of ED visits was estimated from the OHIP claims history database. The RIW methodology was employed to determine the costs for SDS visits identified before 2002 (1-3); we applied the average 2002 cost for ED visits prior to 2002.

Outpatient Drugs
Individuals aged 65 years and older, long-term care residents, individuals receiving home care and other selected groups are eligible for prescription drug coverage under the ODB Plan. We estimated the quantity and cost of outpatient prescription drugs for all covered patients from the ODB Plan records.

Complex Continuing Care (CCC)
The frequency and length of stay in a CCC facility were obtained from the Continuing Care Reporting System data. We estimated the cost of each stay by multiplying the length of stay in days by the average case mix index (a diagnosis-related group weight) per patient-stay and the cost per weighted day for chronic care (5).

Long-term Care (LTC)
We estimated the time spent in LTC facilities using the LTC flag in the Ontario Drug Benefit Plan database. We dated the onset of LTC from the first of three consecutive LTC-flagged drug claims and dated the cessation of LTC from the first of three consecutive non-LTC flagged drug claims to obtain the length of stay. The costs associated with nursing, food and programming for LTC residents are covered by the Ministry of Health and Long-term Care (5).

Diagnostic Tests and Physician Services
We obtained the number of diagnostic tests and their respective cost from the OHIP data. We divided the cost into technical and professional components. The technical component was included in the cost of diagnostic tests while the professional component was included in the cost incurred with physician services. The number of all physician services and respective payments were estimated from the claims history database of the OHIP.

We used the health care component of the Statistics Canada Consumer Price Index for Ontario to adjust for inflation and reported all costs in 2009 Canadian dollars.

REFERENCES

1. Canadian Coordinating Office for Health Technology Assessment. A Guidance Document for the Costing Process, Version 1.0. Ottawa: CADTH, 1996.

2. Canadian Institute of Health Information. Resource Intensity Weights. Summary of Methodology 1995/96. Ottawa: The Institute; 1995: 1–75.

3. Pink GH, Bolley HB. Physicians in health care management: 3: case mix groups and resource intensity weights: an overview for physicians. Canadian Medical Association Journal. 1994; 150: 889–94.

4. Earle C, Coyle D, Smith A, Agboola O, Evans WK. The cost of radiotherapy at an Ontario Regional cancer centre: a reevaluation. Critical Reviews in Oncolology/Hematology. 1999; 32: 87–93.

5. Wodchis WP, Bushmeneva K, Nikitovic M, McKillop I. Guidelines on Person-Level Costing Using Administrative Databases in Ontario. Toronto: Health System Performance Research Network; 2011.