

# **A National List of Provincial Costs for Health Care: Canada 1997/8**

**INSTITUTE OF HEALTH ECONOMICS**

**Contributing agencies:**

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Canadian Institute for Health Information

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## BACKGROUND

A cost list is an inventory of services and associated standard costs. These lists are useful in economic evaluation studies as they present the costs of services in a uniform way, thus allowing the investigator to isolate the utilization component of overall differences in cost. The first cost list in health care was developed in Australia in 1993 (Australia, Commonwealth Department of Housing, Health and Human Services, 1993a) in conjunction with the background document on the use of economic analysis for formulary submissions (Australia, Commonwealth Department of Housing, Health and Human Services, 1993b). In Canada, the first guidelines produced by the Canadian Coordinating Office for Health Technology Assessment (CCOHTA, 1994) recommended the development of a standard cost list; to date, costs lists have been developed in two of the ten provinces: Alberta (Jacobs, Bachynsky, and Hall, 1997) and Manitoba (Jacobs, Shanahan, Roos et.al., 1999). No efforts were made to standardize the components in the two lists, and so considerable differences between them remained.

In response to a desire to expand geographical coverage for standard health care costing, widen the scope of services covered, and standardize estimating procedures between provinces, the health economics committee of Rx&D Canada, the national association of ethical drug companies, commissioned a project at the Institute of Health Economics (IHE) which was to develop a cost list to meet these goals. In February 1999 the IHE formed a nationwide working group consisting of academic, government and industry members. Additional sponsorship was subsequently obtained from the Canadian Institute for Health Information (CIHI), a national health information organization and the Canadian Coordinating Office for Health Technology Assessment (CCHOTA). In this document we present the revised, national cost list. Some of the key features of this list are:

- A wide variety of costs are included for individual services for as many provinces as possible. These costs are placed under the categories of public health, diagnostic and therapeutic services, continuing care, and personal care costs. New items appearing for the first time include: blood; vaccines and screening, both in a public health context; services of non-physician professional groups including optometrists, chiropractors, and physiotherapists; and ambulance services.
- A systematic presentation of all items, in uniform categories that the reader can easily refer to in order to understand the components of the cost estimates for each service.
- Detailed instructions on how to use each component of the cost list in economic evaluation studies, along with walk-through examples.
- Uniform estimates of cost per inpatient weighted case for eight provinces, based on the CIHI Management Information System (MIS) financial and statistical reporting system, and CIHI's Case Mix Groups (CMGs) with complexity overlay.
- Comprehensive retail drug prices for all provinces for the 1,000 top-selling prescription drugs in Canada, based on the national IMS HEALTH Compuscript survey of pharmacies.
- Data on wages and employment to population ratios by age and sex, for all provinces, which will facilitate the estimation of lost-productivity costs.

- A comprehensive assessment criteria along with a quality assessment instrument, applied to each item, in order to allow the user to appreciate the level-of-evidence of each item.

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## 1.0 Objectives of the project

The original objectives of this project were (1) to prepare a national list of province-wide and nation-wide standard costs, based on existing data, for a commonly used group of health care services, to be used in economic evaluation studies; and (2) to provide users of this data with guidance on how to estimate costs in their evaluation studies. A third objective was added during the project; this objective was to provide an assessment of the quality of existing estimates.

A standard cost is a predetermined unit cost of a service which can be used as a benchmark or as a representative cost. Standard costs can be established in several ways. They can be set to approximate average actual costs for a specified provider, or for a group of providers. They can also be set to approximate costs at efficient operating levels, if the objective is to compare existing costs with costs at efficient operating levels. In this report, we will view standard costs as approximations for average actual costs of all providers in the health care system.

Our cost list has been prepared with the use of existing data. This decision was made because the resources were not available to collect new data. In addition, no effort has yet been made to identify and utilize all sources of existing data. It may be that new data must be collected, but before this is done we should assess the current situation.

In this document we present our cost list which we hope will help to develop common cost standards in economic evaluation analyses. In part I, which includes this section, we provide background material. In Section 2 we set out the conceptual background to our project. In Section 3 we present a guide on how to use the costs which are provided in this report. In Section 4 we provide an overview of the organization of the presentation. In part II we present the cost list. In Sections 5-27 we present costs or suggested methods for estimating costs for individual services, including an assessment of each cost item and advice on how these costs can be used. In part III (Section 28) we present an assessment of the overall cost list and suggestions for what activities can be undertaken in the near future to enhance it.

## 2.0 Concepts and measurement of costs

### 2.1 *What are costs?*

Resources are basic services which are used in the production process. These include labor time (professional and non-professional), materials (including medical supplies and medicines), “machining services” [Schwartzback et al., 1983], and the services of non-specific capital equipment (such as buildings) and land. Labor, materials and machining services can be grouped into direct and indirect categories. Direct services are those which are observably linked to the product. Indirect services are those which are not so linked; these are called overhead.

Services are units of output that are produced with resources. Service units can be homogeneous entities, such as inoculations, or they can be quite heterogeneous in nature, such as hospitalizations. Services can be expressed in terms of encounters or single contacts with the system, or in terms of episodes, which are groupings of encounters that are used to achieve a common purpose.

Cost is the value of resources which are required to produce a given service, or to achieve a given objective. It is the value of the service that reflects what was given up by employing the resource in one use, rather than another. Usually, we assign, as the cost, the average monetary price or compensation which the resource receives. In doing so we assume that this was the amount of money that was required to bid the resource away from the alternative use. For labor services, this can be the compensation (wages and benefits) received for the time spent by the resource. For supplies the cost is the average price paid by the user of the service. When services for resources are unpaid (as in the case of unpaid caregivers), an “opportunity cost” can be imputed which approximates what the resources could have earned if they were gainfully employed or used.

### 2.2 *What is a cost list?*

A cost list is a list of commonly used services and their associated costs. In the present context, costs serve as weights or relative values which, when applied to the respective services, yield dollar measures of resource-weighted utilization. When one is developing such a list, one must select a perspective. The perspective can be that of a single providing unit (a hospital), or of a group of providers (e.g., all hospitals in a province or a country). We can also take a broader perspective, that of both formal providers and other individuals (e.g., family caregivers). In this cost list, we want to support this broader, societal perspective. This means that we want to provide costs for all persons. This, of course, is our ideal. It should be recognized that data availability is not equal among all service categories, and so what is found in a cost list will reflect what is available.

### **2.3 *Why do we need a cost list?***

A recent survey of cost-effectiveness analyses that have been done in Canada indicated that there are a wide variety of methods being used to estimate costs [Jacobs and Bachynsky, 1996]. The use of a cost list allows us to achieve a uniformity of approach. The cost of an episode of care is made up of the unit cost of the services and the numbers of services provided in the encounter. Differences between patients or groups in cost of care will be due to differences in unit costs between providers and differences in the volumes of services provided. For many purposes we want to determine the differences in utilization between groups, holding constant the differences in operating efficiency between the units where the services were provided. Standard costs, applied to physical volumes of services, allows us to determine this.

A second reason for developing a standard cost list is that it provides a uniform method of estimating costs. In the literature, investigators have used a wide variety of methods to measure costs. Not all of these measures are commonly used, and often methods are not described. With the use of a standard cost list, some degree of transparency can be maintained.

### **2.4 *Who is this cost list for?***

This cost list is designed for researchers, corporate and government economists, and other persons who want to conduct evaluations or analyses of utilization which include economic data. This list was not designed only for the seasoned health economist. We have tried to provide detailed instructions on the use of all of the estimates and detailed assessments of their shortcomings. In this way, the user of the data will better appreciate the scope and limitations of the data, though his/her understanding of the particular area may have been limited to begin with.

Economists, pharmacists, clinicians and others who are preparing economic evaluation analyses for formulary submissions in a number of provinces will now have a single source of information to which they can turn. Research analysts who are working with utilization data in individual provinces may also want to use these estimates in order to obtain measures for health care expenditures in their province. As well, these estimates should prove useful to those who want better national estimates, although our results on this score are still not complete.

### **2.5 *What services should be included in the cost list?***

There is an enormous variety of services which fall under the rubric "health care." These range in scope from public health services, diagnostics and acute care, rehabilitation, community care, and personal care. Many of these services are provided outside the "formal" health care system much of which the provinces undertake to fund. All such services should ideally be included in a cost list, because they have implications for the allocation of resources.

There is a greater availability of data for some services than others. Hospital, pharmaceutical, and physician databases are quite well developed. Data related to public health, and continuing care are less well developed, and there is even less information about personally (self-) provided health services. We have tried to include some services from all sectors, in order to provide some guidance to investigators on how to develop estimates, if cost estimates are not readily available.

In addition to the scope of services covered, we must also decide on the level of detail of our estimates. There is an enormous range of procedures in health care, many of which would be of interest to some investigators. For example, in the intensive care unit, unit procedures such as ventilation and extracorporeal membrane oxygenation are quite common, and will be of interest to some economic investigators. While some of our estimates will contain considerable detail, there will be many gaps in coverage, especially at the procedure level.

## **2.6 *What are the desirable properties of cost measures?***

There is no agreed upon criteria for the measurement of standard costs. Despite the absence of standards, there are certain desirable properties which will provide us with guidance regarding the assessment of standard costs.

First, we must select an appropriate unit of output. The unit of output is the element in terms of which the service is measured. Measured units can vary in terms of their exactness. A hospitalization encounter can be measured as stays, length of stay, or resource intensity weighted stay (or day). In physician fee schedules services can be defined in a very specific way (an inoculation) or in a vague manner (a follow-up visit). Where possible, we will try to achieve some degree of specificity in our service measures. In the hospital sector, resource intensity weighted cases will be preferred to numbers of cases, and workload units for laboratory and x-ray will be preferred to counts of tests.

Second, a basis for measurement must be selected. One basis is to measure costs directly, by identifying resources which are used in the provision of the service, and then providing a price (or opportunity cost) for these resources. A second basis is to use prices of services as an approximate measure of the costs of the services. There are many variants of prices, including actual market prices, recommended prices, listed prices and government-determined prices.

Third, the cost measure must include the “right” resources. There is a controversy over what resources should be included in an economic evaluation study. An investigator can include only those resources which can be directly related to the immediate producing unit [Roberts et. al., 1998], or they can include these and add general overhead as well [Evans et. al., 1980; Drummond et al., 1997]. In this cost list, our target is to include all resources, including general operating overheads.

Often the data will not be available to achieve this end, and so in some instances we will only include direct resources. When comparing two different alternatives, using only direct resources may well provide an acceptable measurement of the difference in costs.

Fourth, the individual resources must be appropriately priced. For resources which are purchased (such as nurses' labor and supplies) the market compensation rate is usually an acceptable one. In health care, there are resources which are unpaid, and therefore do not have a market rate. Unpaid caregivers, for example devote time to the care of patients and in the process give up paid work. In this case an appropriate wage which reflects lost income should be imputed for this time.

Fifth, direct observation is preferred to opinion. Many studies have been undertaken which show that physicians do not know the cost of certain tests and procedures with any degree of accuracy. Professional unit managers probably have a better idea, because their opinions are often supported by direct observation. Unit cost measures should be subject to the same levels of evidence as other health care variables, and this requires placing an emphasis on direct measurement.

Sixth, the sample of providing units which are selected must be appropriate. Data from more units is preferred to data from fewer units. Any single provider may be an outlier; as one increases sample size, the variance of the estimate declines, and the estimate becomes more accurate. Additionally, the units which are selected is important. Cost estimates from random units within a group is preferred to cost estimates from selective providers. Selective providers, who are willing to provide data, may be biased in terms of their operating characteristics; we want to obtain costs from the typical provider.

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## **3.0 How to use a cost list**

### ***3.1 Introduction***

The cost of any service is the product of its unit cost and the number of units of service which are provided. Thus if the resources (labor, machining costs, supplies and overhead) which go into a complete blood count (CBC) cost \$20, and a patient requires 6 CBCs, then the cost of lab tests for the patient is \$120. In order to develop the cost of a patient episode, one must sum up the costs of all the services which are provided in the episode.

### ***3.2 Where to get utilization data – the resource consumption profile***

The resource consumption profile consists of the volume of each service which is used by the patient/group whose utilization is being studied. There are several different ways of obtaining data on the volume of services used.

First, one can obtain administrative data, such as hospital discharge abstracts and physician service lists. These are often used for billing purposes. In Canada, this data can be obtained on a population-wide basis. Investigators are limited to the items that are contained in the database, and if some services, such as drugs and home care, are absent, then the range of analysis is limited. In addition, the investigator is limited to the resource item definitions which are found in the data base. For example, physician office visits are often labeled very broadly, and contain a wide range of investigations and procedures which cannot be identified in the data base. The usefulness of this information is also dependent on whether or not coding has been appropriate.

Second, one can obtain data from chart reviews. In this case the investigator is limited to the sample of patients whose charts are available. The information which is contained in the chart review is often quite costly to abstract. Additionally, data is often limited to services which are provided by specific providers. If a patient goes to other providers, this data may be unavailable. However, the investigator has considerable flexibility in obtaining those items which are of relevance, because the chart usually contains considerable detail on treatment patterns.

Third, data can be collected prospectively either in the context of a clinical trial, or else in the development of an observational database. Investigators are limited to samples of pre-identified patients, but they have considerable flexibility in the items which they can collect.

Fourth, investigators can collect utilization data directly from patients. Such data can be collected in personal interviews, telephone surveys, questionnaires and diaries. It is generally thought that self-report methods do not provide as accurate information as do chart audits and automated data. However, items can be obtained in self-reports which are not available in automated data bases or in

medical charts. Further, the quality of the self-reported data will depend on the methods which are used to collect the data. Among the factors which can affect the quality of data collected by this mode are:

- The wording of the questions (the use of standardized or validated questions is preferred).
- The time frame of the observation period (a shorter recall period is preferred).
- The nature of the contact with the patient (probing helps to improve recall, and the nature of the contact is important).
- The use of memory aids (for example the use of lists or samples of drugs has proved helpful).
- The overall length of the questionnaire.

Fifth, utilization data can be based on the subjective opinion of providers. Investigators commonly use physician opinion to estimate the utilization and cost of specific treatments. There is very limited information on the quality of data which is generated by this method.

### **3.3 *What kind of studies can be done?***

There are a number of different kinds of studies that can be undertaken with patient cost data. One can use cost data to understand the impact of utilization on overall health care expenditures. While we may know that health expenditures have increased, such increases can be due to increases in unit costs and increases in utilization. If we apply a standard cost list to the utilization data, we can determine what the economic impact of utilization has been. There are numerous different events going on over time: the volume and composition of hospitalizations may change; use of physician services and drugs can go up or down. Using one aggregate figure allows us to determine the net effect of all of these changes, using a common measuring stick - unit cost.

Second, we can compare the utilization between populations or sub-populations [Shanahan, Steinbach, Burchill et al., 1999]. In a recent study of diabetes in Manitoba, Jacobs, Blanchard et al. [in press] estimated the cost of care for Manitoba natives and for the general population, with the use of a standard cost list. With the use of this list, they were further able to break down the differences in utilization between the two groups into two components: those due to per capita utilization, and those due to the inter-group differences in diabetes prevalence. Both factors were found to have significant effects on differences in health care resource use between the groups.

Third, the cost list can be used in studies in which data is prospectively obtained, either in a randomized controlled trial, or in some other observational study. The utilization categories must be collected in a form which is consistent with the units of output of the cost list. One problem with such a use of data is the cost list may not contain all of the necessary categories. For example, in a

study of abnormal bleeding, investigators might want to know the cost of individual procedures, such as curettage or hysterectomies. Data on individual procedures may not be in the cost list, in which case the investigator must supplement the cost data which is available with estimates which are obtained from other sources.

### **3.4 *What is this cost list not for?***

There are several areas of analysis for which this cost list is not appropriate. First, the list cannot be used to determine payment of health services. A payment system is a pricing system, not a cost system. Funding agencies need to make decisions about which resources and services they want to pay for, and once this is decided, they will want to set a policy which rewards certain provider characteristics, and penalizes others. The services which we include, and the resources which are measured, may well not meet funders' criteria.

Second, we cannot use this cost list to compare cost levels between provinces. Differences in health care organizations between provinces (some are regionalized and some are not), and differences in provider characteristics and in patient and resident characteristics will all contribute to differences in cost levels between provinces. We have not been able to standardize for all of these extraneous factors, and so we must caution the reader that it is not appropriate to use the data for comparisons between provinces.

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## 4.0 Organization of the cost list

Each type of service which is included in the cost list appears in a separate section. Each section is laid out under five major headings: introduction, a description of the estimate, the estimates of cost, suggestions on how to use the estimate, and an assessment of the estimate.

### 4.1 Introduction

In the introduction we present any relevant background information about the specific item.

### 4.2 Description

In the description we present the components of the estimate: the unit of output, the scope of services which are included in the estimate, the basis of the estimate, the resources that are included in the estimate, unit prices of these resources, whether or not there is an out-of-pocket component (if a price is used), details of the method used to estimate cost, and the time of availability of the estimates. Following is a description of each item:

**Unit of measurement:** In this section we identify the unit of output in terms of which the cost is measured. “Raw” measures include discharges, patient days, laboratory tests and radiological tests. A more refined measure of output would be a workload unit which is an index which measures the number of minutes it takes to perform a procedure. In general, workload units are preferable to raw output measures, but often these are not available. However, we should note that workload units do not include measures of materials and machine costs.

**Scope of service:** This section provides an identification of the services that are included and excluded in the estimates. For example, the cost of a hospital stay may exclude pre-admission testing which took place in the days prior to admission. In some types of services the physician component is paid for separately. We will identify these instances.

**Basis of estimate:** Under this category we specify whether the service’s cost is measured by a charge, a fee, or a directly measured cost.

- Cost is the direct measure of the value of resources.
- A charge is a listed price; purchasers may obtain discounts, and these would not be identified. Thus when a charge is used to measure the cost of a service, and the purchaser receives a discount, the charge will be greater than the price which is actually paid.
- A fee or rate is a price that is actually paid. An administrative fee is one that is set by government; in some instances the fee is set to approximate costs; in other instances (e.g., ambulance calls) the fee is below cost, and the consumer pays the remainder.

- A recommended price is one which is recommended by some body (e.g., a professional association). This need not be the price which is actually paid or received.

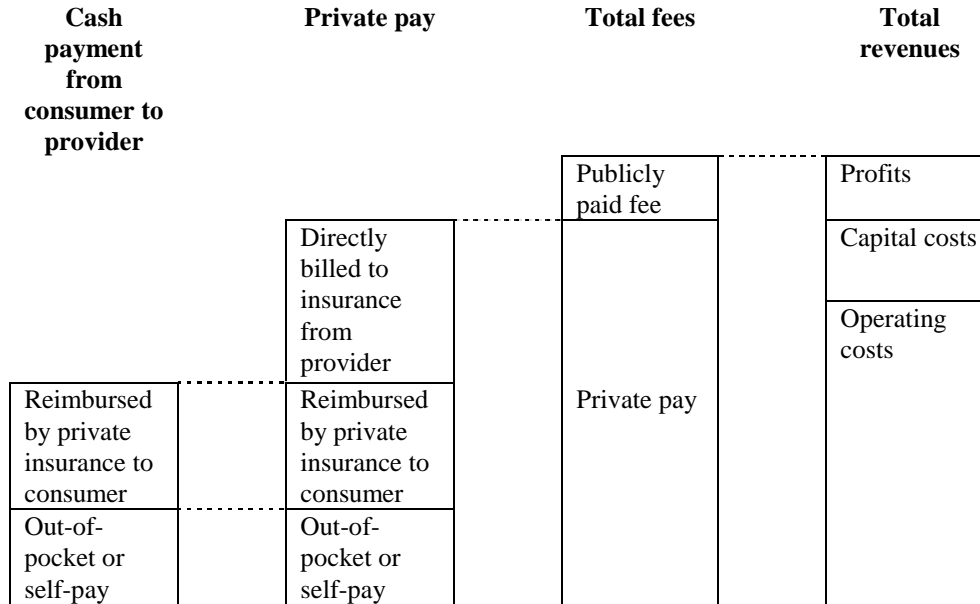
**Resource items included (if cost-based estimate):** When the estimate is one of direct cost, rather than a fee-based measure, we identify which of the following resources are included in the estimate:

- **Direct labor** - These include hands on labor such as nursing, physiotherapy, and ambulance attendants. Unpaid labor (e.g. unpaid caregiver time) would be included in this category.
- **Direct materials** - This category includes pharmaceuticals, ward supplies, and components of specific procedures such as cochlear implants.
- **Direct machining costs** - This category includes the cost of equipment that is directly identified with the service. This category usually has a large fixed cost component, and a machine may last more than one year. The machine's fixed costs must therefore be allocated to a given time period, using depreciation methods, and then assigned to individual products or services. There are two commonly used methods of apportioning fixed machine costs to a given period. These are the use of a straight-line depreciation method over the life of the equipment, and the assignment of annualized costs to each period using a given machine lifetime and a given interest rate. The latter measure includes the opportunity cost of the capital. Where annual fixed costs are allocated to individual services, the reader should be aware that the annual fixed cost can be sensitive to the volume of output which is used.
- **Overhead** - Overhead items include all non-direct resources, including maintenance, administration, and housekeeping. Many of these items are fixed. The exclusion of these items may not affect the difference in costs between two different interventions.

**Estimation of resource prices (if cost based estimate):** If an estimate is made on the basis of cost, a unit price (wage, rent, etc.) is applied to each resource unit. This unit price can be a provincial average rate for the particular occupation (nurses), or an average rate at a particular institution. In the case of labor services, the unit price should include full compensation, including benefits. In the case of equipment, it should include the return on capital foregone as well as the annual depreciation of the unit. If the resource item is unpaid, then a resource price must be imputed to reflect the income that is given up by the resource unit.

**Out of pocket component:** This section refers primarily to services which are not deemed to be "medically necessary" under the Canada Health Act. There are two fundamental ways of estimating costs – by revenues and by the direct measurement of cost.

Revenues can come from government or private sources, and private sources can be insurance companies or the client (out-of-pocket). In the following diagram we outline these sources. Consumers can pay in cash to providers (nursing homes, pharmaceuticals, non-federally insured services) and they may be reimbursed for some of these costs by the insurer. The remainder, those that are not reimbursed, are called “out of pocket” or self-pay expenses.



Alternatively, providers may be paid directly by the insurer. The total fee paid to the provider will include all private-pay fees plus government fees. Either of these components may be zero, of course. Total fees received are therefore one way of measuring costs.

The other way is through the direct measurement of costs. Full costs should include capital costs as well as operating costs, but because non-profit providers often receive capital funding separately from operating funding, capital costs are often left out. In addition, for-profit providers may earn profits; normal profits are considered a return on the risk-taking function and can be included in costs. Excess profits are not so included, but it is difficult to distinguish normal from excess profits. If the provider incurs a loss, rather than a profit, the cost should still be evaluated at full operating costs, as these measure the resources used in production.

**Methods of Data Estimation:** In this section, we provide any relevant information on data estimation. In general, if the data methods have been documented elsewhere, we refer the reader to that source.

**Time Available:** In this section we present the length of time it takes for a specific cost item to become available. In some cases, such as when a research study is used to obtain the estimate, this item is not relevant.

### ***4.3 Estimates of cost***

In this section we provide the estimate of the service's unit cost for each province where data were available. In some instances, only one national figure will be available, and that is presented under the heading "Canada." In other instances, the estimates were taken from the literature, perhaps from a published study; they are identified as such.

### ***4.4 How to use the cost list***

#### ***4.4.1 Instructions and suggestions***

In this section we provide specific instructions and examples on the use of the cost list.

#### ***4.4.2 User alerts***

In this section we highlight any specific issues that the data user should be aware of. These would include the sensitivity of a measure to fixed costs, or an obviously biased sampling strategy.

### ***4.5 Assessment of the components for each service***

In this section we provide an assessment of the individual items in the cost list derived from the overall objectives of this project as well as the *desirable* characteristics of a cost measure that we identified in Section 2. These are defined in the accompanying table, along with assessment criteria. These are divided into two categories. The first deals with the availability and comparability of data. The second deals with the quality of the estimate.

#### ***4.5.1 Availability and comparability of data***

**Availability by province:** Ideally, the cost list should contain an estimate for each province. The provincial coverage will be summarized.

**Uniformity of cost measures across provinces:** Uniformity of measures between provinces will allow comparability, and will assist in the eventual development of a single national cost list. For each service, we will identify the degree to which the individual items can be compared across provinces.

**Timeliness of Estimate:** The availability of the estimate within a shorter time period is better. As well, data which is available on a periodic basis is better than data from one-time studies.

#### 4.5.2 *Quality of data*

We have divided the indicators of quality into four separate groups; these are (1) whether or not the estimate represents the full measure of cost; (2) the degree of detail in the output measure; (3) the basis of evidence; and (4) the characteristics of the provider sample. Criteria were provided for each indicator, ranging from 0 to 1. Judgments about the selection of criteria, and associated ratings, were made by the entire working group. Individual ratings should be regarded as rankings. Numbers, rather than letters, were used to assign grades because there are different numbers of characteristics between criteria. Therefore, although a “0” is always worse than a “1”, in some instances it may still be an acceptable rating. We did not set any cut-off criteria to represent the minimal acceptable level.

In Table 1 we provide a scoring sheet, which lists each of the criteria, the characteristics of the ratings, and the ratings themselves.

**Table 1. Cost-data quality scoring sheet**

Quality indicator	Scoring criteria	Score
Measure of full cost (Price-based or direct cost measure)	<ul style="list-style-type: none"> <li>• Estimate reflects all costs to the payer (or all resource costs incurred by the provider). <span style="float: right;"><i>Score: 1.0</i></span></li> <li><i>or</i></li> <li>• Estimate may not reflect all costs to the payer (or all resource costs) <span style="float: right;"><i>Score:0.5</i></span></li> <li><i>or</i></li> <li>• Estimate does not reflect all costs to the payer (or all resource costs) <span style="float: right;"><i>Score: 0</i></span></li> </ul>	_____
The degree of detail in the output measure	<ul style="list-style-type: none"> <li>• There is sufficient detail in the output units so that systematic variation in resource use between units is captured, or else resources are directly traced to each patient or service event. <span style="float: right;"><i>Score: 1.0</i></span></li> <li><i>or</i></li> <li>• An output classification system is used, but it is not validated or sufficiently detailed. <span style="float: right;"><i>Score: 0.5</i></span></li> <li><i>or</i></li> <li>• There is insufficient detail in the output units so that systematic variation in resource use between units is not captured. <span style="float: right;"><i>Score:0</i></span></li> </ul>	_____
Basis of evidence	<ul style="list-style-type: none"> <li>• Costs or prices are obtained from actual observations (including fee schedules), are reproducible, and the units of output which were observed were representative of all units produced by that provider. <span style="float: right;"><i>Score 1.0</i></span></li> <li><i>or</i></li> <li>• Costs or prices are obtained by actual observation, are reproducible, but the units which were observed were not representative of all units in the output category. <span style="float: right;"><i>Score 0.5</i></span></li> <li><i>or</i></li> <li>• Estimates are based on opinion, or are not reproducible. <span style="float: right;"><i>Score 0</i></span></li> </ul>	_____
Selection of providers	<ul style="list-style-type: none"> <li>• Data is collected from a sample that is representative of all relevant providers. <span style="float: right;"><i>Score: 1.0</i></span></li> <li><i>or</i></li> <li>• Data is collected from a sample of more than one providing unit, but it is not a representative sample. <span style="float: right;"><i>Score: 0.5</i></span></li> <li><i>or</i></li> <li>• Data is collected from only one providing unit (when there is more than one provider). <span style="float: right;"><i>Score: 0</i></span></li> </ul>	_____



Below we present a description of each of the indicators:

**Measure of full cost of providers:** The cost of services can be estimated by the revenue (price) received by the provider, or directly by summing up the costs of all resources (see diagram in section 4.2). An estimate of the quality of the estimate can be provided in either case.

*Price-based estimates:* If a price-based estimate is used, the highest quality measures are those in which the price represents all revenue received by the provider (and hence which equals the total cost of resources). For example, one measure which would receive a high rating is a uniform price paid to all eligible providers of the service in a particular market or jurisdiction. We assign a value of 1.0 to such a measure. When a provider or professional association sets a list or recommended price, the actual fee paid and received may differ from recommended fees. In such cases, the charge (or listed price) may not equal revenues received. We therefore assign a value of 0.5 to such estimators. Finally, there are instances when the price paid does not cover the full amount received by the provider for supplying the service. For example, a copayment may reflect only a portion of the total revenue received for a drug; or an ambulance service may receive an operating subsidy from the government and then set its charges below cost. In these cases, the fee will be a poor estimate of overall cost, and we assign a value of 0.

There are instances when a provider can receive fees from a number of different payment sources; although each payer deems that its payment covers the entire cost of services, the payments from each source may be quite different from each other. In accordance with our “full cost” criteria, the fee from each source represents the full amount received by the provider for the provision of the service; it is therefore rated a value of 1.0. However, when there are fees coming from multiple payers, the average cost for all payers will provide a better estimate. If we obtain data from only one payer, this will not provide a good “basis of evidence” to estimate costs; when data only comes from one payer, then, we would record a reduced level of quality in the “Basis of Evidence” criteria (see below).

*Direct-cost estimates:* If a cost-based measure is used, then we can separate the quality criteria into two sub-criteria – one which assesses whether all the relevant resources were included in the cost measure, and one which assesses whether an appropriate unit price or opportunity cost as assigned to these resources. These criteria are set out as follows.

*Inclusion of resources:* As stated in the previous section, there does not exist at present a standard which identifies which resources are to be included in a cost measure. At the very

least, direct labor, supplies and direct machining costs should be included. If a societal approach is taken, then unpaid resources should be included as well. Whether or not indirect overheads should be included will depend on the circumstances. In some instances, for example when comparing two surgical techniques, leaving out overheads may be perfectly acceptable.

*Unit price applied to resource units:* The unit price should reflect the average price of resources in the sample of producing units or the uniform price applicable to all providers in a market/ jurisdiction. It should include all compensation, including benefits (in the case of labor compensation). In the case where there are unpaid resources, an appropriate opportunity cost should be used.

If the appropriate resources are included in the estimate, and if these resources are valued at the appropriate cost, then the estimate should be assigned a value of 1.0. A lower quality (0.5) would be assigned if an input (e.g., the price of a drug) were assigned a listed price which might not equal the actual cost of the resource. Finally, there are situations when input prices do not represent the actual ones, or else because some resources have been left out of the measure. In either case, the cost estimate does not equal the actual cost, and we assign it a value of 0.

**Degree of detail in the unit of output:** There may be considerable variation in resource use between units of output within a given output category (e.g., bed days, lab tests). Some degree of categorization of output units is desirable in order to capture systematic variations in cost between units of services. Workload units and case-mix groups were designed to capture this variation. In general, the use of workload units (or some system which assigns weights to sub-groups of services) will be deemed to be preferable to the use of raw counts. Of course, a classification or workload system is not always required. Some outputs (e.g., vaccinations) are relatively homogeneous in nature, and can be measured in raw units. In some instances, the unit of a service is the number of input units (e.g. hours of home care). If these measures are used, the estimate will provide a unique cost for each service event. The detail of such a method is fully acceptable.

**Basis of evidence:** The criteria which were developed for this indicator are based on the following assumptions: facts are better than opinion, and there are good facts and bad facts. The highest level of evidence in this indicator is the development of estimates from actual observations of representative units of output (e.g., patient visit, surgical operations, etc.), or uniform fee schedules governing payments to all providers in a market / jurisdiction. A unit cost per weighted case measure, derived from total operating costs and total weighted input,

would be ranked high. Also ranked high would be micro-costing using a representative sample of outputs. The direct observation of non-representative units is ranked lower, but above the situations where costs are obtained by opinion or non-reproducible means. Examples of non-representative samples of output units would include the observation of a series of emergency visits which were not the norm in terms of resource use, or the use of a price paid by a public payer for a service which is provided (at the same level of quality) in both private and public markets.

**Sampling characteristics of providing units:** This indicator deals with the representativeness of providers from which estimates were obtained. There are two main characteristics in this category. The first is *the number of sites which were used* to generate the cost measure within the province or country. More sites are preferred to less, as the variance of the sample is reduced with a greater sample size. The second characteristic is *the representativeness of the sites* which appear in the sample. A random selection of sites is preferred to a convenience sample. Sample representativeness is not an issue where uniform fee-for-service schedules govern payments to all eligible service providers of services funded under various federal and/or provincial/territorial health and social services programs.

#### **4.6 *The cost list - outline***

The items in the cost list are presented in the following general order:

- Public Health
- Diagnostics and Therapeutics
- Continuing care
- Personal cost items

There is some overlap between units. For example personal costs will occur when community care is being provided. Therefore we present this ordering only as a general guide to where items are found.

### ***References***

References which are specific to each section are provided at the end of the section.

## **PUBLIC HEALTH**

Public health is comprised of a wide variety of services, such as environmental control, health promotion, and a variety of disease prevention activities, such as vaccinations and disease screening. Very little attention has been focused on the development of costing systems for public health, even though this is a public activity. Virtually all of the information on costs that we have comes from published research studies. Although some of these studies are of a high quality, our knowledge in this area is spotty. In this section we provide several examples of the costing of public health activities. Our purpose is to identify studies which an investigator can turn to for guidance, rather than providing ready-to-use statistics.

## 5.0 Immunization

### 5.1 Introduction

Immunization is a key public health activity. A number of individual studies have been conducted for specific vaccine preventable diseases, which include measles, mumps, and rubella (MMR); diphtheria, pertussis, and tetanus (DPT); polio; and influenza. These studies can provide estimates which can be used in other studies, and can also provide methodological guidance for investigators who want to conduct their own analyses. Only studies which specified the methodology that were used are presented below.

### 5.2 Description

**Unit of measurement:** See table.

**Scope of service:** Single dose of vaccine. A complete regimen might require several doses. Frank et al. (1985) also conduct an estimate of the cost of sending out reminder letters and follow-up telephone calls but these results are too dated to be of use in the cost list.

**Basis of estimate:** Cost (except for physician services, which are based on fees).

**Resource items included (if cost-based estimate):** Varies with study. Should include the vaccine, resources involved in the direct administration of the vaccine (doctor or nurse), supplies and clerical overhead. General overhead and program costs (e.g., promoting the program) have not generally been included in most studies.

**Unit price of resources (if cost-based estimate):** Estimate is based on actual wages and prices.

**Out of pocket component:** N/A.

**Methods of Data Estimation:** The estimation of the time it takes to administer the vaccine was either by manager's opinion (Pabst et al., 1999) or based on data from a large program (Pelletier et al., 1998). For a study which was based on actual observation, see Sadoway et al. (1990).

**Time available:** These were all one time published studies.

### 5.3 Estimates of cost

Disease	Study	Unit of measurement	Cost items					
			Vaccine cost	Supplies	Cost of administration - nursing	Physician fee	Direct clerical costs	Over-head (management, promotion etc.)
DPT	Pabst et al. (1999) – Alberta	Per dose (clinic)	\$3.69		\$6.60	-	\$3.50	-
MMR*	Pabst et al. (1999) – Alberta	Per dose (clinic)	\$8.22		\$6.60	-	\$3.50	-
MMR	Pelletier et al. (1998) – Quebec#	Per dose (in school)	\$8.14	\$0.75	\$6.00	\$0.75	Included in overhead	Cost varies by program, number of recipients
Influenza	Helliwell et al. (1988)- Ontario	Per dose	\$1.34			\$5.38**		

\* If both DPT and MMR vaccines are given in a single visit, there would be a single cost item for administration etc.

# Cost will vary depending on whether the vaccine is administered in schools or public sector

\*\* Physician cost will vary depending on whether the visit was just for an immunization (\$3.15) or for a brief exam (\$14.30). A weighted average was provided.

### 5.4 How to use the cost list

**General suggestions:** You may conduct a separate costing yourself, using these studies as a guide to methodology. Or you can use the estimates presented in these tables. Public health officials can organize immunization programs in a variety of ways. They can locate these programs in public health clinics or schools; they can operate them out of mobile units; or they can have private physicians administer the vaccines. The cost structure – both fixed and variable – will differ between programs. When analysts compare stand-alone programs, they should consider conducting their analyses at the program level, rather than that of the individual patient. When they take such a focus, the investigators will often be able to present a more realistic picture of the program’s economic characteristics.

**User alerts:** The time to administer the vaccine is a key element in the study. Evidence as to this time which is based on managers’ opinions is not of a high level.

## 5.5 Assessment of the estimates

(Based on Pabst, et al,1999)

### 5.5.1 Availability and comparability

**Availability by province:** Estimates were only available for a single province.

**Uniformity of estimates across provinces:** None.

**Time available:** This is a one-time published study.

### 5.5.2 Quality of data

Item and comments	Rating
<b>Measure of full costs:</b> Supplies were not included in this study.	0
<b>Detail in output measure:</b> Doses do not vary between output units, and so a classification of outputs is not needed	1.0
<b>Basis of evidence:</b> Times to administer vaccine appeared to be based on personal estimates.	0
<b>Sample selection:</b> Study was done at one center only	0

## References

Frank JW, McMurray L, Henderson M. Influenza vaccine in the elderly: 2. The economics of sending reminder letters. *Canadian Medical Association Journal* 1985; 132(5):516-18, 521.

Health Canada. Update: vaccine-preventable diseases. Ottawa: Health Canada, Laboratory Centre for Disease Control 7(2), August 1999 (Internet address: <http://www.hc-sc.gc.ca/hpb/lcdc/publicat/vacprev/vol17-2/index.html>)

Helliwell BE, Drummond MF. The costs and benefits of preventing influenza in Ontario's elderly. *Canadian Journal of Public Health* 1988; 79(3):175-80.

Pabst HF, Boothe PM, Carson MM. A comparison of alternate immunization regimes for measles in vaccinated populations. *Vaccine* 1999; 17(2):182-92.

Pelletier L, Chung P, Duclos P, Manga P, Scott J. A benefit-cost analysis of two-dose measles immunization in Canada. *Vaccine* 1998; 16(9-10):989-96.

Sadoway DT, Plain RH, Soskolne CL. Infant and preschool immunization delivery in Alberta and Ontario: a partial cost-minimization analysis. *Canadian Journal of Public Health* 1990; 81(2):146-51.

## 6.0 Disease Screening

### 6.1 Introduction

Screening is an activity by which individuals who have no signs or symptoms are examined to detect an unsuspected condition or disease. Screening can be done with and without a formal public health program. We are primarily concerned with the costs of public health screening programs, although both public and non-public programs will have common elements.

Public health screening is a multi-step process, involving an initial contact of patients by the program, testing, patient notification and follow-up. Follow-up can include further testing and treatment. There are no routine published costs of screening activities. There are, however, individual studies. In what follows we have identified several articles which can serve as examples of the analysis of screening costs.

### 6.2 Description

**Unit of measurement:** See table.

**Scope of service:** See table.

**Basis of estimate:** Direct estimate of cost.

**Resource items included (if cost-based estimate):** See table.

**Unit prices of resources (if cost-based estimate):** In both studies unit prices were based on actual data from the program.

**Out of pocket component:** N/A.

**Method of data estimation:** In Ostrowsky et al. (1985) and Olivotto et al. (1999) the investigators divided total program costs by the number of patients screened.

**Time available:** One-time studies.

### 6.3 Estimates of cost

We have selected two programs, genetic screening for thalassemia and screening for breast cancer, based on the availability of detailed costing studies.

Study	Disease screened for	Scope of services	Resources included	Estimate and cost object
Ostrowsky et al., 1985	Thalassemia	Initial test, notification, follow-up	Labor and materials	\$7.51 per person screened
Olivotto et al. (1999)	Breast cancer	Examination, interpretation, data collection and notification	Operating costs (labor, supplies, professional fees)	\$45.94 per patient examined

### 6.4 How to use estimates

**Instructions and suggestions:** These studies provide examples of how a costing analysis of a screening program might be conducted.

**User alerts:** Costs of individual programs will vary by disease and other circumstances.

### 6.5 Assessment of the estimates

Assessment is based on the article by Olivotto (1999).

#### 6.5.1 Availability and comparability

**Availability by province:** Estimates were made for one province.

**Uniformity of estimates across provinces:** Not applicable.

**Time available:** One time study, continuing data is not provided.

#### 6.5.2 Quality of data

Item and comments	Rating
<b>Measure of full costs:</b> All costs were included at one centre; physician fees were used in the rest of the province.	1.0
<b>Detail in output measure</b> Screenings were homogeneous	1.0
<b>Basis of evidence</b>	1.0
<b>Sample selection</b> The entire province was covered.	1.0

## ***References***

Olivotto IA, Kan L, Mates D, King S. Screening mammography program of British Columbia: pattern of use and health care system costs. *CMAJ* 1999; 160(3):337-41.

Ostrowsky JT, Lippman A, Scriver CR. Cost-benefit analysis of a thalassemia disease prevention program. *American Journal of Public Health* 1985; 75(7):732-36.

## **DIAGNOSTICS AND THERAPEUTICS**

Diagnostic and therapeutic services are comprised partly of services which are insured under the Canada Health Act, and partly of services which do not fall under the Canada Health Act. The “insured” group of services includes physician services and hospital inpatient and outpatient services. The “uninsured” services (under the Canada Health Act definition) include services of professionals other than physicians (chiropractors, optometrists, physiotherapists, etc.), ambulance services, and outpatient pharmaceuticals; some of these services are at least partly insured by provincial governments, and partly by private insurance. Out-of-pocket payment is quite common for these. The quality of data is quite variable for both insured and non-insured services. Detailed data exists for inpatient acute care and physician services in all provinces; data on outpatient hospital care (emergency room services and special clinics) and blood is less readily available. With regard to non-insured services, data for pharmaceuticals is very complete. The availability and quality for other non-insured diagnostic and therapeutic services is not very good. In the following section we provide estimates for both groups of services.

## 7.0 Physician services and provincial fee schedules

### 7.1 Introduction

The proportion of physicians who are funded only by fee-for-service varies from 47 per cent in Manitoba to 98 per cent in Alberta. In Ontario the amount is 94 per cent and in Quebec it is 62 per cent. In provinces where other payment modes are prominent, fee-for-service is often used in combination with other forms of payment. The provincial fee schedules, on which fee-for-service payments are based, contain considerable detail and distinguish between physician specialty. There is some overlap in fee categories between provinces, but the overlap is not complete. Therefore, in some cases it may be difficult to obtain comparative costs between provinces for the identical procedures. In what follows, we provide a users' guide to the ten provincial fee lists. Recognizing that there is a lack of comparability, we also refer users to a second list which does provide costs for comparable groups, but at a much reduced degree of detail (see Section 8).

### 7.2 Description

**Unit of output:** Individual services. Each province has its own list of service categories. Visits are less well defined than are procedures.

**Scope of service:** Each fee item is a specific service defined by the schedule. There can be more than one service provided in any one visit. If the visit is to a hospital clinic, the costs of the clinic's own services will have to be added.

**Basis of estimate:** Negotiated fees.

**Resource items included:** Fee covers physician services, and in a few cases (radiology and laboratory services in some provinces) a technical fee as well.

**Unit prices of resources:** N/A.

**Out of pocket component:** Generally none.

**Method of estimation and data:** Fees are actual prices. Investigators will use these fees as their cost estimates.

**Time of availability:** Information is current.

### 7.3 Estimate of cost

Each provincial Medicare plan issues a fee schedule with a list of services and an associated fee. See below for the reference to the list from each province.

### 7.4 How to use estimates

You need to get a copy of the provincial fee schedule (see references below). With the fee schedule, you will need to find the appropriate service, and then the fee that is associated with this service. These fees reflect physician payments. We calculate the fee for each province, for the following example:

**Example:** A patient is showing a common symptom of asthma. He/she visits a family doctor who does a brief assessment of the patient's condition. In the table below we present suggested coded items and the associated cost for a physician visit in each province. We should note that there is discretion in coding practices.

Province	Coded items	\$ Amount
Newfoundland	Under Consultations and Visits section; page C-1 of the payment schedule, for a general practice office visit; fee for a partial assessment; code 121 [Newfoundland and Labrador Medical Care Plan: Payment Schedule for Physicians]	\$16.67
Prince Edward Island	On page 1 of the Tariff of Fees, under General Practice, section 2; fee for an initial office visit; code 0113. [Prince Edward Island Health and Community Services System Schedule of Payments for Medical Services]	\$18.95
Nova Scotia	In Nova Scotia the fee is based on the number of units assigned to each service and on a dollar value assigned to each unit. Under the Family Practice section, page A1; fee for an office visit, code 03.03; 11 units at medical service unit value of \$1.89 [Nova Scotia Medical Services Insurance physician's manual]	\$20.79
New Brunswick	In New Brunswick the fee is based on the number of units assigned to each service and on a dollar value assigned to each unit. Under the General Practice section, Office Visits, page 5/1 of the physician's manual; code 1; 21 units at a unit value of \$1.03 [New Brunswick Physician's Manual]	\$21.63
Quebec	Under Consultations and Examinations, section B of the General Practitioners' manual, fee for an ordinary office exam; code 0001 [Quebec General Practitioner's Manual]	\$14.70
Ontario	Under the Family Practice and Practice in General section, page 1 of the 1999 schedule of fees, fee for a minor assessment; code A001 [Ontario Health Insurance Plan Schedule of Benefits and Fees]	\$26.81
Manitoba	Under the General Practice section, Office and Home Visits on page A-44; fee for a regional basic visit; code 8509 [Manitoba Physician Manual]	\$16.05
Saskatchewan	Under section b: General Practice of the provincial payment schedule for physician services, page B.1, fee for a practitioner visit, partial assessment; under age 55; code 5B [Saskatchewan Health Payment Schedule for Insured Services Provided by a Physician]	\$19.25
Alberta	Under the Price List section, I. Certain Diagnostic and Therapeutic Procedures, section 0.3: Clinical Evaluation and Examination; page 5; code SKLL GP; code #3.03C [Alberta Health Care Insurance Plan: Schedule of Medical Benefits]	\$22.19
British Columbia	Under the Visits section; page 7-5 of the provincial payment schedule; fee for a visit in office for a patient aged 0-74 years; code 00100 [British Columbia Payment Schedule]	\$26.53

**User Alerts:** The Ontario and British Columbia Medical Associations also maintain their own fee schedules, with suggested list prices. These suggested prices are generally not the ones paid and so the provincial fee schedules should be used.

## 7.5 *Assessment of the estimates*

### 7.5.1 *Availability and comparability*

**Availability by province:** Data is available for all provinces.

**Uniformity of estimates across provinces:** Items within the schedules are not uniform between provinces. For uniform fee items (with a reduction in the degree of detail) see section 8.

**Time available:** Estimates are current.

### 7.5.2 *Quality of data*

<b>Item and comments</b>	<b>Rating</b>
<b>Appropriate cost measure</b>	1.0
<b>Detail in output measure</b>	1.0
<b>Basis of evidence</b>	1.0
<b>Sample selection</b>	1.0

## **References**

[St. John's, NF]: Newfoundland and Labrador Medical Care Plan: Payment Schedule for Physicians. 1999.

[Montague, PEI]: Prince Edward Island Health and Community Services System Schedule of Payments for Medical Services. 1999.

[Halifax, NS]: Nova Scotia Medical Services Insurance Physician's Manual. 1996.

[Fredericton, NB]: New Brunswick Physician's Manual. New Brunswick Health and Community Services; 1998.

[Quebec, QB]: Quebec General Practitioner's Manual. 1999. Regie de l'assurance maladie du Quebec.

[Toronto, ON]: Ontario Health Insurance Plan (OHIP) Schedule of Benefits and Fees. 1999.

[Winnipeg, MB]: Manitoba Physician Manual. Manitoba Health. 1999.

[Regina, SK]: Saskatchewan Health payment schedule for insured services provided by a physician. Saskatchewan Health. 1999.

[Edmonton, AB]: Alberta Health Care Insurance Plan: Schedule of Medical Benefits. Alberta Health. 1999.

[Victoria, BC] British Columbia Payment Schedule. Ministry of Health and Ministry Responsible for Seniors. 1999.

## 8.0 Physician services – a uniform national fee schedule

### 8.1 Introduction

The individual items in the provincial fee schedules may differ from province to province. The Canadian Institute for Health Information (CIHI) maintains a classification of physician services which is standard across provinces. Comparable output categories have been applied and fees are provided in each output category. In order to achieve cross-provincial uniformity, the indexes compromise on detail. For many purposes, when detail is not needed, these fee lists may be very useful.

### 8.2 Description

**Unit of measurement:** The fee list contains the following categories of services:

- Consultations
- Major assessments
- Other assessments
- Hospital care days
- Special calls
- Psychotherapy / counseling
- Major surgery
- Minor surgery
- Surgical assistance
- Anesthesia
- Obstetrical services
- Diagnostic / therapeutic services
- Special services
- Miscellaneous services

These items are contained for each of 18 specialties, including general practice, internal medicine, psychiatry and specific surgical specialties. In addition, a selected list of very common surgical procedures is also available.

**Scope of service:** The specific services are confined to the physician's component of output.

**Basis of estimate:** Average fees charged for each province, for a commonly used group of services. These include overtime premiums.

**Resource items included (if cost-based estimate):** N/A.

**Unit price of resources (if cost-based estimate):** N/A.

**Out of pocket component:** N/A.

**Method of data estimation:** Estimates are based on provincial fees. Average fee levels for each of the above categories, and for each specialization, are estimated by province. These estimates are made for services which are commonly used.

**Time available:** Occasional publications appear after 3 or 4 years; however, more timely data may be available from CIHI.

### 8.3 *Estimates of cost*

See CIHI (1998). In Tables 15-1 through 15-22 of the CIHI document cost per service is provided for the major service categories, by province and specialty. For example, a “major surgery” procedure for Ophthalmology in Nova Scotia in 1993/4 was \$354 (See CIHI (1998) Table 15-18). Additional detail on the more common procedures is found in CIHI (1998) Table 23-5. For example, a therapeutic abortion in Nova Scotia in 1993/4 had an average fee of \$115. Further updates are expected, and information can be obtained from CIHI.

### 8.4 *How to use estimates*

**Instructions and suggestions:** The method would be similar to using any fee schedule, only the range of procedures in this case will be less.

**User alerts:** The procedures in the broader classification are often not provided in enough detail.

### 8.5 *Assessment of the estimates*

#### 8.5.1 *Availability and comparability*

**Availability by province:** Availability in all provinces.

**Uniformity of estimates across provinces:** There is a considerable degree of uniformity in items.

**Time available:** Data is 3 to 4 years old.

#### 8.5.2 *Quality of data*

Item	Rating
------	--------

<b>Measure of full cost</b>	1.0
<b>Detail in output measure</b>	0.5
<b>Basis of evidence</b>	1.0
<b>Sample selection</b>	1.0

### ***References***

Canadian Institute for Health Information. National physician database: national grouping system categories report, Canada 1989/90 to 1993/94. Ottawa, Canadian Institute for Health Information, 1998.

Canadian Institute for Health Information. Physician services benefit rates report, Canada, 1995/96. Ottawa: Canadian Institute for Health Information, 2000.

## 9.0 Other Professional Services

### 9.1 Introduction

Other professional services, including those for optometry, chiropractic, physiotherapy, and naturopathy, are not covered under the Canada Health Act, and coverage varies by province. As a result there are a number of different prices. There is a government rate, a suggested fee by the professional associations, and an actual private fee which is charged by providers to individuals who are not publicly insured. The government fees and actual fees are the most important; in instances where they differ (usually in a predictable way) the government fee may be below actual cost, and the private fee may be above it.

### 9.2 Description

**Unit of measurement:** See table.

**Scope of service:** Visits to the professional in an office setting.

**Basis of estimate:** A mixture of actual prices, provincial fees, and suggested fees.

**Resource items included:** Not applicable.

**Unit prices of resources:** Not applicable.

**Out-of-pocket components:** If the government pays the entire fee in public programs, there is no out-of-pocket component. There are, however, many instances where there are out of pocket fees. See table for self-pay estimates.

**Methods of data estimation:** List of paid fees obtained from provincial associations.

**Time available:** Estimates are current.

### 9.3 Estimates of Cost

Province	Fee items	Public fee	Out of pocket fee	Suggested fee	Actual price	Comments
<b>Chiropractic</b>						
<b>All Canada</b>	First visit				\$42.97	Based on national survey. Unclear whether xrays are included or excluded.
	Subsequent Visits				\$24.10	
<b>Naturopathy</b>						
<b>BC</b>	Per hour				\$150	Anecdotal estimate
<b>Physiotherapy</b>						
<b>ON</b>	Per visit	\$12.20	none			Public price. Limitations are placed on the number of publicly funded visits Suggested private fee. Actual fees may differ.
	Per hour			\$150.00		
<b>Manitoba</b>	Initial assessment			\$46		Recommended private rates.
	Subsequent visit			\$36		
<b>Sask</b>	Initial assessment			\$45		Suggested fees for private practice.
	Subsequent visit			\$30		
<b>BC</b>	Per visit	\$13.60	\$10.00	\$33.60		\$10 is copay on public fee. Total is \$23.60.
<b>Optometry</b>						
<b>Quebec</b>	Full exam	\$19.50	None	\$47.00		Government fee for persons <18 and >65.
<b>Ontario</b>	Full exam	\$39.15	None			Government rate for covered persons.
	Partial exam	\$14.25	none			
<b>Manitoba</b>	Full exam	\$28.00	None	\$55.00		Public fee for publicly covered persons. Suggested fee for others; actual fee may differ.
	Partial exam	\$16.20	None			
<b>Alberta</b>	Full exam	\$60.00	None			Persons <19 and >65 are covered. Others pay a fee set by optometrist.
	Partial exam (3 procedures)	\$45.00	None			
	Brief exam (1 procedure)	\$17.00	None			
<b>BC</b>	Full exam	\$44.83	None			Fee for non-covered people set by optometrist.
	Partial exam	\$21.64	None			

### 9.4 How to use the Estimates

First identify the service. Government or public fees can then be obtained from fee schedules. Fees for non-covered services are generally set within guidelines, but are not necessarily followed.

## 9.5 *Assessment of the estimates*

### 9.5.1 *Availability and comparability*

**Availability by province:** Availability varies. Data on actual prices are not generally available.

**Uniformity of estimates across provinces:** Within most professions the services are quite uniform. However, where services are detailed, there is not much information.

**Time available:** Estimates are current.

### 9.5.2 *Quality of data*

Because of the wide variation in methods, no rating was attempted.

## ***References***

Kopansky-Giles D, Papadopoulos C. Canadian Chiropractic Resources Databank (CCRD): a profile of Canadian chiropractors. *Journal of the Canadian Chiropractic Association* 1997; 41(3): 155-91.

British Columbia Naturopathic Association. Website: <http://www.bcna.ca>.

Ontario Physiotherapy Association. Website: <http://www.opa.on.ca/Pages/aboutopa.html>.

Private Practice Physiotherapists of Manitoba. Mailing address: 30 – 2866 Pembina Highway, Winnipeg, Manitoba R3T 2J1.

Saskatchewan Physiotherapy Association. Mailing address: Private Practice Section, 313 1121 College Drive, Saskatoon, Saskatchewan, S7N 0W3.

Physiotherapy Association of British Columbia. Website: <http://www.bcphysio.org>.

Association des Optométristes du Québec. Website: <http://www.opto.ca/contact>.

Ontario Association of Optometrists. Mailing address: 290 Lawrence Avenue West, Toronto, Ontario M5M 1B3.

Manitoba Association of Optometrists. Website: <http://www.optometrists.mb.ca>.

Alberta Association of Optometrists. Website: <http://www.optometrists.ab.ca>.

British Columbia Association of Optometrists. Website: <http://www.optometrists.bc.ca>.

## 10.0 Diagnostic laboratory tests

### 10.1 Introduction

Laboratory services are provided both in the public and private sectors. In the public sector, they are provided in provincial laboratories such as the Westman and Cadman Labs in Manitoba and the Provincial Laboratories in Alberta, as well as in many hospitals. When provided publicly, the provincial governments in some provinces maintain fee schedules to reimburse private pathologists for conducting and interpreting these tests. These fees can be used as approximations for the cost of these tests.

### 10.2 Description

**Unit of measurement:** Laboratory test, for specific types of tests. Fee schedules contain items in chemical, hematological, blood bank and microbiology areas.

**Scope of service:** Both the technical and professional components are combined in all provinces. Separate listed fees for the technical and professional components are available from the British Columbia Medical Association Fee Guide.

**Basis of estimate:** Negotiated fees.

**Resource items included (if cost-based estimate):** N/A.

**Unit price of resources (if cost-based estimate):** N/A.

**Out of pocket component:** N/A.

**Method of data estimation:** Data is taken directly from fee schedules.

**Time available:** Concurrent.

### 10.3 Estimates of cost

See provincial fee schedules for selected provinces, indicated below.

### 10.4 How to use estimates

**Instructions and suggestions:** You need a copy of the provincial fee schedule. Currently, fee

schedules in five provinces contain items related to laboratory services. These provinces are: Ontario, Manitoba, Saskatchewan, Alberta, and British Columbia. In other provinces, lab tests are done in facilities, and are not paid for by fees.

As an example, assume you want the cost of a complete blood count. You would find the appropriate item in the provincial fee schedule, and use the combined fee which includes technical and professional components. In the following table we present the fees and references to them for the five provinces where this data was available.

In each province the investigator will obtain the dollar fee for the appropriate test, except in Ontario. In Ontario, fees are expressed in terms of laboratory workload (LMS) units, which are assigned a price of 91.32 cents per unit.

Province	Combined fee (\$)	References
Ontario	9.13	Tests are expressed in LMS units. (10 LMS units x \$0.9132 per unit) 1999 Schedule of Fees, pages 28,29,35
Manitoba	5.65	Manitoba Physician Schedule, page V-5.
Saskatchewan	10.20	Payment Schedule for Physician Services 2000, page v3
Alberta	10.76	AHCIP 1999, page 149
British Columbia	14.76	British Columbia, Medical Services Commission item T90205

**User alerts:** Costs at public labs may differ from these schedules.

## 10.5 Assessment of the estimates

### 10.5.1 Availability and comparability

**Availability by province:** Availability in five provinces.

**Uniformity of estimates across provinces:** There is some degree of uniformity in items.

**Time available:** Current.

### 10.5.2 *Quality of data*

<b>Item</b>	<b>Rating</b>
<b>Appropriate cost measure</b>	1.0
<b>Detail in output measure</b>	1.0
<b>Basis of evidence</b>	1.0
<b>Sample selection</b>	1.0

## **10.6 Comments**

Lab costs (usually only the technical component) can also be derived using financial data on costs and workload units from MIS. CIHI maintains workload units for lab tests.

## **References**

[Toronto, ON]: Ontario Health Insurance (OHIP) Schedule of Benefits and Fees. 1999.

[Winnipeg, MB]: Manitoba Physician Manual. Manitoba Health. 1999.

[Regina, SK]: Saskatchewan Health payment schedule for insured services provided by a physician. Saskatchewan Health. 1999.

[Edmonton, AB]: Alberta Health Care Insurance Plan (AHCIP): Schedule of Medical Benefits. Alberta Health. 1999.

[Victoria, BC] British Columbia Payment Schedule. Ministry of Health and Ministry Responsible for Seniors. 1999.

## 11.0 Diagnostic tests - radiology

### 11.1 Introduction

Diagnostic radiology is done in both private physicians' offices and in public hospitals. Tests done in private offices are funded on a fee for service basis. The fees can be used as an estimate of the costs of these tests. Fees are divided into two components – a technical component and a professional component. The technical component covers costs for the facility resources, including technical personnel, supplies, equipment and overhead. The professional component is the physician's fee. In some instances, only the professional component is reported and the costs of the technical component are covered in a public facility. In other instances, a single fee is set for both components.

### 11.2 Description

**Unit of measurement:** The fee is for specific types of tests.

**Scope of service:** The service is the entire test, including its interpretation by the physician and the technical component.

**Basis of estimate:** The basis is fees, set by the provincial health departments.

**Resource items included:** N/A.

**Unit price of resources:** N/A.

**Out of pocket component:** None.

**Method of data estimation:** Items obtained from fee schedules.

**Time available:** Information is current.

### 11.3 Estimates of cost

Fees can be obtained from the Diagnostic Radiology component of the provincial fee schedules. See references below.

## 11.4 How to use estimates

**Instructions and suggestions:** Items are obtained in fee schedules. We use a chest x-ray with two views as an example.

Province	Professional Component	Technical Component	Comments
Newfoundland	\$7.93	Not available	Tests are done in public facilities, and so there is no technical component. See Newfoundland, page F-2, item 70502.
Prince Edward Island	\$5.70	Not available	Tests are done in public facilities, and so there is no technical component. See Prince Edward Island, page 121.
Nova Scotia	Not available	Not available	
New Brunswick	\$1.19	Not available	Tests are done in public facilities, and so there is no technical component. See New Brunswick, item 3001.
Quebec	\$18.75	Included in one fee	Fee includes both professional and technical component. Fee consists of a basic amount of \$14 and an additional \$4.75 if x-ray is a consultation. See Quebec, Update 52, p.VII, item 8100.
Ontario	\$14.48	\$38.98	See Ontario, page 54.
Manitoba	\$6.10	\$15.20	See Manitoba, page PT-1, item 7074.
Saskatchewan	\$8.89	\$20.85	See Saskatchewan, page X-2 (Number of views is not specified).
Alberta	\$22.29	Contained in a single fee	See Alberta, page X-21.
British Columbia	\$28.67	Contained in a single fee	See British Columbia, page 24-3, item 08550.

**User alerts:** The cost of an x-ray must include both professional and technical components. In some instances only the professional component is available; in these cases a technical component must be estimated.

## 11.5 Assessment of the estimates

### 11.5.1 Availability and comparability

**Availability by province:** All provinces except Nova Scotia. However, for the Atlantic provinces, only the professional component is included.

**Uniformity of estimates across provinces:** Definitions are largely uniform.

**Time available:** Current.

11.5.2 *Quality of data*

<b>Item</b>	<b>Rating</b>
<b>Measure of full cost</b>	1.0
<b>Detail in output measure</b>	1.0
<b>Basis of evidence</b>	1.0
<b>Sample selection</b>	1.0

***References***

[St. John's, NF]: Newfoundland and Labrador Medical Care Plan: Payment Schedule for Physicians. 1999.

[Montague, PEI]: Prince Edward Island Health and Community Services System Schedule of Payments for Medical Services. 1999.

[Halifax, NS]: Nova Scotia Medical Services Insurance Physician's Manual. 1996.

[Fredericton, NB]: New Brunswick Physician's Manual. New Brunswick Health and Community Services; 1998.

[Quebec, QB]: Quebec General Practitioner's Manual. 1999. Regie de l'assurance maladie du Quebec.

[Toronto, ON]: Ontario Health Insurance Plan (OHIP) Schedule of Benefits and Fees. 1999.

[Winnipeg, MB]: Manitoba Physician Manual. Manitoba Health. 1999.

[Regina, SK]: Saskatchewan Health payment schedule for insured services provided by a physician. Saskatchewan Health. 1999.

[Edmonton, AB]: Alberta Health Care Insurance Plan: Schedule of Medical Benefits. Alberta Health. 1999.

[Victoria, BC] British Columbia Payment Schedule. Ministry of Health and Ministry Responsible for Seniors. 1999.

## 12.0 Acute inpatient costing by case mix group (CMG)

### 12.1 Introduction

The cost per weighted case (CWC) approach involves the assignment of a standard cost to a case based on its case-mix group, resource intensity weight (riw), and the average cost per weighted case for the province where the care was provided. In the simplest form of the case-mix method, we assume that each case within the case-mix category requires a similar amount of resources. We should stress that, when we use this method, we do not estimate a unique cost for each individual case within the case mix group.

There are other, more refined, ways to apply the case mix method. For example, we can assume that, within each case mix category, all days of care use a similar amount of resources, and thus we can derive a unique cost for each case within a case-mix group with a specified length of stay. The Canadian Institute for Health Information (CIHI) grouping methodology further refines case mix measurement by distinguishing between typical and atypical (deaths, sign-outs, inter-hospital transfers, and long-stay outliers) cases. Typical cases are evaluated on a per case basis while atypical cases are evaluated on a per-day basis. In this report, we will follow the CIHI format.

### 12.2 Description

**Unit of output:** The CWC approach uses the Case Mix Group (CMG) system to classify cases (CIHI, 1997). The CMG system assigns patients to each group according to diagnosis and surgical procedure. In addition, each case is further assigned to a complexity level according to the type of co-morbidity diagnoses which are recorded in the patient's record. An additional breakdown by age is provided. Within each CMG and complexity / age group, the patient can be classified as typical or atypical. The resource intensity weight (riw), which is assigned according to CIHI's classification system, will depend on all of these factors.

**Scope of service:** The entire inpatient stay, from admission to discharge. Pre-admission work-ups which are conducted in pre-admission clinics are not included. Physician services are excluded, whether they are paid directly by the hospital or by the province.

**Basis of estimate:** Direct estimate of cost.

**Resource items included:** All direct resources and overheads (except where noted). This includes allocated overheads, including those allocated from regional headquarters, in the case where provinces have regionalized services. Excluded are hospital funded costs for education and research,

undistributed services such as the cafeteria, general building depreciation and interest on long term loans.

**Out of pocket component:** None.

**Method of estimation:** *Cost per weighted case.* In order to calculate a cost per weighted case the following must be determined: the sample of hospitals in each province; the case-mix, complexity, age, and disposition of each inpatient which is obtained from the CIHI data collection and classification procedures, based on data from the medical charts; and inpatient costs for each of the sample hospitals, which are based on Management Information System (MIS) data. A cost allocation method is used to segregate inpatient costs from the total costs for each hospital. The cost per weighted case measure is the ratio of total inpatient cost to total inpatient weighted cases for all hospitals in each provincial sample.

*Coding cases.* In each patient's medical record, the health records analyst records up to sixteen diagnoses which are associated with the hospital episode. In Canada, both the International Classification of Diseases – Version IX (ICD-9) (World Health Organization,) and the International Classification of Diseases – Version IX – with Clinical Modification (ICD-9-CM) are used. The analyst also assigns a typing code to each diagnosis, according to whether it is the first principal diagnosis which has contributed to the longest portion of the stay, an additional diagnosis which has contributed to the length of stay in hospital, or a diagnosis with no impact on length of stay. Surgical procedures are coded in accordance with ICD-9-CM or the Canadian Classification of Diagnostic, Therapeutic and Surgical Procedures (Statistics Canada, 1993).

*Grouping cases.* CIHI assigns patients to a specific CMG according to first principal diagnostic and procedure codes. Cases are further separated into age and one of four complexity groups, according to the identification and types of additional diagnoses. Examples of case mix classification by CMG, Age, and Complexity categories are shown in Table 12-1. The first CMG (Number 001) is Craniotomy, which is subdivided by complexity group (Plx level). Finally, cases are sub-divided into typical and atypical categories, although these are not shown in Table 12-1.

**Table 12-1**

CMG	Description	Plx Level	Age 0 - 17					Age 18 - 69					Age 70 +				
			VO	RIW	RA	CIHI	TRIM	VOL	RIW	RA	CIHI	TRIM	VOL	RIW	RA	CIHI	TRIM
			L		PDW	PDW				PDW	PDW				PDW	PDW	
1	CRANIOTOMY PROCEDURES	1	480	2.2425	0.1048	0.3504	23	2406	2.3747	0.1048	0.3096	24	420	2.4983	0.1048	0.2826	25
1	CRANIOTOMY PROCEDURES	2	52	2.9889	0.1486	0.291	37	354	3.1763	0.1486	0.2752	38	55	3.3515	0.1486	0.2637	39
1	CRANIOTOMY PROCEDURES	3	40	4.1617	0.1788	0.2745	54	236	4.3871	0.1788	0.2672	55	58	4.5978	0.1788	0.2612	56
1	CRANIOTOMY PROCEDURES	4	39	7.8458	0.2212	0.27	101	203	8.1248	0.2212	0.268	102	47	8.3856	0.2212	0.2662	103
3	SPINAL PROCEDURES	1	191	1.7365	0.1525	0.2938	15	619	1.5858	0.1525	0.3223	14	53	2.1599	0.1525	0.2486	18
3	SPINAL PROCEDURES	2	9	3.1888	0.1725	0.2474	47	51	3.0183	0.1725	0.2536	46	11	3.6676	0.1725	0.2342	50
3	SPINAL PROCEDURES	3	11	3.7193	0.1699	0.2486	47	32	3.5514	0.1699	0.2542	46	6	4.1909	0.1699	0.2364	50
3	SPINAL PROCEDURES	4	3	8.7410	0.1569	0.1996	168	18	8.5859	0.1569	0.2005	167	5	9.1766	0.1569	0.197	171
4	EXTRACRANIAL VASCULAR PROC	1	6	1.4043	0.1915	0.3745	9	1406	1.4043	0.1915	0.3745	9	1236	1.4043	0.1915	0.3745	9
4	EXTRACRANIAL VASCULAR PROC	2	89	2.0692	0.1976	0.291	22	116	2.0692	0.1976	0.291	22	0	2.0692	0.1976	0.291	22
4	EXTRACRANIAL VASCULAR PROC	3	70	2.5406	0.2084	0.2944	31	72	2.5406	0.2084	0.2944	31	0	2.5406	0.2084	0.2944	31
4	EXTRACRANIAL VASCULAR PROC	4	31	3.2134	0.2158	0.2921	43	50	3.2134	0.2158	0.2921	43	0	3.2134	0.2158	0.2921	43
5	VENTRICULAR SHUNT REVISION	1	282	1.1713	0.1256	0.3157	11	125	1.1713	0.1256	0.3157	11	17	1.1713	0.1256	0.3157	11
5	VENTRICULAR SHUNT REVISION	2	5	1.1799	0.1382	0.3163	11	5	1.1799	0.1382	0.3163	11	1	1.1799	0.1382	0.3163	11
5	VENTRICULAR SHUNT REVISION	3	2	4.9825	0.1304	0.1542	223	6	4.9825	0.1304	0.1542	223	2	4.9825	0.1304	0.1542	223
5	VENTRICULAR SHUNT REVISION	4	2	5.1272	0.1325	0.1587	223	4	5.1272	0.1325	0.1587	223	0	5.1272	0.1325	0.1587	223
6	CRPL TNL RLS&SPEC NRVS SYS PR	1	146	0.7491	0.1256	0.3803	7	1082	0.7491	0.1256	0.3803	7	220	0.7491	0.1256	0.3803	7
6	CRPL TNL RLS&SPEC NRVS SYS PR	2	5	1.2967	0.1296	0.2299	22	45	1.2967	0.1296	0.2299	22	9	1.2967	0.1296	0.2299	22

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*Assigning Resource Intensity Weights (RIW):* Using individual case cost data from Maryland, CIHI assigns an index number which represents relative resource use, called a resource intensity weight, to each CMG/Plx level. (CIHI now uses Ontario case costs to estimate RIW's.). Typical cases are assigned a weight on a per-case basis. The grand average RIW for all typical cases in the CIHI data set is 1.000, and all other cases are assigned a weight in accordance with their cost in terms of this number. An example of a typical CMG which is close to the average case is a cesarean delivery (CMG 604, no additional complications); such a case has an average stay of 4.3 days and an RIW of 0.983. CIHI also calculates weights for each group according to total resources per day (called CIHI PDW), routine and ancillary cost per day (called RA PDW in Table 12-1) and Blended Outlier cost per day (Blended Outlier PDW in Table 12-2). CIHI assigns weights to atypical cases (deaths, sign-outs, transfers to other hospitals, and long-stay outliers) on an individual case basis according to their lengths of stay.

**Table 12-2**

CM G	Description	Plx Level	Age 0 - 17			Age 18 - 69			Age 70 +		
			RIW	ELOS	Blended Outlier PDW	RIW	ELOS	Blended Outlier PDW	RIW	ELOS	Blended Outlier PDW
1	CRANIOTOMY PROCEDURES	1	2.2425	6.4	0.1048	2.3747	7.7	0.1048	2.4983	8.8	0.1048
1	CRANIOTOMY PROCEDURES	2	2.9889	10.3	0.1391	3.1763	11.5	0.1391	3.3515	12.7	0.1391
1	CRANIOTOMY PROCEDURES	3	4.1617	15.2	0.1568	4.3871	16.4	0.1568	4.5978	17.6	0.1568
1	CRANIOTOMY PROCEDURES	4	7.8458	29.1	0.1817	8.1248	30.3	0.1817	8.3856	31.5	0.1817

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The CIHI PDW is a measure of the total cost for all typical cases within a CMG/Age/Complexity group divided by all days of stay in that group. For Craniotomy CMG001, Plx level 1, age 18-69 this weight is 0.3096 and is an index of resources used in a day relative to the grand average per weight of all cases. The RA PDW is the average of Routine and Ancillary resource units, including nursing, diagnostic tests and rehabilitation, and excluding up-front fixed-costs of operating room and supplies. For the Craniotomy group this weight is shown in Table 12-1 as 0.1048. Finally the Blended Outlier PDW is a blend of the full cost of a typical day, the CIHI PDW, and the cost of a day for a very low severity case which represents an alternative level of care (ALC), or nursing home care. The Blended Outlier PDW was developed to capture the idea that outlier cases are often low severity cases and do not require the resources of a typical acute care patient. The amount of each type of case which goes into the blend will vary among CMGs. In Table 12-2 the blended PDW for Craniotomy Plx level 1 is 0.1048, the same as the RAPDW. This indicates that all the final days of a long-stay craniotomy are still acute care days, not alternative level of care (ALC) days.

*Inpatient cost.* Inpatient expenditures are derived from the CIHI Management Information System (MIS). MIS expenditures for health care facilities are reported to CIHI in the Annual Hospital Survey in accordance with a national chart of accounts found in the MIS guidelines (CIHI, 1999). The major functional and accounting centers (i.e., cost and revenue centers) included here are as follows:

- Administrative and support services
- Nursing inpatient / resident services which include:
  - Operating Room and Post-anesthetic Recovery Room
  - Long term nursing
- Ambulatory care services
- Diagnostic and therapeutic services
- Community and social services
- Research
- Education
- Accounting centers (e.g., revenue centers) and Undistributed expenses (all-other, including general depreciation).

Thus the MIS captures a broad array of services, including inpatient, outpatient, community services, businesses unrelated to health care, and so on. We narrowly confined our interest to inpatient care, exclusive of care in other settings such as long-term care, non-health care lines of business such as rental of office space to outsiders, and research and education activities. We based our selection of choice of expenditures on the following criteria:

- The expenditures should be associated with current operations.
- Expenditure categories where there are significant reporting disparities between hospitals should be excluded.
- Hospital expenditures only include those physician costs which are funded out of operating dollars. There is also wide reliance on fee-for service reimbursement for physician services in Canada, variations in physician expenditures will be great between hospitals. Expenditures for physician services should be excluded, and physician services should be valued with the use of provincial fee schedules.

Using the first criterion, we excluded expenditure categories such as termination benefits and pre-retirement leave costs. Using the second criterion, expenditures on amortization of buildings and building service equipment, and building loans, were excluded. Using the third criterion, expenditures on all physician services paid by the hospitals otherwise were excluded. The allocation process is summarized in the following table, Table 12-3. Following the application of these rules to MIS-reported costs, we were left with inpatient expenditures. This formula was applied to a sample of hospitals in all participating provinces. The composition of the sample is explained below.

**Table 12-3**  
**Allocations of MIS Costs**

List of accounts	MIS account	Cost Pool Disposition
Administration and support	71 1 **	Allocated to accounting, inpatient, ambulatory, diagnostic and therapeutic, long term care, medical service, community and social services, research, education and undistributed expenses.
Regional expenditures		Allocated to all "71" account groups.
Nursing inpatient / resident (except Operating Room, Post-anesthetic recovery room, and long term care)	71 2 ** (except 71 2 60, 71 2 65, and 71 2 95)	Allocated to inpatients.
Nursing inpatient / resident: Operating Room and post-anesthetic recovery room	71 2 60, 71 2 65	Allocated between inpatient and outpatient using inpatient: outpatient ratio of 3:1.
Long term care nursing units	71 2 95	Excluded after other allocations have been made.
Ambulatory care services	71 3 **	Allocated to ambulatory.
Diagnostic and therapeutic services	71 4 **	Allocated between inpatient and outpatient using either workload units, or service activity statistics, or attendance days (in order of preference).
Community and social services	71 5 **	Excluded after other allocations have been made.
Research	71 7 **	Excluded after other allocations have been made.
Education	71 8 **	Excluded after other allocations have been made.
Undistributed (revenue-earning or accounting centers)	71 9 **	Allocated to other centers.
Recoveries	12*	Excluded.
Amortization – equipment except building service	9 50 ** except 9 50 20, 9 50 40, and 9 50 60	Allocated to cost centers.
Undistributed amortization – grounds, buildings, and building service equipment	9 50 20 9 50 40 9 50 60	Excluded.
Interest on long term liabilities	9 55 **	Excluded.
Compensation – medical personnel	3 90 **	Excluded.
Termination benefits	3**85 **	Excluded.
Pre-retirement leave	3**39 **	Excluded.

*Provincial samples of hospitals.* Hospitals included in the sample are “those where there is deemed to be a “match” between the financial and hospital’s inpatient discharge data. As well, statistical outliers were removed. Coverage, in terms of beds, is reasonably high except in Saskatchewan and Prince Edward Island. Below we present the per cent of hospitals and beds which are covered in each provincial sample. Because of the low coverage in Saskatchewan, which excluded data from the two largest urban centres, we excluded this province from the inpatient list.

**Table 12-4**  
**Coverage in inpatient sample, by province**

Province	Hospitals in sample	Beds in sample	Per cent of all beds in sample
Newfoundland	20	1,804	70%
Prince Edward Island	Insufficient data	Insufficient data	Insufficient data
Nova Scotia	29	3,400	99%
New Brunswick	26	3,674	87%
Quebec	Data not available	Data not available	Data not available
Ontario	162	28,247	96%
Manitoba	67	4,444	90%
Saskatchewan	Insufficient Data	Insufficient Data	Insufficient Data
Alberta	87	9,313	75%
British Columbia	69	11,694	69%
Canada	561	90,596	76%

*Cost per weighted case.* A cost per weighted case for each province was estimated by dividing the total inpatient cost by the total weighted cases for all participating hospitals.

### 12.3 Estimates of cost

The cost for a typical weighted case is shown for each province in the following table.

**Table 12-5**  
**Cost per weighted case by province**

Province	Cost per weighted case
Newfoundland	\$3,062
Prince Edward Island	Insufficient data
Nova Scotia	\$2,783
New Brunswick	\$2,789
Quebec	Data not available
Ontario	\$2,755
Manitoba	\$2,301*
Saskatchewan	Insufficient data
Alberta	\$2,842
British Columbia	\$2,722
Canada	\$2,686

\* See user alert section pertaining to this statistic

## 12.4 How to use estimates

**Instructions and suggestions:** In order to use the CWC method you will need to purchase a copy of “DAD Resource Indicators for use with Complexity 1997” from CIHI (CIHI, Toronto, 1997). The steps required to assign a cost to each case are summarized in the following table. We provide a series of examples to allow the investigator to have some facility with the concepts.

*Case mix and RIW assignment.* Generally, the investigator will have to make a determination of the case mix group in which the patient is classified. The investigator will need diagnostic information, which can be obtained from the patient record, and access to a CIHI Case Mix Grouper. If the investigator does have this information, then he/she can run the data with a CIHI grouper, which will group each case, and assign a weight (RIW) in accordance with the CMG/Plx/age/disposition of the patient. If data cannot be run through an electronic grouper, the investigator will have to consult CIHI documents to assign cases to CMGs. The investigator will use the CWC in the chosen province, applying it to the RIW for the selected cases.

**Table 12-6**  
**Steps in the estimation of a cost per case**

Step 1 (optional upon having case records).	Patient’s record is coded by diagnosis and procedure using ICD9-CM codes.
Step 2	<ul style="list-style-type: none"> <li>• Option 1. If you have access to electronic case record and CMG grouper: Patient is assigned to CMG and complexity level using CIHI CMG/Plx grouper according to ICD-9-CM codes.</li> <li>• Option 2. If you know the clinical characteristics of a case, but do not have the case record: Patient is assigned to a CMG/Plx group by studying the list and choosing the CMG that the case is expected to fall within.</li> </ul>
Step 3	If you do not have electronic record: determine if patient is typical or atypical (death, sign-out, inter-hospital transfers and long-stay outliers).
Step 4	Use the resource intensity table to assign a weight to patient according to patient CMG/Plx, age, and disposition (typical or atypical).
Step 5	Calculate a cost for the case using the given CWC for each province and the assigned RIW from Step 4.

If the investigator does not have access to the patient’s record and to a CMG grouper, he/she can develop an approximation of the case assignment. In the examples that follow, we will assume that this second scenario is true. All examples are made with reference to Tables 12-1 and 12-2, which are pull-outs from the 1997 version of the CIHI document “DAD Resource Indicators”. We assume all patients are from Ontario.

In the first example, we estimate the full RIW of a typical patient using the RIW methodology.

<b>Example</b>	<b>Situation</b>	<b>Estimation of RIW</b>
Example 1	In a clinical trial, of a drug, a patient aged 65 had brain cancer. She was hospitalized and required a craniotomy. No serious co-morbidities were discovered which would increase the length of stay. She was released alive to home, with poor prognosis, 10 days after admission.	The patient had a craniotomy, which is listed as CMG001. With no serious co-morbidities, she is assigned to Plx level 1, age group 18-69. None of the dispositional conditions were present which would cause this case to be atypical. This includes the length of stay, which is lower than the trim point (24 days) which would result in the patient being classified as a long-stay outlier. The patient was therefore typical, and is assigned an RIW of 2.3747. The CWC in Ontario is \$2,755 so the estimated cost of the case is \$6,542 ( $\$2,755 \times 2.3747$ ).

In the second example, we estimate the RIW of a case which is a long stay outlier. The RIW is therefore evaluated on a per diem basis.

<b>Example</b>	<b>Situation</b>	<b>Estimation of RIW</b>
Example 2	The situation is similar to example 1, except the patient is hospitalized for 30 days.	The assignment to the CMG is the same as in example 1. However, this patient is not typical because the length of stay (30 days) is longer than the trim-point for the CMG/Plx/age category (24 days). Therefore the patient is a long stay outlier. Using the formula on page 14 of CIHI (1997), we base the RIW on the typical weight, the value of the Blended Outlier RIW for this case (0.1048), the actual length of stay, and the expected length of stay, ELOS (7.7 days). The values for Blended Outlier LOS and ELOS are found on Table 2, obtained from CIHI (1997). The RIW is therefore $2.3747 + .01048(30 - 7.7)$ or 4.7117. Therefore the cost is \$12,980 ( $\$2,755 \times 4.7117$ ).

In the third example, the patient is a death case; it is therefore atypical and is evaluated on a per diem basis.

<b>Example</b>	<b>Situation</b>	<b>Estimation of RIW</b>
Example 3	The example is similar to example 1 except the patient dies in the hospital.	The CMG/Plx/age assignment is the same (CMG 001/Plx1/age 18-69) except the patient is atypical. The formula to be used to evaluate the RIW is found on page 11 of CIHI (1997). The CIHI PDW is found in Table 1 and the Cost Curve Value <sub>LOS</sub> is found on page 57 of CIHI (1997). The RIW is $0.3096 \times 10 \text{days} \times 1.7939 = 5.5539$ . The cost of the case is \$15,300 ( $\$2,755 \times 5.5539$ ).

In the next example the patient is not operated on, and therefore is a medical case. The investigator must therefore find the appropriate medical CMG to fit with the diagnosis of brain cancer; we propose that this is CMG 10 (Neoplasms of the Nervous System).

Example	Situation	Estimation of RIW
Example 4	The diagnosis is the same as case 1, except that the patient is evaluated, found unfit for surgery, and discharged alive to home after 10 days in hospital.	The CMG assignment would be Neoplasm of the Nervous System (CMG 10), which is a medical group. The complexity level would be 1 and the age group is 18-69. According to Table 1 in CIHI (1997) (value not shown) a typical RIW would be 1.1519. The cost for the case would be \$3,173 (\$2,755 x 1.1519).

In the next example, the additional resources are extra days of care. We therefore need an estimate of the additional resources of the days of care. We have two possibilities from the per diem weights which are available from the CIHI (1997) document. The RA PDW provides an estimate of the resource requirements of an extra day of acute care (marginal resource requirements). The Blended Outlier PDW represents the value of the extra day of care for long stay outliers. It is made up of the blended resource use of RA PDW for the given case, and an estimated RA PDW for a very low severity case. In what follows, we will assume that the extra days of care are acute days, and therefore the additional resource requirements are reflected by the RA PDW.

Example	Situation	Estimation of RIW
Example 5	There are two arms of a trial. All cases have a craniotomy. Complexity is level 1 and age is 18-69. An early discharge intervention is introduced to one arm of the trial. The results of the trial are that in the intervention arm, length of stay is 7.4 days; in the control arm, the length of stay is 8.4 days.	The difference between interventions is 1 day. This is assumed to be an acute day, and so the resource requirement is approximated by RA PDW. The RIW for the extra day is found in Table 12-1 for CMG 001/Plx1/age 18-69. This value is 0.1048.

*Cost per RIW.* The cost per RIW is obtained by applying the CWC to the RIW. Let us use Ontario as an example, with a CWC of \$2,755. The cost for a case with an RIW of 2.3747 is \$6,542 (= \$2,755 x 2.3747).

**User alerts:** The investigator should know when to use the RIW method. When the research

protocol calls for detailed costs for each case, the RIW method is not appropriate. For example, if a new drug reduces the nursing requirements of a day of stay, then the investigator would be better off using micro-costing techniques to capture differences in cost per day between interventions. If the study calls for the costing of additional days of care, but each day is a standard day of care, then the RIW technique can be used with per diem weights. If the study calls for the costing of additional cases whose stays and per diem resource requirements are typical of resource use within that group in general, then cases can be costed using the per case RIW method.

The investigator should be cautioned against guessing CMG assignment and Plx levels. CMG titles are very general approximations, and complexity levels can vary from one another by a factor of 5. The investigator should therefore use CIHI documentation to ensure appropriate assignment of cases.

The investigator should be cautioned against comparing CWC data between provinces. This data is new, and in many ways it is preliminary. As one example, many facilities in Manitoba are not able to separate acute and chronic cases when reporting their patient abstracts. As a result, the CWC statistic may be undervalued relative to those of other provinces.

The investigator should be cautioned against comparing CWC data between provinces. This data is new, and is continually being revised. As one example, many facilities in Manitoba are not able to separate acute and chronic cases when reporting their patient abstracts. As a result, the CWC statistic may be undervalued relative to those of other provinces.

## ***12.5 Assessment of estimates***

### *12.5.1 Availability and comparability*

**Availability by province:** Estimates are available for all provinces except Saskatchewan and Quebec. Due to reporting anomalies, Saskatchewan's sample was not representative and was excluded.

**Uniformity of estimates across provinces:** There is a high degree of uniformity.

**Time available:** Estimates may take up to two years to produce.

### *12.5.2 Quality of data*

Item and comments	Rating
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<b>Measure of full costs</b>	1.0
<b>Detail in output measure</b>	1.0
<b>Basis of evidence</b>	1.0
<b>Sample selection</b>	1.0

## ***12.6 Other Comments***

Quebec maintains a case mix system which is based on the United States Diagnosis-Related Group (DRG) System Version 12. Weights were derived using Maryland data, and inpatient costs were based on Quebec financial data.

## **Contact information**

For information on obtaining documents from CIHI, contact their order desk at 613-241-7860.

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## 13.0 Acute inpatient care – case costing

### 13.1 Introduction

A number of hospitals across Canada have been conducting individual case costing projects for several years. These initiatives have been more formally organized into provincial case costing initiatives in Ontario and Alberta. At latest word, both initiatives have been incorporated into their respective health ministries. The purpose of these initiatives has been to standardize the data reporting functions, so that comparability is achieved between hospitals in each province. Case cost data can be linked with clinical data to provide estimates of the cost of inpatient stays for a variety of conditions. The data on individual costs is not publicly reported, but with reference it can be obtained from a variety of sources (see below).

### 13.2 Description

**Unit of measurement:** Individual case.

**Scope of service:** Individual hospitalization. Pre-admission testing and physician services are excluded.

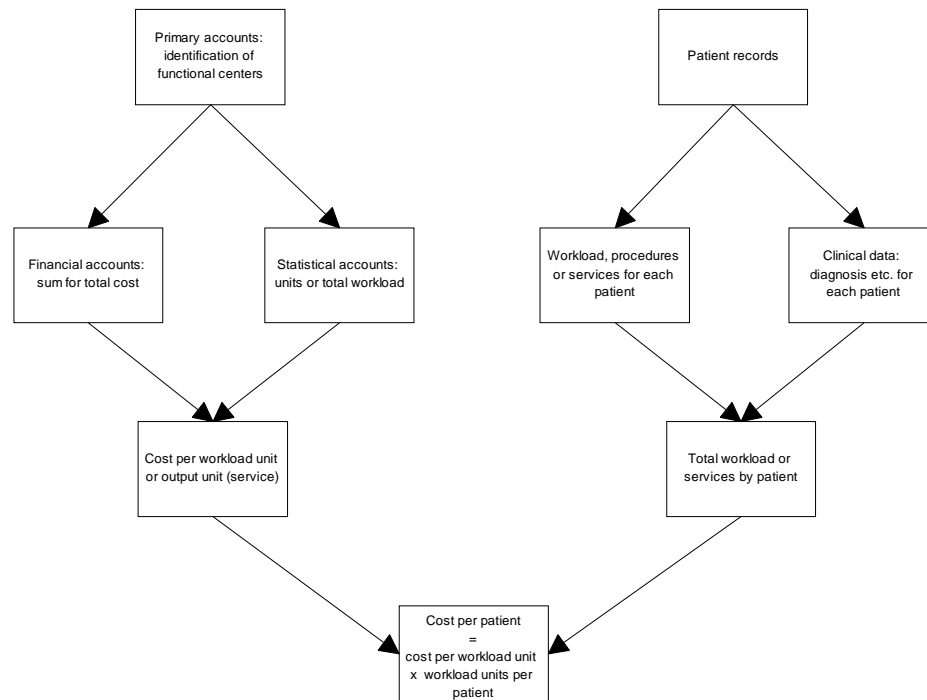
**Basis of estimates:** Cost.

**Resource items included (if cost base):** All resources.

**Unit prices of resources (if cost based):** Unit prices are the actual ones in the hospitals.

**Out of pocket payments:** N/A.

**Method of estimation:** Cost per case is calculated using the Management Information Systems (MIS) guidelines (Canadian Institute for Health Information, 1998). MIS is an accounting system which was originally designed in the 1970's to provide uniform costing and accounting standards for hospitals and other health care institutions across Canada. MIS has two key dimensions – a departmental dimension for functional (cost) center reporting and a service recipient dimension for patient-level reporting. There are two types of accounts in the departmental dimension: primary accounts which identify the type of activity and assign the activity to a functional (cost) center; and secondary accounts, in which the financial and statistical details of each economic event are recorded. The overall scheme of both dimensions is shown in the accompanying diagram.



Costs are reported to either transient or absorbing cost centers. Transient cost centers are those centers where overhead (administration and support) functions occur. Costs in transient centers are allocated to absorbing centers, which are centers where direct, patient-related activities (such as nursing care, surgery, laboratory and radiology testing) occur.

In each absorbing cost center, patient-related activities are assigned workload units, which reflect the number of minutes of direct patient-related activity time spent on the patient's diagnosis or treatment. Workload systems are better developed and more uniform for diagnostic services than for therapeutic activities. Total patient-related workload units are summed for each absorbing cost center.

Overall, the hospital estimates a cost per workload unit for each unit-producing department.

Individual patient data which is collected for each inpatient includes: patient characteristics; clinical variables (ICD-9-CM diagnoses and procedures); and either workload units or intermediate products received (days of nursing care by level of care, laboratory tests, etc.) These services or workload units can be assigned a cost from the data collected for each unit-producing or absorbing center. In addition, costs for drugs and supplies greater than \$250 are directly traced to each patient. The costs for each patient can be summed in total, or else they can be presented according to major functions (nursing, radiology, pharmacy, etc.).

### ***13.3 Estimates***

Data on individual case costs is available upon special requests from individual hospitals and from the Ontario Case Costing Project (1999). Data can usually be obtained by ICD-9-CM diagnosis and procedure codes for individual patients, for a number of cost centers, including nursing, laboratory, radiology, and pharmacy. Patients can also usually be categorized by Case Mix Group. Information on who to contact is provided below. Note that the situation with regard to data availability by hospital changes frequently.

### ***13.4 How to use the cost list***

**Instructions and suggestions:** Data users can request (anonymous) data for patients who have specific diagnoses or procedures, as identified by ICD-9-CM. They can also request data by Case Mix Group, each of which will contain a number of different diagnoses and/or procedures. Requests should be made to hospitals or agencies identified below.

**Use alerts:** Estimating procedures may vary between hospitals. However, costs for specific procedures will generally not be available.

### ***13.5 Assessment of the estimates***

#### *13.5.1 Availability and comparability*

**Availability by province:** Availability is limited to a few hospitals.

**Uniformity of estimates across provinces.** Uniformity is not verified.

**Time available:** Not established.

#### *13.5.2 Quality of data*

There was no basis to make assessments.

## **For additional information**

Individual hospitals will often provide data which will meet a data user's desired specifications. These hospitals should be contacted directly. A list of hospitals that collect case data can be found on the Ontario Case Costing website: [http://occp.com/hospitals/hosp\\_profiles.htm](http://occp.com/hospitals/hosp_profiles.htm). A useful contact is Randy Welch, London HSC ([Randy.Welch@LHSC.on.ca](mailto:Randy.Welch@LHSC.on.ca)).

St. Boniface Hospital in Winnipeg also collects case cost data. Contact April Hughes ([ahughes@sbgh.mb.ca](mailto:ahughes@sbgh.mb.ca)). Other hospitals may also collect such data, and the situation as to who has data and is willing to make it available changes regularly.

## ***References***

Provincial costing project. Final report. Edmonton: Alberta Health, February 1998.

Canadian Institute for Health Information. Introduction to the MIS guidelines. Ottawa: Canadian Institute for Health Information, 1999.

Ontario Case costing Project. Ontario guide to case costing. Version 2.0. Toronto: Ontario Hospital Association and Ontario Ministry of Health, Ontario Case Costing Project, Joint Policy and Planning Committee, September, 1999.

## 14.0 Acute inpatient care – intensive care

### 14.1 Introduction

Because of the high maintenance costs of monitoring and drug costs, intensive care has drawn a good deal of attention. Most estimates of hospital costs are blended, and do not separate the costs of the intensive care unit (ICU) from ward and intermediate care days. A few estimates of intensive care costs have been made, and one study has examined the ratio of ICU to ward care daily costs. Investigators who are studying inpatient populations who receive some of their care in the ICU may want to estimate the cost of ICU days separately from ward days. The following studies may give them some suggestions on how to go about doing this.

### 14.2 Description

**Unit of measurement:** ICU day.

**Scope of service:** Services received in ICU. Noseworthy et al. (1996) include a physician component. Norris et al. (1995) include total stay, including non-ICU costs, but exclude operating room costs.

**Basis of estimate.** Costs.

**Resource items included (if cost-based estimate):** See table below.

**Unit prices of resources (if cost-based estimate):** Actual prices paid by study hospitals.

**Out of pocket component:** N/A.

**Methods of Data Estimation:** See studies.

**Time available:** One-time studies.

### 14.3 Estimates of cost

Study	Cost per ICU day	Cost per ward day	Ratio of cost of ICU to ward day	Resources included in study
Norris et al., 1995	\$1,572	\$289	5.43:1	Direct ICU costs, laboratory, diagnostic, imaging, and rehabilitation. Excludes drugs. No general overhead.
Noseworthy et al., 1996	Hospital component: \$1,363 Physician fees: \$145 Total: \$1,508	N/A	N/A	All direct costs including drugs, diagnostic imaging, laboratory, etc. No general hospital overhead. Physician fees included.

### 14.4 How to use the cost list

The investigator will usually only have the following information: overall cost per day (for ICU and ward days combined), the number of ICU days, and the number of ward days. He/she may want to estimate the cost of an ICU day. He/she can do this with two relationships. The first relationship specifies that an ICU day costs 5.43 times that of a ward day. This is based on the literature (Norris et al. 1995). The second relationship is an expression of the blended cost per day, as follows:

$$\begin{aligned} \text{Blended cost per day} = & \text{Per cent of total days that are ICU days} \\ & \text{X ICU cost per day} \\ & + \text{Per cent of total days which are ward days} \\ & \text{X Ward cost per day} \end{aligned}$$

If the average cost per day (blended, ward and ICU) is \$500, and if 4 per cent of all days are ICU days (and therefore 96 per cent of days are ward days), then the equation can be expressed as follows:

$$\$500 = 4\% * 5.43CWD + 96\% * CWD$$

where CWD is the cost of a ward day. Then CDW is \$424, and the cost of an ICU day is 5.43\*\$424 or \$2,302

If a patient is in the hospital for 6 days, 2 of them in the ICU, then the cost for the entire stay would be \$6,300 (\$2,302\*2 + \$424\*4).

**User alerts:** Data is five years old. Costs can vary considerably from one hospital to another.

## 14.5 Assessment of the estimates

### 14.5.1 Availability and comparability

**Availability by province:** Data is only available for provinces where individual studies have been done.

**Uniformity of estimates across provinces:** There is no uniformity.

**Time available:** These are only one-time studies.

### 14.5.2 Quality of data

Item and comments	Rating
Measure of full cost	1.0
Detail in output measure	0.5
Basis of evidence	1.0
Sample selection Data obtained from one teaching hospital	0

## References

Norris C, Jacobs P, Rapoport J, Hamilton S. ICU and non-ICU cost per day. Canadian Journal of Anaesthesia 1995; 42(3):192-6.

Noseworthy TW, Konopad E, Shustack A, Johnston R, Grace M. Cost accounting of adult intensive care: methods and human and capital inputs. Critical Care Medicine 1996; 24(7):1168-72.

## 15.0 Ambulatory care visits

### 15.1 Introduction

Alberta conducted a pilot project in which ambulatory care visits were grouped and costed. This data is a possible source of estimates for ambulatory visits.

### 15.2 Description

**Unit of measurement:** The unit of observation is the ambulatory care visit. The specific site of the visit (emergency room, day surgery and recovery room, clinic) is not identified. A grouper with 428 categories, called the Ambulatory care classification system (ACCS) was developed (Alberta Health, 1999a) which classifies ambulatory visits into two major groups: those with interventions and those without.

**Scope of service:** Patient visit, including related services while the patient is receiving care (e.g., drugs, lab tests, x-rays).

**Basis of estimate:** Costs.

**Resource items included (if cost based estimate):** Overhead, direct labor and supplies, drugs, ancillary services such as laboratory tests and diagnostic radiology. Physician services for salaried physicians are included.

**Unit prices of resources (if cost based estimate):** Actual prices paid by study hospitals.

**Out of pocket component:** N/A.

**Methods of Data Estimation:** Average costing according to Canadian MIS Workload Measurement System.

**Time available:** 1997/8 data were released in mid-1999.

### 15.3 Estimates of cost

See Alberta Health, 1999b, Schedule 6.

### 15.4 How to use the cost list

The investigator should determine whether the visit included a procedure. Once this is determined, he/she will have to identify the appropriate procedure in the code book, based on ICD9-CM codes, or diagnostic category. Assignment of a case to a group is done using ICD9-CM codes (the look-up

tables which relate the ICD9-CM code to the specific ACCS category are found in Alberta Health, 1999a). For example, a hysteroscopy is assigned ICD9-CM code 6812. This code is found in ACCS group 40, Endo and Gynecological Interventions (Alberta Health, 1999a). The associated cost for this item is found in Alberta Health (1999) Schedule 6. It is \$475. Costs for medical cases can be similarly identified.

**User alerts:** Physician fees must be added to each visit. Classification is not provided by treatment site, e.g. emergency rooms. Cost allocations for nursing, lab and radiology are first approximations.

## 15.5 Assessment of the estimates

### 15.5.1 Availability and comparability

**Availability by province:** Data is only available for Alberta at present.

**Uniformity of estimates across provinces:** Not applicable.

**Time available:** Data is about 18 months old. For such studies, this is quite reasonable.

### 15.5.2 Quality of data

Item and comments	Rating
<b>Measure of full cost</b> There is insufficient information about the cost measure	Unknown
<b>Detail in output measure</b> The ambulatory care grouper has not been validated	0.5
<b>Basis of evidence</b>	1.0
<b>Sample selection</b> The sample seems quite representative	1.0

## ***References***

Alberta Health. Ambulatory care classification project documentation. Volume II: Alberta ambulatory care minimum data set. Edmonton: Alberta Health, April, 1999a.

Alberta Health. Provincial costing project. Final report. Edmonton: Alberta Health, 1997.

Alberta Health and Wellness. Health costing in Alberta. 1999 Annual Report. Edmonton: Alberta Health and Wellness, 1999b, Schedule 6.

## 16.0 Day Procedures

### 16.1 Introduction

Similar in approach to inpatient case mix costing, the costing of day procedures also involves using the cost per weighted case statistic.

### 16.2 Description

**Units of output:** Day procedures, classified according to CIHI's Day Procedure Groups (DPG).

**Scope of service:** The entire procedure, from admission to discharge as a same-day patient. Pre-admission work-ups are excluded, as are physician services.

**Basis of estimate:** Procedures are costed indirectly, using a weighted-case method.

**Resource items included:** All hospital resources found in the cost per weighted case.

**Out of pocket component:** None.

**Method of estimation:** CIHI has assigned a weight to each DPG using relative weights from Maryland data. These weights are calibrated to the inpatient RIWs so that the cost per weighted case approach can be used with DPGs.

*Grouping cases.* CIHI assigns a DPG according to the surgical procedure performed. DPGs are shown in Appendix E of the CIHI (1997) document. The first DPG (Number 001) is for nerve and other procedures.

*Assigning Resource Intensity Weights.* CIHI assigns a weight to each DPG. This RIW represents the relative resource use of each procedure. For example, for nerve and other procedures the DPG RIW is 0.2500. This is a relative value, with 1.0000 being the relative weight of a typical inpatient case.

### 16.3 Estimates of cost

The cost for a typical inpatient weighted case is shown for each province in the table in section 12, (acute inpatient care, subsection 1.3). These costs are multiplied by the weighted value of each DPG.

### 16.4 How to use the estimates

**Instructions and suggestions:** In order to use the CWC method you will need a copy of "DAD Resource Indicators for use with Complexity 1997" (CIHI, Toronto, 1997). The steps required to assign a cost to each procedure are summarized in the following table.

*Procedure group and RIW assignment.* The investigator will have to determine the procedure group to which the day patient belongs. The investigator will use a cost per weighted case (CWC) in the chosen province, applying it to the DPG RIW for the selected procedures. This will yield a cost for each of the desired procedures.

**Table**  
**Steps in the estimation of a day procedure**

Step 1 (optional upon having records)	Patient's procedure is coded.
Step 2	The patient's DPG is assigned in accordance with the procedure.
Step 3	Assign a weight to the procedure according to the DPG RIW (Appendix E of CIHI (1997)).
Step 4	Assign a cost to the weighted case using the given CWC for each province and the assigned DPG RIW from step 3.

*Cost per RIW.* The cost per RIW is obtained by applying the CWC to the DPG RIW.

**Example:**

An Ontario patient has a procedure which is classified under the sinus procedures day procedure group.

**Estimation of RIW:** The patient's surgery is classified under the sinus procedures category of day procedures, which is listed as DPG 011. It is therefore assigned an RIW of 0.3796 (Appendix E).

*Cost per RIW.* The cost per RIW is obtained by applying the CWC to the RIW. Using Ontario as an example, with a CWC of \$2,755, the cost in the example case is \$1,046 ( $=\$2,755 \times 0.3796$ ).

**User alerts:** Physician fees are not included, and need to be added for the full cost of the procedure.

## ***16.5 Assessment of the estimates***

### *16.5.1 Availability and comparability*

**Availability by province:** Data is available for 8 provinces, the same for which inpatient case mix costs are available.

**Uniformity of estimates across provinces:** Estimates were uniform.

**Time available:** Several years.

16.5.2 *Quality of data*

<b>Item and comments</b>	<b>Rating</b>
<b>Measure of full cost</b> Measure only indirectly measures outpatient cost	0.5
<b>Detail in output measure</b>	1.0
<b>Basis of evidence</b> Generalizability to Canada not known	0.5
<b>Sample selection</b>	1.0

***References***

Canadian Institute for Health Information. DAD Resource Indicators for use with ComPlexity 1997. Ottawa:  
Canadian Institute for Health Information, 1997.

## 17.0 Radiation oncology

### 17.1 Introduction

A radiation oncology treatment involves an initial patient assessment, treatment planning by medical and technical staff, and radiation treatment. Two recent costing studies can be used as a basis for estimates.

### 17.2 Description

**Unit of measurement:** Costs are provided on the basis of old Statistics Canada Radiation Oncology Workload Units (Health and Welfare Canada, 1988).

**Scope of services costed:** Activities included are pre-treatment assessment, treatment planning and radiation therapy. Physician billings are included in Ontario estimate; excluded in British Columbia estimate.

**Basis of estimate:** Direct costs.

**Resource items included:** See tables.

**Unit prices of resources:** Actual prices were used in both studies.

**Out of pocket component:** None.

**Methods of Data Estimation:** See references.

**Time available:** One-time studies.

### 17.3 Estimates of cost

Estimates are presented in the following table:

	Resources included	Assessment costs	Treatment planning	Treatment
Ontario (Earle et al.,1999)	Direct labor (including physician billings), direct materials, depreciation of equipment and general facility overhead	Not provided	Included in treatment cost	\$8.91 per workload unit
British Columbia (Coy et al., 1994)	Direct labor (excluding physician billing), direct materials, annualized cost of equipment and general facility overhead	\$456 per patient	\$6.59 per planning workload unit	Cobalt therapy: \$6.96 per workload unit LINAC: \$7.10 per workload unit

### 17.4 How to use the estimates

You will need a copy of the Statistics Canada Workload Measurement System (Statistics Canada, 1989) for radiation oncology. This data will provide planning workload units based on the number of fields, the presence or not of an overall plan, and shielding. Treatment workload units will depend on the number of fields.

**User alerts:** Expensive equipment has high fixed costs which will be sensitive to patient volume. The 1989 Workload Measurement System is no longer in use. It has been superceded by the new MIS workload system (CIHI 1998), but so far no estimates of cost per weighted unit have been developed.

### 17.5 Assessment of the estimates

#### 17.5.1 Availability and comparability

**Availability by province:** Data only available in two provinces.

**Uniformity of estimates across provinces:** No uniformity.

**Time available:** Only one-time studies.

### 17.5.2 Quality of data

<b>Item and comments</b>	<b>Rating</b>
<b>Appropriate cost measure</b>	1.0
<b>Detail in output measure</b> Workload units were used.	1.0
<b>Basis of evidence</b>	1.0
<b>Sample selection</b>	0

### ***References***

Coy P, Schaafsma J, Schofield JA, Nield JA. Comparative costs of lung cancer management. *Clinical Investigative Medicine* 1994; 17(6):577-87.

Earle C, Coyle D, Smith A, Agboola O, Evans WK. The cost of radiotherapy at an Ontario regional cancer centre: a re-evaluation. *Critical Reviews in Oncology/hematology* 1999; 32(2): 87-93.

Canadian Institute for Health Information. *MIS Guidelines* 1999. [Monograph on CD]. [Ottawa: CIHI] 1998.

Health and Welfare Canada. *National Hospital Productivity Improvement Program. Radiation therapy workload measurement system.* 1988-9 edition. Canada: Ministry of Supply and Services, July 1988.

## 18.0 Ground ambulance

### 18.1 Introduction

Ground ambulance services are either organized or provided by the province. There is almost always a charge for these services, which are not “medically necessary” according to the Canada Health Act. This charge is usually not equal to the cost. In the following section we review the availability of information on ground ambulance services.

### 18.2 Description

**Unit of measurement:** Ambulance rides are usually costed on a “per call” basis; sometimes the cost is adjusted for the distance traveled.

**Scope of service:** Not usually specified, but would include all services associated with the call.

**Basis of estimate:** Services are valued on a cost basis. User fees usually do not reflect cost in this area.

**Resource items included:** Costs include salaries and benefits of ambulance personnel, ambulance supplies, equipment, transport, and communications.

**Out of pocket component:** Most provinces charge the patient directly. The entire fee is usually self-pay.

**Methods of Data Estimation:** Usually, this information has not been provided, and is sometimes anecdotal.

**Time of availability:** Costs were provided for recent operations, but no specific dates were provided.

### 18.3 Estimates of cost

In the following table we present data on the cost of ground ambulance services and on the out of pocket charge that is made by the ambulance operator to the clients. The fees almost never represent the full cost of the services. They are presented here as they may provide a compendium of this information.

Province	Approximate Total Cost of Ambulance Trip	Ambulance fee charged to client	Data Source
Newfoundland	Not available		Newfoundland and Labrador Department of Health and Community Services, Emergency Health Division
Nova Scotia	\$513 (\$5700-air ambulance)	\$155-175	Emergency Health Services Nova Scotia, Department of Health
Prince Edward Island	\$450	\$130	PEI ground ambulance user fees from PEI Department of Health (2000)
New Brunswick	\$400	\$275	New Brunswick Department of Health and Community Services Website: <a href="http://www.gov.nb.ca/hcs-ssc/english/publications/budgets/97-98/ambu.htm">www.gov.nb.ca/hcs-ssc/english/publications/budgets/97-98/ambu.htm</a>
Quebec	Not available	Rate for all calls involving transport: basic rate of \$125 plus \$1.75 per kilometer.	Corporation des services d'ambulance du Quebec (2000).
Ontario	\$240	Direct fee for medically necessary cases: \$45 per call	Ontario Ministry of Health and Long Term Care, web site: <a href="http://www.gov.on.ca/health/english/program/ambul/chsfaq_dt.html">http://www.gov.on.ca/health/english/program/ambul/chsfaq_dt.html</a> . Date is for 2000
Manitoba	\$312.50 (same for air ambulance)	User pay = \$312.50	Manitoba Health , Emergency Services Branch
Saskatchewan	Not available	Regina: basic rate \$95 per call. Per kilometer charge of \$0.95. Saskatoon: Basic rate of \$102.50. Per kilometer charge of \$0.87.	Saskatchewan Health Acute and Emergency Services for 12/31/1997. Regina rates are the modal values for providers; Saskatoon rates are the mean values.
Alberta	\$450-500 per call (\$3000 average for air ambulance)	\$2.20 per distance (km) traveled	Alberta Health and Wellness
British Columbia	\$396 per call (\$2400 per hour for air ambulance)	Residents: Basic rate per call of \$54 for first 40 kms. + \$0.50 per additional km. Up to \$274 (ground or air)	British Columbia Ministry of Health. Emergency Health Services Commission. Web site: <a href="http://www.hlth.gov.bc.ca/bcas/bcasfes.html">http://www.hlth.gov.bc.ca/bcas/bcasfes.html</a>

#### ***18.4 How to use the estimates***

Use the basic cost as the cost for an ambulance ride. The modal range is \$400 - \$500 per call.

**User alerts:** The quality of data has not been verified.

#### ***18.5 Assessment of the estimates***

##### *18.5.1 Availability and comparability*

**Availability by province:** Some data is available for most provinces.

**Uniformity of estimates across provinces:** There is no uniformity.

**Time available:** Data is not available on time of estimates.

18.5.2 *Quality of data*

<b>Item</b>	<b>Rating</b>
<b>Measure of full cost</b> With few exceptions, details on components of cost are not available.	Not determined
<b>Detail in output measure</b> Ambulance rides differ considerably and a simple ride does not seem adequate.	0
<b>Basis of evidence</b> Data is largely anecdotal and has not been verified.	0
<b>Sample selection:</b> Samples are usually unknown.	Not known

***References***

See table.

## 19.0 Pharmaceuticals - Prescription drugs on the provincial formulary

### 19.1 Introduction

Each province maintains a drug formulary, which is a list of drugs that are covered by the provincial drug plan. The plan sets a price for each product for reimbursing the pharmacy. Not all available drugs are listed on the formulary, so other sources of data may have to be used, if it is not listed (see section 20 “Pharmaceuticals – full retail prices” in this document).

### 19.2 Description

**Unit of measurement:** One dose unit, for example, one tablet.

**Scope of service:** The quoted price is the price of the drug. Pharmacists’ professional services and professional services for intravenous doses are not included. These have to be estimated separately. See the appropriate sections (21 and 22) of this manual for information on how to obtain costs for these additional services.

**Basis of estimate:** These are quoted prices which are paid to the pharmacies.

**Resource items included (if estimate is cost-based):** N/A.

**Unit price of resources (if estimate is cost based):** N/A.

**Out of pocket component:** Most provinces have out-of-pocket components. However, the prices quoted in the formulary represent the full price received by the pharmacy.

**Method of data estimation:** N/A.

**Time available:** Formulary lists contain prices that are current through negotiation with suppliers.

### 19.3 Estimates of cost

Drug costs per dose are provided in the provincial formulary for each province. These are fixed prices paid to the pharmacies by the provinces. References to the formulary for each province are provided below. The prices quoted are for a specific quantity / dose of the drug. An example and specific references are provided below.

## 19.4 How to use estimates

**Instructions and suggestions:** In order to obtain the price of listed drugs you need to obtain a copy of the provincial formulary (see references below). In our example, we will assume that a prescription has been filled for a sympathomimetic (adrenergic) agent, which is an inhaler used for asthma. The trade name of the agent is “Novo-Salmol.” (there are several brands on the market). This particular agent is dispensed in a 100 micro-grams / dose inhaler aerosol package. The Health Canada Drug Identification Number (DIN), which should help to locate the drug on the formulary is 00874086; there is a unique number for each formulation of each drug. Each package of Novo-Salmol provides 200 doses. The price in each province is shown below:

Province	Data sources	Price
Newfoundland	Data not obtained	
Prince Edward Island	Data not obtained	
Nova Scotia	Nova Scotia Formulary 1999, Appendix 4. You have to call the provincial drug plan for the price.	Quoted price is \$0.0239 per dose (\$4.78 for the entire package of 200 doses).
New Brunswick	New Brunswick Therapeutic Drug Formulary and Interchangeable Products List, 1999, page 25.	Quoted price is \$0.0233 per dose (\$4.66 for package of 200 doses).
Quebec	Regie de L'assurance maladie, Medical Specialists' Manual, 1999, page 49.	Quoted price is for 200 doses, the entire package, \$4.65.
Ontario	Ontario Drug Benefit Formulary, Comparative Drug Index, #36, 1999, page 90.	Quoted price is for 200 doses, the entire package, \$4.65
Manitoba	Manitoba Drug Benefits and Interchangeability Formulary, 1999, page 61.	Price quoted in cents per dose (2.97) (which is \$5.94 for the 200 dose package).
Saskatchewan	Saskatchewan Health Formulary Drug Plan, 1998, page 31.	Quoted price is for 200 doses, the entire package, \$5.05.
Alberta	Alberta Health Drug Benefit List, 1999	Quoted price is \$0.0232 per dose (\$4.64 for package of 200 doses).
British Columbia	British Columbia Pharmacare Drug Price File, 2000.	Quoted price is \$0.0245 per dose (\$4.90 for package of 200 doses).

**User alerts:** These data do not contain the pharmacist dispensing fee. In some instances, as when a drug is taken intravenously, there may be considerable resources required. These are dealt with in other sections.

## 19.5 Assessment of the estimates

### 19.5.1 Availability and comparability

**Availability by province:** Data is available for all provinces.

**Uniformity of estimates across provinces:** Drug definitions are the same for all provinces. However, what is listed on the provincial formulary may vary between provinces.

**Time available:** Data is current.

### 19.5.2 Quality of data

Item and comments	Rating
Measure of full cost	1.0
Detail in output measure	1.0
Basis of evidence	1.0
Sample selection	1.0

## References

[Alberta Health]. Alberta Health Drug Benefit List. 1999.

[British Columbia Pharmacare]. Downloadable Manufacturers Drug Price File, 2000. Website:  
<http://www.hlth.gov.bc.ca/pharme/outgoing/index.html>

[Government of Manitoba]. Manitoba Drug Benefits and Interchangeability Formulary-Fourteenth edition. 1999.

[Government of New Brunswick]. New Brunswick Therapeutic Drug Formulary and Interchangeable products list.  
[Moncton, New Brunswick]: New Brunswick Health and Community Services. 1998.

[Nova Scotia Department of Health]. Nova Scotia Formulary. [Halifax, Nova Scotia] 1999.

[Ontario Ministry of Health]. Ontario Drug Benefit Formulary / Comparative Drug Index. No. 36. Toronto, Ontario Ministry of Health, Update B, 1999. Website: [http://www.gov.on.ca/health/english/program/drugs/drugs\\_mn.html](http://www.gov.on.ca/health/english/program/drugs/drugs_mn.html).

[Regie de l'assurance maladie]. Medical Specialists' Manual. [Quebec, Quebec], 1999.

[Saskatchewan Department of Health]. Saskatchewan Health Formulary Drug Plan, Forty-Seventh Edition.  
[Regina, Saskatchewan]: Saskatchewan Health. 1998.

## **20.0 Prescription drugs (including drugs not listed on provincial formularies) – full retail price**

### ***20.1 Introduction***

Not all prescription drugs are listed on the provincial formularies. Some prescription drugs did not get approval through the formulary selection process. Others are waiting for a decision. However, these drugs are still sold on the open market, and some might be listed on private formularies. In addition, the retail price of a drug may not equal the price which is set by the provincial government for those drugs which are listed on the formulary. For these reasons, it is desirable to obtain drug prices at retail for all prescription drugs which are dispensed. A large pharmaceutical information firm, IMS HEALTH Canada, collects data on all drugs sold in a sample of pharmacies. The sample includes sales in all regions of the country. This data is proprietary. It can be used in economic analyses, and is included in this cost list.

### ***20.2 Description***

**Unit of measurement:** Cost is expressed on a per unit dose basis, for each drug and formulation.

**Scope of service:** Estimate includes the drug and any professional services provided by the pharmacy, i.e., pharmacist professional fee and mark-ups are included.

**Basis of estimate:** Actual prices paid.

**Resource items included (if cost-based estimate):** N/A.

**Unit price of resources (if cost-based estimate):** N/A.

**Out of pocket component:** There are often out of pocket components, but the price is inclusive of all payments.

**Method of estimation and data:** The dispensed prescription prices of the retail pharmacy were derived from IMS's CompuScript database. This audit estimates the number, value, average size and average cost of prescriptions which are dispensed through retail pharmacies both nationally and by province. The sample is representative of the universe of retail pharmacies and is stratified by province, store size, and store type. The data are collected electronically on a weekly or monthly basis from the sample stores. After quality checks, projection factors derived from the sample to universe ratio are applied to each cell to estimate the values for each province.

**Time available:** Estimates are current.

### ***20.3 Estimates of cost***

See the diskette “IMS data” available from the Institute of Health Economics. A sample output appears in the Table 20-4. The columns in this appendix contain the following information:

Product:	Name given by the manufacturer
Launch date:	The month and year in which the data was first observed by IMS after launch. This usually corresponds with the actual launch month and year
Manufacturer:	Name of manufacturer
Therapeutic class:	Code and description of the finest level of classification of products by the IMS system, based on therapeutic effect
Format:	Code and description of each formulation of the product
Strength:	Description of each strength for each product
Unit description:	The measure used in the standard cost
Unit price:	The national average cost, as dispensed, per individual unit for that product formulation and strength, for Canada and for each province, except Newfoundland and Prince Edward Island which are combined

### ***20.4 How to use estimates***

**Instructions and suggestions:** The database, with the 1,000 most commonly used prescription drugs in Canada is contained in the accompanying disk in PC EXCEL format. The Excel spreadsheet in the IMS Date file contains filters manifested by a small down arrow in each column heading. Let us say we want the full retail price in Manitoba for Novo-Salmol, 100 mcg inhaler, which contains 200 doses. This example is shown in Table 20-4. Records may be extracted as follows:

1. Select a primary column for filtering, say “Therapeutic Class.” In this case we would select “Bronchodialators”.
2. Click on the small arrow in the column heading to bring down a selection box. Either scroll through the selection until you find your choice and click on this, or use the “custom” selection and type in the class that you require.
3. This selection may then be printed on legal size paper or cut and pasted into another file if further selections need to be made.
4. The selection may be further refined by filtering on a second column, e.g., if an aerosol is selected. The secondary selection would be by “format”, choosing the aerosol. We would

then select Novo-Salmol which comes in a 100 mcg package. The package contains 200 doses, and the price, inclusive of the pharmacy fee, is \$0.08 per dose (i.e. about \$16 per package).

**User alerts:** Products were tracked by the Canadian Drug Identification Number (DIN). If two products have the same DIN the ability to report the products separately is lost. In some instances, the average price and average size of a prescription for pre-packaged goods may be inaccurate since there is no national standard of consistency in the manner in which the pharmacist enters the size of the prescription, e.g., an ointment may be entered as 1 tube or 15 gm.

## 20.5 Assessment of the estimates

### 20.5.1 Availability and comparability

**Availability by province:** Data is available for all provinces, although Newfoundland and Prince Edward Island data is presented jointly.

**Uniformity of estimates across provinces:** There is a high degree of uniformity.

**Time available:** There is a short time lag between sales and data availability.

### 20.5.2 Quality of data

Item and comments	Rating
Measure of full cost	1.0
Detail in output measure	1.0
Basis of evidence	1.0
Sample selection	1.0

## For further information

Contact Brian Carter, IMS, 720 Carter Crest Way, Edmonton, Alberta, T6R 2N3. Tel. 780-414-6645. Internet address: Bcarter@ca.imshealth.com.

## References

IMS. IMS academic reference manual. 1997 edition. Pointe-Claire, Quebec: IMS, 1997.

**Table 20.4**  
**Data elements in the IMS database**

<b>Product</b>	<b>Launch Date</b>	<b>MNF.</b>	<b>Therapeutic Class</b>	<b>Format</b>	<b>Strength</b>	<b>Unit Description</b>	<b>Canada Unit Price \$</b>	<b>British Columbia Unit Price \$</b>	<b>Manitoba Unit Price \$</b>
<b>NOVO-SALMOL</b>	<b>Oct-84</b>	<b>NVP</b>	<b>28120 Bronchodilators, General</b>	<b>HHA Inhalants, Pressurised, Aerosol</b>	<b>100MCG</b>	<b>DOSE</b>	<b>0.07</b>	<b>0.05</b>	<b>0.08</b>
<b>NOVO-SALMOL</b>	<b>Oct-84</b>	<b>NVP</b>	<b>28120 Bronchodilators, General</b>	<b>OSR Orals, Soluble, Tab/Cap Regular</b>	<b>2MG</b>	<b>TAB</b>	<b>0.16</b>	<b>0.15</b>	<b>0.15</b>
<b>NOVO-SALMOL</b>	<b>Oct-84</b>	<b>NVP</b>	<b>28120 Bronchodilators, General</b>	<b>OSR Orals, Soluble, Tab/Cap Regular</b>	<b>4MG</b>	<b>TAB</b>	<b>0.20</b>	<b>0.20</b>	<b>0.22</b>

## 21.0 Pharmaceuticals – professional fees and mark-ups

### 21.1 Introduction

In addition to the cost of medication, each prescription has a preparation evaluation and distribution component. The costs for these are summarized in this section. Below are the fees for the provincial drug plans. They are similar to those for private purchases of pharmaceuticals in some provinces, but higher in other provinces, such as Ontario.

### 21.2 Description

**Unit of measurement:** There is a separate fee for each prescription.

**Scope of service:** Pharmacist preparation evaluation and distribution.

**Basis of estimate:** Negotiated fee.

**Resource items included:** All pharmacist resources are included in the fee.

**Out of pocket component:** Government pays fees as part of the total prescription price in most public programs (except British Columbia). Consumers (or private insurers) cover fees for individuals who are not covered by drug plans.

**Methods of data estimation:** Not applicable.

**Time of estimate:** fiscal year ending 99/03/31.

### 21.3 Estimates of cost

	<b>Pharmacist reimbursement for a regular prescription (\$)</b>	<b>Mark Up</b>	<b>Explanatory Notes</b>
<b>BC</b>	7.55	No	Fee determined by individual pharmacy and same for all types of prescriptions. Average fees in 1997 were: Plan A \$5.99, Plan B \$5.70, Plan C \$5.98, Plan D \$6.35, Plan F \$6.27, Plan G \$6.65
<b>AB</b>	9.90-21.85	No	The reimbursement rate varies according to the prescription cost: \$9.90 (for prescriptions up to \$74.99); \$15.45 (\$75-\$149.99); \$21.85 (over \$150).
<b>SK</b>	7.08	Yes	Mark-up capped at \$20.00 per prescription, is included in cost of ingredient varies with drug cost per prescription - \$0-\$6.30 30% - \$6.31-\$15.80 15% - \$15.81-\$200.00 10% The average markup for the year ending 99.03.31 was \$2.29.
<b>MB</b>	6.26	Yes	\$6.26 is the average dispensing fee, with no set maximum. There is a mark-up allowed, but generally it is built into the system to reflect the cost that the wholesaler might charge, which is typically less than 10%.
<b>ON</b>	6.47	10%	Fee on private prescriptions is higher.
<b>QC</b>	7.00	No	Manufacturers Guaranteed Selling Price will be paid. If purchased via wholesaler a markup of up to 9% may be included in price paid to wholesaler.
<b>NB</b>	7.40-160.00	No	The reimbursement varies, depending on the prescription cost: \$7.40 (for prescriptions up to \$99.99); \$9.90 (\$100-\$199.99); \$15 (\$200-\$499.99); \$20 (\$500-\$999.99); \$60 (\$1000-\$1999.99); \$80 (\$2000-\$2999.99); \$100 (\$3000-\$3999.99); \$120 (\$4000-\$4999.99); \$140 (\$5000-\$5999.99); \$160 (over \$6000).
<b>NS</b>	8.82	No	\$13.23 if ingredient cost exceeds \$115.
<b>PEI</b>	7.85	Yes	Markup is 7.5% of ingredient cost where ingredient cost is \$45 or more.
<b>NFLD</b>	5.00	Yes	This is the maximum professional fee allowed by the NLPDP. Markup on brand name products is 10% if ingredient costs are over \$30; on generic products there is a mark-up of 9% on the direct cost from the manufacturer with an additional 10% if ingredient cost over \$30.

## 21.4 How to use the estimates

A pharmacist fee should be added on to each prescription. Thus if one obtained a prescription for Novo-Salmol in Manitoba (see section 20), one would add a pharmacist fee of \$6.26 on to the drug price of \$5.94.

**User alerts:** Certain drugs may require longer time periods for preparation, and incur more economic costs. In some cases this is reimbursed (e.g., those which require compounding) while other time-consuming tasks such as special authorization are deemed to be included in the regular fee.

## 21.5 Assessment of the estimates

### 21.5.1 Availability and comparability

**Availability by province:** Data is available for all provinces.

**Uniformity of estimates across provinces:** Pharmacist activities are largely the same between provinces.

**Time available:** Data is current.

### 21.5.2 Quality of data

Item	Rating	Comments
Measure of full cost	1.0	
Detail in output measure	1.0	
Basis of evidence	1.0	
Sample selection All pharmacists are covered	1.0	All pharmacists are covered.

## References

Canadian Pharmacists Association. 1999. (Tel. 1-800-917-9489) Provincial Drug Benefits Programs. Ottawa, Canada.

## 22.0 Pharmaceuticals – Intravenous administration

### 22.1 Introduction

In many instances, drugs are provided intravenously. The provision can be in a hospital ward, on an inpatient or outpatient basis, or at home. Usually, a health professional is present to administer the dose. The resources used in the drug encounter, then, include a professional component for drug administration, in addition to the drug itself and the pharmacist's services. In this section we refer to one study which developed a cost for this component.

### 22.2 Description

**Unit of measurement:** Dose.

**Scope of service:** Preparing and administering the drug, and one treatment administration visit. If the administration of the drug is in the home, this will require a full home visit.

**Basis of estimate:** Cost.

**Resource items included:** Personnel and supplies.

**Out of pocket component:** None.

**Method of data estimation:** See Ortega et al. (1997). Workload units, applied for one visit, to which were added IV preparation and administration. Data obtained from one cancer center, using workload measurement.

**Time available:** This is a one-time study.

### 22.3 Estimates of cost

\$117.30 for the preparation and administration of one dose of a cancer drug.

### 22.4 How to use estimates

**Instructions and suggestions:** The investigator should obtain an estimate of the professional time, supplies and other related services for any visit requiring IV drug administration. This study might give some suggestions on how this might be done. If the patient took a dose of Vancocin intravenously, a broad spectrum antibiotic, the listed price, including the pharmacist component,

would be \$24.68 in Alberta (see section 21). If a nurse administered the dose, one would have to add the cost of supplies and nursing time. The supplies might be assumed to be \$4 and nursing time would be an hourly wage prorated.

**User alerts:** Results from this study will not reflect resource use in other drug applications.

## 22.5 *Assessment of the estimates*

### 22.5.1 *Availability and comparability*

**Availability by province:** Only one province included in study.

**Uniformity of estimates across provinces:** None.

**Time available:** One-time study.

### 22.5.2 *Quality of data*

<b>Item</b>	<b>Rating</b>
<b>Measure of full cost</b>	1.0
<b>Detail in output measure</b>	1.0
<b>Basis of evidence</b>	0.5
<b>Sample selection</b>	0

## ***References***

Ortega A, Dranitsaris G, Sturgeon J, Sutherland H, Oza A. Cost-utility of paclitaxel in combination with cisplatin for patients with advanced ovarian cancer. *Gynecologic Oncology* 1997; 66(3):454-63.

## 23.0 Blood

### 23.1 Introduction

There are many different component services of blood. Only one component, red blood cells, has been costed.

### 23.2 Description

**Unit of measurement:** One unit of red blood cells.

**Scope of service:** Collection, processing, transport to hospital and preparation in hospital.

**Basis of estimate:** Direct costs were estimated.

**Resource items included:** This study included labor (including an imputation for unpaid blood services volunteers), materials, equipment depreciation, risk of infection, and an imputation for unpaid blood donors.

**Out of pocket component:** None.

**Methods of Data Estimation:** See Tretiak et al., 1996. In a separate study Sheingold et al. [1992] estimated the cost per transfused unit to be \$180, plus and extra \$30 for transfusion-related illness. Methods were not made explicit.

**Timing of study:** One-time study.

### 23.3 Estimates of cost

#### Per unit of red blood cells

Process	Allogeneic	Autologous
Blood centre collection, processing and distribution	\$56	\$134
Blood donor indirect cost	\$30	\$30
Hospital preparation	\$124	\$174
<b>Total cost per red blood cell unit</b>	<b>\$211</b>	<b>\$338</b>

### 23.4 How to use the cost list

**Instructions and suggestions:** The estimates contain the comprehensive costs of red cells, including the hospital component. If one were developing the cost of a hospitalization for an ectopic pregnancy with minor procedure (CMG 613 plx level 1) in Ontario, the hospital cost would be \$1,839 ( $\$2,755 \times 0.6676$ ) according to the case mix method (see section 12). This estimate

would include the hospital preparation, but would exclude the cost of collection, processing, and distribution, and any indirect donor costs. If the patient required 3 units of red cells, the blood center costs would add \$168 (\$56 x 3, assuming an allogeneic transfusion) and \$30 in indirect costs.

**User alerts:** Red blood cells, along with plasma, platelets and cryoprecipitate, are joint products of whole blood. It is not possible to allocate the overall costs of production to each component in a unique manner. Therefore, the concept of the cost of any component, including red cells, is an arbitrary one [Jacobs et al., 1992].

### 23.5 Assessment of the estimates

#### 23.5.1 Availability and comparability

**Availability by province:** Data was collected from 4 provinces.

**Uniformity of estimates across provinces:** Estimates were uniform.

**Time available:** This was a one-time study.

#### 23.5.2 Quality of data

Item and comments	Rating
Measure of full cost	1.0
Detail in output measure Units of output are arbitrary when there are joint products.	0
Basis of evidence	1.0
Sample selection	1.0

### References

Jacobs P, Turner AR, Kopetsky D. Joint costs in health care: application to blood component production. *Journal of Ambulatory Care Management* 1992; 15(1):48-55.

Sheingold S, Churchill D, Muirhead N, Laupacis A, Labelle R, Goeree R. The impact of recombinant human erythropoietin on medical care costs for hemodialysis in Canada. *Social Science in Medicine* 1992; 34(9):983-91.

Tretiak R, Laupacis A, Riviere M, McKerracher K, Souetre E, and the Canadian Cost of Transfusion Study Group. Cost of allogeneic and autologous blood transfusion in Canada. *Canadian Medical Association Journal* 1996; 154(10):1501-8.

## CONTINUING CARE - GENERAL COMMENTS

Continuing care includes a wide range of community and residential services. There are a number of major groupings of services within continuing care and terminology varies across jurisdictions. The term *long term care* is often used to describe residential services such as nursing homes, chronic care hospitals, intermediate care facilities, and homes for the aged. It can also be used, as it is in Ontario, to refer to both residential and community based services provided for the elderly and persons with disabilities who need ongoing care.

The term *home support* generally refers to non-professional supportive services provided by persons such as homemakers, home support workers, and care aids. The term *home care* may include home support or may be used to describe professional services provided in an individual's home by persons such as nurses or physiotherapists. The wider and perhaps more generic use of the term *home care* refers to professional services and home support services and may also refer to community services such as adult day care, group homes and, more recently, assisted living. Finally, for historical reasons short-term post acute care is also included in home care and in the broad definition of long term care which also includes home and community based services. The rationale for this, rather than using hospital outreach, is that community based staff are better able to coordinate a range of community services to match client needs and because hospital outreach would only cover people living in the immediate area. Individuals may receive care in tertiary hospitals outside of their community of residence and need home care in their community of residence when they return home.

Continuing Care generally includes social as well as health services, for example, special transportation for those with disabilities. It is best understood as a complex and integrated system of care rather than as a type of service such as physician services or hospitals. In most jurisdictions chronic care hospitals are included within the residential portion of continuing care.

Continuing Care is distinct from hospital and medical services because it comes under the extended health care services portion of the *Canada Health Act* and, thus, is not an insured service. Because continuing care is not an insured service under Medicare, guaranteed standards such as portability and accessibility, do not apply. Services and terminology have developed in different ways in different jurisdictions from the historical bases of acute care services, public health services and social services. In fact, aside from chronic care hospitals and professionals such as home care nurses, most continuing care services were, historically (before the mid-1970s), part of social services. Not being insured services under the *Canada Health Act* also means that one can apply user fees to continuing care services.

It is beyond the scope of this report to provide standard costs for all continuing care services. However, cost estimates will be provided for two major components, including residential services and professional home care services.

## 24.0 Long term care

### 24.1 Introduction

Long term care, also known as residential care, nursing home care, and (in Manitoba) personal-care home services, has two components – a residential (room and board) component and a professional care component. The costs or fees for these two components are usually included in a single statistic which encompasses both types of service. Long-term care has not been deemed to be a “medically necessary” service under the Canada Health Act, and so it is not automatically insured. However, long-term care is provided in each of the provinces, but there is little standardization in terms of services provided, copayments/costs to residents, or data collected.

In recognition of the varying levels of care which are required by residents, long-term care is often divided into different level-of-care categories. Ideally, a separate cost should be assigned to each level of care. A number of provinces have their own level-of-care classification systems, and only Alberta and Ontario share a common one.

Per-patient long-term care costs are expressed on a per-diem, rather than a per-case basis. This is because of the wide variability in patient stays, making it very difficult to identify a typical patient in terms of length of stay.

There are government, non-profit and proprietary nursing homes in Canada. Proprietary nursing homes receive a fee (some or all of which may come from private funding sources) which covers all costs, including capital costs, and profit. The fee for non-profit or government nursing homes usually will not include capital costs (annualized costs for building) or profits. Costs can be estimated by actual costs or fees. When the fee-based method is used, all sources of payment, public and private, should be included, so that the measure is the amount actually received by the provider for the service.

### 24.2 Description

**Unit of measurement:** Per day, by level of care, where levels of care are distinguished. Definitions of levels differ by province. The provinces with the most detailed categorizations are Ontario and Alberta, who have a seven (A-G) level categorization, originally developed in Alberta. Newfoundland’s categorization is currently under review. We have cross-categorized the level-of-care classifications for the other provinces in terms of the Alberta system, in the following table, 24-1.

**Table 24-1**

Client Services	Alberta / Ontario	B.C.	Saskatchewan	Manitoba	Nova Scotia	P.E.I.	New Brunswick	Newfoundland
<ul style="list-style-type: none"> <li>room and board, hotel services</li> <li>minor assistance in eating, dressing, toileting, transferring</li> <li>general observation for potential injury</li> <li>routine catheter/ostomy care and/or occasional incontinence care</li> </ul>	Level A	Level: Personal Care ↓	Level 1: Supervisory Care ↓	Level 1 (Minimum Dependence on Nursing) ↓	Level 1 Assistance / Supervision ↓	Level 1 Minimum Care/Service Needs ↓	Residential Facility 1 ↓	Under Revision
<ul style="list-style-type: none"> <li>intermittent/minor assistance in eating, dressing, toileting, transferring</li> <li>low/medium support for coping</li> <li>close/constant or intermittent intervention for potential injury</li> <li>routine catheter /ostomy care and/or occasional incontinence care</li> </ul>	Level B	↓	Level 2: Limited Personal Care ↓	↓	↓	Level 2 Low Care / Service Needs ↓	↓	
<ul style="list-style-type: none"> <li>intervention every 15 min. for risk of injury and assistance with coping OR</li> <li>constant intervention for potential injury or medium level of support for coping e.g. reassurance OR</li> <li>constant supervision/ assistance to dress, or eat or 1-person assistance with toileting or transferring</li> <li>services around one major need and several minor needs</li> </ul>	Level C	Intermediate Care 1 ↓	↓	Level 2 (Partial Dependence on Nursing) ↓	Level 2 Nursing Care and/or Nursing Supervision ↓	Level 3 Medium Care / Service Needs ↓	Residential Facility 2 ↓	
<ul style="list-style-type: none"> <li>bowel and bladder retraining/management</li> <li>intervention for potential injury up to every 15 minutes</li> <li>medium/intense support for coping</li> <li>minimal to constant supervision of client to dress or eat or toilet or transfer</li> <li>routine catheter/ostomy care</li> <li>tube feeding</li> <li>bedpositioning of client</li> <li>2-person assist with toilet and/or transfer</li> <li>services provided around several major needs</li> </ul>	Level D	Intermediate Care 2 ↓	Level 3: Intensive Personal or Nursing Care ↓	Level 3 ↓	↓	↓	Residential Facility 3 ↓	
<ul style="list-style-type: none"> <li>more intense services required around several major needs such as activities of daily living, behavioral problems and incontinence e.g. total assistance with eating, dressing, etc.</li> </ul>	Level E	Intermediate Care 3 ↓	Level 4: Restorative or Palliative ↓	↓	↓	Level 4 High Care / Service Needs ↓	Residential Facility 4 ↓	
<ul style="list-style-type: none"> <li>constant supervision with activities of daily living including 1 person assist with toileting and transferring</li> <li>intervention every 15 min for risk of injury</li> <li>intense intervention for coping</li> <li>total assist for activities of daily living such as tube feeding, 2-person toilet and transfer of client Level F</li> <li>care of bowel and bladder incontinence</li> <li>e.g.</li> <li>ALS,MS, agitated Alzheimer's, dementia</li> <li>disruptive wanderer</li> <li>palliative care</li> <li>bedridden</li> <li>non-mobile with incontinence</li> </ul>	Level F	Extended Care ↓	↓	Level 4 (Maximum Dependence on Nursing) ↓	↓	Level 5 Intensive Care/Service Needs ↓	↓	
<ul style="list-style-type: none"> <li>total client care on all domains with a few exceptions</li> <li>e.g.</li> <li>advanced neurological diseases, palliative care,</li> <li>advanced dementia, severe rheumatoid arthritis</li> </ul>	Level G	↓	↓	↓	↓	↓	↓	
<ul style="list-style-type: none"> <li>Client needs 24 hour monitoring by professional nursing staff, but does not require all the resources of acute care.</li> </ul>	Sub-Acute (in LTC)	NOT KNOWN	NOT KNOWN	NOT KNOWN	NOT KNOWN	NOT KNOWN	NOT KNOWN	NOT KNOWN
<ul style="list-style-type: none"> <li>active aggressive rehab by a professional rehab team, directed by physical medicine specialists</li> <li>teaching self-care</li> <li>special devices and assistance for regaining independence</li> <li>services by SLP's, orthopedic and prosthetic technicians, OT's, PT's, remedial gymnasts, social workers, vocational counselors, psychologists, chaplains, RT's, educational specialists</li> <li>may be fully restored within 3 months to independent self-care</li> <li>may need ongoing level 4 care for prolonged treatment and care</li> <li>all ranges of mobility</li> </ul>	Intensive Rehabilitation (Rehab Hospitals)		Level 5					

**Scope of service:** Costs usually include overhead, room and board, and professional care, especially nursing and physical therapy. Doctors' services are excluded.

**Basis of estimate:** Varies between administrative fees and actual estimated costs. See table.

**Resource items included:** Generally the resource items include all operating costs including supplies and medications. Sometimes depreciation and capital costs are excluded, especially for public homes.

**Unit price of resources:** These are usually the actual resource prices.

**Out of pocket component:** Out of pocket components are separately identified in the table. Generally they are not additional to the total reported fee.

**Method of estimation and data:** Often one has only a single cost per day statistic to start out with; that is, costs or revenues are aggregated to give a blended per diem cost per facility. Many funding models adjust for case mix in an aggregate way; they assign a value, compared to the provincial average which is set at 1 or 100, and funding facilities on a proportionate basis. For example, a facility with a score of 1.2, or 120 gets 20% more resources than the "average" facility. [This is the approach taken in calculating "needs" for Newfoundland, Ontario and Quebec]. In neither method of funding is a cost by each level of care calculated. One can only rely on such aggregate estimates if given types of facilities have clients at a single level of care. We should note that these refined estimates are not actual costs but budgeted values, and so are more closely akin to revenues.

It is important to compare costs by level of care because the difference in resource utilization between the lowest level (low care needs) and the highest level (high care needs) can be more than tenfold. Thus, any comparisons based on aggregate numbers may be misleading because one does not know the extent to which the case mix distribution is the same across the groups being compared. Differences in case mix distributions may account for differences in costs even if unit costs are actually identical across groups. In Canada, most jurisdictions have their own classification systems although there is some limited usage of the same system in different provinces. In general, most of these systems range from four to seven categories and are only used for residential services. Some jurisdictions such as British Columbia and Prince Edward Island apply the same classification system to both residential and home/community services.

Although actual per client costs are not usually available, one can estimate the per diem cost of facility residents by level of care. Hollander (1994) has outlined this method. It involves knowing the distribution of residents at each level of care, for each day, the total monthly or annual cost of all facilities in the analysis and the relative resource utilization ratios (weighted units) of each level of care. These weights can be derived if there are standard staffing allocations by level of care. One starts by calculating non-care staff costs. Then one calculates the relative ratios of different staff by level of care and multiplies by the unit cost for each type of worker to obtain a cost for care staff by level of care. This is added to the non-care staff cost which is the same for each level of care. The resulting costs are standardized by comparing the costs of the levels of care to the lowest levels which is the basis of the analysis. Thus, for example, the per diem for the lowest level of care may be \$50. The per diem for the next level is \$60 or 1.2 times the per diem of the lowest level. By doing this one comes up with ratios for each level of care. One then multiplies the number of bed days in a year, for each level of care, by the ratios to obtain the total number of units (where the lowest level of care is set at one unit). This number is divided into the total annual cost for the range of facilities in the analysis to obtain the cost for one unit. This cost is then multiplied by the unit weights (e.g., 1.2 as noted above) to obtain the estimated per diem cost by level of care for the group of facilities in the analysis. If there is no staffing matrix by level of care one can use expert opinion to estimate the relative resource use of care staff by level of care to derive the weights for each level of care where the value of the lowest care level is set at one. (However, relying on expert opinion rather than observation results in lower quality of estimates.) The type of calculation noted above was conducted by Hollander (1994) for costs to the BC Ministry of Health for long term care facilities in the 91/92 fiscal year; it was also used for Nova Scotia, New Brunswick, Saskatchewan, and Alberta, though not always using actual costs.

**Time available:** Costs were usually obtained for the previous year. In some cases where regionalization occurred, direct estimates of cost were no longer available and were updated using an inflation factor.

### ***24.3 Estimates of cost***

**Estimates of cost:** See table 24-2 for estimates of cost and rates. See Table 24-1 for descriptions of each province's level of care.

**Table 24-2**  
**Estimates of long term care costs**

Province	Cost estimate	Out of Pocket Fee
Newfoundland	Average cost for public units is \$4200/month, all inclusive, over all levels of care. [=approximately \$140/day].	\$1000 per month
Prince Edward Island	Rates vary according to whether a patient is self-pay (private) or subsidized. For subsidized patients average rates in private homes are: Level III - \$86.05/day Level IV - \$88.05/day Level V - \$89.05/day Rates for self-pay residents in public homes are \$107/day.	
Nova Scotia	Level I- \$74.39-94.69/day Level II- \$90.92-147.21/day (all inclusive approved rates for public homes). Actual rates may be higher, and there would then be a co-payment.	Varies with income level (\$0-\$360/month)
New Brunswick	Level 1 -\$36/day Level 2 - \$68/day Level 3 - \$105/day Level 4 - \$134/day ( rates for public homes)	Varies with income level
Quebec	\$124 - \$163 per day, all inclusive cost for public homes (level of care not specified).	
Ontario	A \$65.06/day B \$72.43 C \$82.32 D \$88.44 E \$100.25 F \$109.58 G \$142.65 (These are per diem rates adjusted for level of care.)	
Manitoba	Level 1 and 2: \$71.45/day Levels 3 & 4: \$99.35/day (excludes pharmaceuticals, rehabilitation services, physician payments). These are per diem rates for private homes in Manitoba.	
Saskatchewan	Level 3: \$96/day Level 4: \$132/day (These are all inclusive cost, updated for inflation.)	Resident pays 25%
Alberta	A \$28.9 /day B 36.06 /day C 47.35 /day D 54.42 /day E 73.11 /day F 88.88 /day G 147.75/day (These are all inclusive rates, updated for inflation.)	\$26.67 / day (average co-payment)
British Columbia (1991 data)	Personal care and Intermediate Care Level 1 - \$57.39/day Intermediate care Level 2 - \$43.85 Intermediate care Level 3 - \$69.20 Extended care - \$99.88 (These are actual costs.)	

## 24.4 *How to use estimates*

**Instructions and suggestions:** In order to assign a cost per day to any patient, you must first determine the patient's level of care. Then the cost associated with the level of care will be used. For example, assume we wanted to determine the cost in Manitoba of reducing a hospitalization stay for a hip replacement (CMG 352, Plx 1) by 2 days, and a consequent increase in stay in a long term care facility by the same amount. The cost savings per day in the hospital can be approximated by using the CIHI RAPDW weight (0.1363 if under 65 years) and applying it to the per weighted case cost for Manitoba (\$2,301). The cost is therefore \$313 per day, or \$626 for two days. If the person is a level 3 resident in Manitoba, the added long term care cost for 2 days is \$198.70 (\$99.35 per day). The difference (excluding transport) is \$526.65.

**User alerts:** A single average cost for the province will depend on the number of persons within each category in the province. In the case of Newfoundland, we do not have cost data by level of care. For low-severity cases, this would mean we are overestimating costs. Care must be taken to ensure that the cost used is consistent with the perspective being taken in the study. We have tried to report total costs (regardless of who pays) where this data was available, or where we were able to estimate it. The ministry's payment would then be obtained by deducting the out of pocket cost from the total or all-inclusive cost. In many cases the public rate may not equal the actual rate, and there would be a copayment. Also, when public and private rates are not equal (even after factoring in the copayment), it is possible that the private sector cross-subsidizes the public one, and neither rate represents a true cost.

## 24.5 *Assessment of the estimates*

### 24.5.1 *Availability and comparability*

**Availability by province:** Estimates are available for most provinces.

**Uniformity of estimates across provinces:** There is very little uniformity between provinces.

**Time available:** Most data is current; however much of the information (Alberta, Saskatchewan, and British Columbia) is dated.

24.5.2 *Quality of data*

**Because the variation between provinces is so great, we have provided a single estimate for each province.**

Province	Measure of full cost	Output detail	Basis of evidence	Sample selection
Newfoundland	1.0	0.0	1.0	Insufficient information
Prince Edward Island	1.0	0.0	1.0	Insufficient information
Nova Scotia	0.5	1.0	1.0	Insufficient information
New Brunswick	Insufficient information	1.0	1.0	1.0
Quebec	Insufficient information	0	1.0	Insufficient information
Ontario	1.0	1.0	1.0	1.0
Manitoba	1.0	1.0	1.0	1.0
Saskatchewan	Insufficient information	1.0	Insufficient information	1.0
Alberta	0.5	1.0	Insufficient information	1.0
British Columbia	1.0	1.0	1.0	1.0

N/A - not available

***References***

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Government of Newfoundland. Health and Community Services. St. John's, NF.

Government of Alberta, Capital Health, Regional Continuing Care Services. Edmonton, AB.

Government of British Columbia, Ministry of Health and Ministry Responsible for Seniors. Capital Health Region. Victoria, BC.

New Brunswick Department of Health and Community Services. Fredericton, NB.

Nova Scotia Department of Health. Halifax, NS.

Ontario Ministry of Health and Long-Term Care. Toronto, ON.

## 25.0 Home care

### 25.1 Introduction

Home care refers to professional services which are provided in the home. Home care is distinct from home support, which refers to non-professional services, such as home-making. In this section, we will concentrate our attention on professional home care, primarily on nursing services, although some estimates for home support are provided as well. The measurement of home care is a new and emerging area. At the same time, home care activities are quite varied. The estimates contained herein are therefore less well developed than in other areas.

### 25.2 Description

**Unit of measurement:** There are two different units of output in home care. Costs can be expressed in terms of hours of service or visits. Both have been used.

**Scope of service:** When the service being analyzed is home care, the services included are limited to professional services, such as monitoring and providing medicine. In a few instances (New Brunswick and Saskatchewan) the other services which are used in home care (planning, assessment, transportation) are included as well.

**Basis of estimate:** Both cost and fee based estimates have been used in different provinces.

**Resource items included:** The estimate should include travel time, training, coordination assessment, and transportation expenses as well as actual service time. Often they are incomplete.

**Unit price of resources:** Actual input prices are usually included in cost-based estimates.

**Out of pocket component:** No discussion presented.

**Method of data estimation:** The basis of estimation is usually not explicitly presented.

**Time available:** Data are usually current.

### 25.3 Estimates of cost

The estimates of cost are contained in the accompanying table.

Province	Cost estimate	Comments
Newfoundland	Not available	
Prince Edward Island	Home support (light housekeeping) \$12.50/hour Personal care (bathing, grooming) \$14.87/hour Home nursing: LPN \$17.75/hour RN \$22.75 / hour	These are average fees charged to clients by private agencies.
Nova Scotia	Home Nursing: Registered Nurse (RN) \$41.47 per visit; Licensed Practice Nurse (LPN) \$30.66 per visit; No client fees for RN or LPN visits; Home Support: \$15.00 to \$20.00 per hour via contracts with Non-Profit Agencies; Sliding client fee scale for Home Support services, e.g., 1) No fee for clients receiving OAS – GIS income, 2) Other clients, \$8.00 per hour to maximum \$480.00 per month for families with net income of \$50,000.00 annually	
New Brunswick	Home Health Care – \$82/visit Home Support-\$68/day	These are full costs, including supplies and drugs, but excluding some general planning and administrative costs.
Quebec	Not available	
Ontario	Not available	
Manitoba	Registered nurse - \$24.30 / hour Physical / occupational therapy - \$42.72 / hour LPN-\$21.68 / hour Home care attendant-\$14.75 / hour Home support worker-\$12.01 / hour	These are direct salary costs. They exclude overheads.
Saskatchewan	Physical therapy - \$65/hour Registered nurse - \$49/hour Home support - \$25 per hour	These are full costs including salaries, supplies, overhead, down-time and support.
Alberta	Professional nurse - \$20.10 / hour Physical / occupational therapy - \$43 / hour LPN 20.10 / hour	These are fees charged per hour of service. The relation between these fees and costs is unknown.
British Columbia	Not available	

## 25.4 *How to use estimates*

**Instructions and suggestions:** You can obtain estimates of services on an hourly or per visit basis. Given current data, it is advisable to estimate the number of hours that are needed for a visit and to apply a given hourly rate to this required time. The total operating costs are about double the direct hour costs [L. Taylor, personal communication]. Therefore, if you estimate that a nursing visit in Winnipeg takes 3 hours, and the direct rate for nursing is \$24.30, then the visit would cost about \$145.80 (\$24.30 per hour x a cost mark-up factor of 2 x 3 hours).

**User alerts:** Currently, we have very poor data on the number of hours per visit, and we do not have a very good home care classification system, which would categorize visits according to resource intensities. Nevertheless, it is preferable for an investigator to determine the required hours per service of a visit.

When comparing home care with institutional care, one should justify the inclusion or exclusion of services which are, in fact, provided in both milieus. For example, room and board is a part of hospital and nursing home care. Room and board is also provided in the home, but is seldom included in cost estimates. However, if one is comparing the costs of a patient in two different care settings (home care or institutional care), then if one takes a broad, societal, perspective, then room and board should appear in both arms of the analysis.

## 25.5 *Assessment of the estimates*

### 25.5.1 *Availability and comparability*

**Availability by province:** Data is available in six provinces.

**Uniformity of estimates across provinces:** There is very little comparability between provinces.

**Time available:** Data on fees is concurrent. There is no information on time to availability for cost data.

### 25.5.2 *Quality of data*

Because the variation between provinces is so great, we have provided a single estimate for each province.

<b>Province</b>	<b>Measure of full cost</b>	<b>Output detail</b>	<b>Basis of evidence</b>	<b>Sample selection</b>
Newfoundland	N/A	N/A	N/A	N/A
Prince Edward Island	0	0.0	1.0	1.0
Nova Scotia	1.0	Insufficient information	1.0	1.0
New Brunswick	1.0	0	1.0	1.0
Quebec	-	-	-	-
Ontario	-	-	-	-
Manitoba	0	0	1.0	1.0
Saskatchewan	1.0	0	1.0	1.0
Alberta	0	0	1.0	1.0
British Columbia	-	-	-	-

## ***References***

### **Other data sources:**

Prince Edward Island. Personal communication, PEI Department of Health and Social Services.

Saskatchewan. L.Taylor, personal communication.

### **Documents:**

Health Services Utilization and Research Commission. Hospital and Home Care Study. Summary Report No. 10.

Saskatoon: Health Services Utilization and Research Commission, March 1998.

## 26.0 Telemedicine

### 26.1 Introduction

Telemedicine involves the application of electronic communication media to replace the face-to-face interaction between the patient and clinician. The clinician and patient can therefore be miles apart, but interaction, in the form of a direct communication, or a reading of an x-ray, can still take place. Telemedicine applications include radiology, psychiatry, and in fact, any area of medicine where touch and smell are not required by the clinician. Telemedicine requires reasonably high quality audio or audio and video equipment at both ends of the communication. Technical support is also required, though possibly only for maintenance. A high quality transmission also requires the use of transmission lines. Telemedicine is in its infancy, and it is expected that costs will change rapidly. In addition, the costs will vary considerably from application to application.

### 26.2 Description

**Unit of measurement:** A consultation.

**Scope of service:** Clinician services and costs of telemedicine operations.

**Basis of estimate:** Costs.

**Resource items included:** Clinician services, transmission services and telemedicine equipment.

**Out of pocket component:** N/A.

**Methods of Data Estimation:** See study.

**Timelines:** N/A.

**Other comments:** Telemedicine fees for physicians are now contained in the Manitoba Physicians' Manual (See section on physicians services and provincial fee schedules).

### 26.3 Estimates of cost

A telepsychiatry application in Alberta included a variable cost of \$180 per consult, including clinician, support staff, and long-distance connection. Fixed costs were \$426 per consult, including

depreciation for equipment and installation, and an annual fixed line charge. Fixed costs were evaluated at a break-even volume; they will be very sensitive to the operating volume of consultations (Doze et al., 1999).

## ***26.4 How to use the estimate***

**How to use the cost list:** The data provides a rough idea of the average costs. The method can be followed, but investigators should try to estimate the costs for their own operations.

**User alerts:** Equipment costs can vary considerably. Output volumes can also vary considerably, and will influence the average fixed operating costs, which is an important component of cost.

## ***26.5 Assessment of the estimates***

### *26.5.1 Availability and comparability*

**Availability by province:** Not currently available.

**Uniformity of estimates across provinces:** Not applicable.

**Time available:** Not applicable.

### *26.5.2 Quality of data*

Only rough, preliminary estimates are available at present.

## ***References***

Doze S, Simpson J, Hailey D, Jacobs P. Evaluation of a telepsychiatry pilot project. *Journal of Telemedicine and Telecare* 1999; 5(1):38-46.

## **PERSONAL COST ITEMS**

Personal costs are costs which are borne directly by patients or caregivers. Strictly speaking, any costs which are directly financed by the patient are “personal” costs. Many of these costs have already been identified, at least in principle, in those sections of this document where patients were partly or wholly responsible for paying a portion of their expenses. In this section, we concentrate on another form of personal costs – lost productivity costs. These costs are tied to the losses of income from illness and caregiving. In this unit, we present values for these foregone worktime activities.

## 27.0 Lost productivity costs

### 27.1 Introduction

There are many instances where there is unpaid “labor” in health care. Patients can use their time in traveling to receive care, or by waiting to receive the care. Caregivers can use it by taking care of relatives or friends. Persons who provide their time in these ways can lose both work-time and leisure-time. In this section we focus on the lost income due to lost work-time. Although lost leisure time is also important, there is very little agreement in the literature on how to value this service. The value of lost work-time has also been termed “indirect” costs or lost-productivity costs.

### 27.2 Description

**Unit of measurement:** Hours, weeks, or years of work.

**Scope of service:** All labor services.

**Basis of estimate:** Estimates are based on actual data on compensation (wages and supplementary labor income).

**Resource items included:** Labor time, adjusted for per cent of persons who are employed in each population group.

**Unit price of resources:** Total compensation per hour, week, or year.

**Out of pocket component:** N/A.

**Method of data estimation:** Data was obtained from Statistics Canada labor surveys.

**Time available:** Data is reasonably current.

### 27.3 Estimates of cost

The value of lost time for any member of a given patient or caregiving population is assumed to be the expected loss in compensation which results from the loss of work. We calculated this statistic, by age and sex group, for each province, in the following steps:

- Determine the wage rate for each sex group (Table 27-1), by province, and also for each age group with a gender breakdown (Table 27-2). This calculation can be made per hour or per week (depending on which measure is more convenient to the analyst).
- Add 13.9 per cent on top of wages to account for supplementary labor income (fringe benefits such as life insurance, supplementary health insurance, disability insurance and pension benefits).
- Not all of the caregiving or patient group will have been employed, and thus they will not all expect to lose income. To adjust for the per cent of patients in any given group who are employed (and hence who would have lost income from waiting or caregiving activities) we multiply by the percentage of the population in each group who are employed. This data is presented for the total population by province and age (Table 27-3) and by province, age and sex (Table 27-4).

Estimates of average annual earnings for Canada are also given (see Table 27-5). Provincial estimates are available upon request from Statistics Canada.

#### **27.4 How to use estimates**

**Instructions and suggestions:** Suppose a caregiver who is 50 years old and female, in New Brunswick, spends 3 hours a week taking care of her aged mother. From Table 27-2, the wage of such a person is \$12.65 per hour, to which we add \$1.75 (13.9 per cent) for benefits, for a total compensation of \$14.40 per hour, or \$43.20 for three hours. However, 65.9 per cent of all females in this group in New Brunswick are employed. Therefore, we would expect that the “statistical woman” would expect to lose \$28.46 ( $=\$43.20 \times .659$ ) for the three hours. These estimates can also be applied to place a value on waiting and travel time.

**User alerts:** These estimates are for the “statistical” or average person within their group. They will vary substantially by occupation and education level. Thus if work loss by educational group is desired, more detailed data must be obtained. As well, we assume that the wage is a value of lost work; individuals may make up their lost work time for short absences and so these may be over-estimates of lost productivity. In the longer term, individuals who give up work may be replaced by unemployed workers, and so productivity losses may be overstated using this method.

## 27.5 *Assessment of the estimates*

### 27.5.1 *Availability and comparability*

**Availability by province:** Data is available for all provinces.

**Uniformity of estimates across provinces:** Data is uniform across provinces.

**Time available:** Data is available after several months.

### 27.5.2 *Quality of data*

<b>Item and comments</b>	<b>Rating</b>
<b>Measure of full cost</b>	1.0
<b>Detail in output measure</b>	1.0
<b>Basis of evidence</b>	1.0
<b>Sample selection</b>	1.0

## ***References***

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Statistics Canada. Labour income. Monthly estimates. December 1998. Ottawa: Statistics Canada, Catalogue. 13F0016XPB, Table 1, December 1998.

Statistics Canada. Earnings of men and women. 1997. Ottawa: Statistics Canada, Catalogue. 13-217-XIB, Table 10, 1997.

**Table 27-1**

**Wage rates of all employees for both sexes, by age and province, annual average, in dollars;  
1998.**

<b>Province</b>	<b>Average hourly wage rate</b>			<b>Average weekly wage rate</b>		
	<b>age 15-24</b>	<b>age 25-54</b>	<b>age 55+</b>	<b>age 15-24</b>	<b>age 25-54</b>	<b>age 55+</b>
Newfoundland	6.80	14.08	13.96	206.98	540.16	539.01
Prince Edward Island	7.27	13.05	13.62	236.25	499.36	504.13
Nova Scotia	7.45	14.29	14.44	225.87	546.51	542.16
New Brunswick	7.61	14.17	14.85	245.69	548.12	548.46
Quebec	9.04	16.62	16.71	267.00	610.47	596.02
Ontario	9.33	17.80	17.97	272.82	677.82	659.39
Manitoba	8.01	15.39	15.76	249.94	578.67	578.15
Saskatchewan	8.41	15.17	14.51	269.55	576.22	528.21
Alberta	8.92	16.78	16.08	297.29	647.28	598.61
British Columbia	10.04	18.42	18.85	297.46	679.66	684.22
Canada	9.07	17.07	17.21	273.52	642.64	628.01

**Table 27-2**

**Wage rates of all employees, by sex, age, and province, annual average, in dollars; 1998.**

Province	Average hourly wage rate			Average weekly wage rate		
	age 15-24	age 25-54	age 55+	age 15-24	age 25-54	age 55+
<b>MALES</b>						
Newfoundland	6.81	15.85	16.13	220.36	653.13	651.81
Prince Edward Island	7.32	13.60	14.45	254.00	568.16	571.66
Nova Scotia	7.68	15.80	16.21	254.34	649.71	648.24
New Brunswick	7.82	15.59	16.80	268.22	642.13	667.75
Quebec	9.29	18.06	18.54	297.92	704.72	700.61
Ontario	9.77	19.55	20.18	308.75	788.06	791.60
Manitoba	8.34	17.10	18.45	285.33	691.00	734.49
Saskatchewan	8.80	17.03	16.34	306.94	697.02	657.66
Alberta	9.56	19.02	18.50	347.15	789.58	742.38
British Columbia	10.59	20.27	21.34	340.17	803.66	829.96
Canada	9.48	18.79	19.37	310.17	753.55	755.37
<b>FEMALES</b>						
Newfoundland	6.80	12.29	10.20	192.22	426.36	343.45
Prince Edward Island	7.22	12.57	12.65	217.48	438.86	425.56
Nova Scotia	7.22	12.68	12.27	197.35	437.22	411.81
New Brunswick	7.40	12.65	12.57	222.69	447.22	409.15
Quebec	8.77	15.04	13.91	233.69	506.24	436.73
Ontario	8.86	15.94	15.10	235.73	560.60	487.84
Manitoba	7.66	13.59	12.70	211.27	461.23	400.00
Saskatchewan	7.94	13.28	12.77	225.45	452.90	404.61
Alberta	8.19	14.33	12.99	241.50	491.61	414.80
British Columbia	9.46	16.49	15.90	252.03	550.74	512.26
Canada	8.63	15.23	14.39	234.51	523.98	461.62

**Table 27-3****Estimates of percentage of persons employed, for both sexes, by age and province, annual average, in thousands; 1998**

Province	# Persons Employed (E)			Population (P)			E/P (%)		
	age 15-24	age 25-54	age 55+	age 15-24	age 25-54	age 55+	age 15-24	age 25-54	age 55+
NFLD	26.7	153.0	14.5	83.6	251.0	104.7	31.9	61.0	13.8
PEI	10.7	43.6	6.1	19.5	58.7	28.5	54.9	74.3	21.4
NS	60.5	302.5	35.9	124.1	410.7	200.2	48.8	73.7	17.9
NB	50.7	239.4	27.7	103.7	336.4	156.2	48.9	71.2	17.7
QC	462.0	2,516.8	302.8	972.6	3,357.1	1,520.0	47.5	75.0	19.9
ON	795.5	4,146.1	548.4	1,476.5	5,165.1	2,325.0	53.9	80.3	23.6
MB	91.3	386.1	58.3	146.9	464.6	234.9	62.2	83.1	24.8
SK	83.2	329.9	63.2	144.1	397.4	217.6	57.7	83.0	29.0
AB	260.4	1,106.2	148.8	414.1	1,317.7	481.4	62.9	83.9	30.9
BC	260.9	1,414.1	195.2	517.5	1,821.7	819.6	50.4	77.6	23.8
Canada	2,101.9	10,637.5	1,400.9	4,002.7	13,580.4	6,088.1	52.5	78.3	23.0

**Table 27-4**

**Estimates of percentage of persons employed, by sex, age and province, annual average, in thousands; 1998**

Province	# Persons Employed (E)			Population (P)			E/P (%)		
	age 15-24	age 25-54	age 55+	age 15-24	age 25-54	age 55+	age 15-24	age 25-54	age 55+
<b>MALES</b>									
NFLD	14.1	81.1	9.5	42.8	124.2	49.7	32.9	65.3	19.1
PEI	5.4	22.3	3.7	9.8	29.2	13.0	55.1	76.4	28.5
NS	30.2	160.3	21.9	62.6	199.9	90.7	48.2	80.2	24.1
NB	25.3	128.0	16.2	53.0	167.4	71.4	47.7	76.5	22.7
QC	239.6	1,372.4	193.0	497.1	1,686.0	684.8	48.2	81.4	28.2
ON	402.9	2,220.5	328.4	752.1	2,560.5	1,067.9	53.6	86.7	30.8
MB	48.2	207.9	35.4	75.1	233.1	106.8	64.2	89.2	33.1
SK	45.4	176.7	39.4	74.1	200.0	100.6	61.3	88.4	39.2
AB	137.3	602.5	92.6	212.6	669.1	228.2	64.6	90.0	40.6
BC	133.0	753.9	114.1	263.5	910.8	384.1	50.5	82.8	29.7
Canada	1,081.4	5,725.7	854.3	2,042.7	6,780.2	2,797.2	52.9	84.4	30.5
<b>FEMALES</b>									
NFLD	12.6	71.9	5.0	40.8	126.8	55.0	30.9	56.7	9.1
PEI	5.3	21.3	2.4	9.6	29.6	15.4	55.2	72.0	15.6
NS	30.3	142.2	14.0	61.5	210.7	109.5	49.3	67.5	12.8
NB	25.4	111.3	11.5	50.7	169.0	84.8	50.1	65.9	13.6
QC	222.3	1,144.4	109.8	475.4	1,671.1	835.2	46.8	68.5	13.1
ON	392.6	1,925.6	220.0	724.4	2,604.5	1,257.1	54.2	73.9	17.5
MB	43.1	178.2	22.9	71.9	231.4	128.2	59.9	77.0	17.9
SK	37.8	153.1	23.8	70.1	197.4	117.1	53.9	77.6	20.3
AB	123.1	503.6	56.2	201.5	648.6	253.2	61.1	77.6	22.2
BC	127.9	660.2	81.1	253.9	910.9	435.5	50.4	72.5	18.6
Canada	1,020.5	4,911.9	546.6	1,959.9	6,800.1	3,290.9	52.1	72.2	16.6

**Table 27-5****Average Annual Earnings of all Earners by Age and Sex, Canada, 1997**

	<b>Men</b>	<b>Women</b>
<b>Age group</b>	<b>dollars</b>	
15-24	11,339	8,743
25-34	31,701	21,786
35-44	39,828	25,262
45-54	43,228	26,385
55 years and over	33,899	19,501
Total	33,185	21,167

## **ASSESSMENT AND RECOMMENDATIONS**

## 28.0 Summary and assessment

### 28.1 Introduction

In this project we set out to develop a list of provincial costs for commonly-used health care services. The purpose of this project, as first conceived, was to expand the coverage of existing cost lists, then available for two provinces (Manitoba and Alberta), to all provinces. As the working group came together, the scope of the project expanded to cover health services whose costs were not as widely available. At all times the working group held firm to its initial purpose, which was to develop estimates of costs using existing data. In pursuing this objective, the issue of data quality emerged in importance. In the end, the project was much wider in scope than it was when first conceived. As the scope of this project expanded -- a natural outcome of assembling a group with such diverse backgrounds -- the working group recognized that it would not have the time and resources to adequately complete the wider task. In many instances, the data were not available to undertake a more comprehensive costing initiative. The final task of this report is to provide an overall assessment of the availability and general quality of data for health care costing in Canada.

Our assessment falls into two parts. First, we assess the current situation, both in terms of the overall quality of data and the identification of those provinces which had best costing practices. Second, we note where there are gaps in the data. This involved the identification of areas where no costs exist. In this latter case, a greater degree of development, both in terms of classification systems and costing systems, will be needed if we are to bring cost estimates up to acceptable levels.

### 28.2 Assessment of existing data

In Table 28-1 we present an overall assessment of the cost list. We used three components – the degree of provincial coverage (for those services where there is at least some coverage), an overall assessment of quality, and the degree of uniformity of the estimates across the provinces.

A high degree of provincial coverage was achieved for inpatient acute care hospitalization, physician services, outpatient pharmaceuticals, day procedures and long-term care. For other services, the coverage is far less complete. Notable gaps in coverage occur in the areas of ambulatory care (especially emergency care and special clinics) and home care.

The quality of data for inpatient acute care, physician services, and pharmaceutical services is uniformly high. There were two different measures of outpatient hospital services. One was CIHI's Day Procedure Groups. The applicability of the DPG weights, which were derived from Maryland data, has not been assessed. The other measure is Alberta's Ambulatory Care Classification System (ACCS). The ACCS classification system and weights have also not been assessed. Thus, although

it is currently the only contender which could serve as an example, we do not know enough about this system to recommend it as a prototype. Nevertheless, in developing such a system Alberta Health has broken new ground, and the development of this system deserves to be closely watched.

Although eight provinces have adopted long-term care classification systems, we know very little about unit costs in this area. The work by Hollander (1994), which is the most appropriate for our purposes, was conducted on data which is ten years old, and has not been updated. The Alberta classification system, currently in use in two provinces, can provide a very useful categorization for this area; further, weights have been devised for this system. However, the estimates that have been made with the use of this system are not cost-based analyses. In sum, although there is no one ideal system, the individual components of such a system exist, and so we conclude that there is considerable guidance in long term care for those who want to develop valid cost estimates.

In home care, only Saskatchewan and New Brunswick have conducted estimates which incorporate overall costs, rather than just the direct time costs of the service provider. Saskatchewan conducted its estimates using hours-of-service, rather than visits; New Brunswick conducted its estimates using visits, unadjusted for any case mix variations. Certainly, the other provinces would benefit by adopting a full-cost approach; at the same time, the field would benefit from the development of a home care classification system.

In the area of other professional services, very few of the estimates were measures of the actual fees or revenues which were received. Most estimates were based on government fees; in an environment where cross-subsidization between government and private sectors is likely to be experienced, government fees will be lower than private fees, and actual average revenues will be in between. Other initiatives have focused on listed or recommended fees; there is no information on the relationship between actual and listed fees. In this area, the Canadian Chiropractic Association serves as the best role-model. Despite the fact that their national survey of actual fees has interpretation problems, their method is an excellent example of the way to obtain information that can be used in economic analyses.

In the other area where there was data from many provinces – ambulance services – we could not find any examples which could serve as a role model.

In the areas of inpatient acute care, physician services, and drug areas there was a generally high degree of uniformity. The main exception was for inpatient care in Quebec, where the Quebec government used the U.S.-based Diagnosis Related Groups (DRGs) rather than the Canadian-based CMGs. We were unable to obtain information regarding the methods which were used to assign and

develop DRG weights for Quebec, but the use of DRGs does hamper uniformity in this area. Long-term care is an area where there is very little uniformity. Although the federal government has developed a classification tool, it is not used by any of the provinces. Only Ontario and Alberta use the same long term care classification system.

### ***28.3 Areas where there are no estimates***

We did not obtain information on costs in a number of areas. There were several areas where we did attempt to obtain estimates of cost, but very little data was available. In the area of blood services, data was only available for whole blood and only from the scientific literature; this leaves us without information on the cost of other blood components, such as plasma, platelets, and the globulins. Also, we did not obtain costs for many individual procedures. Some estimates of procedure costs will be available under the topics of day procedures and ambulatory care. Much more can be done: The potential exists to exploit the wealth of data that can be used with existing workload systems.

In several broad areas we attempted to obtain estimates but they were not available. Very weak data exists in public health and social services. There are a number of services in public health, such as mammography screening, cervical screening, metabolic screening in newborns and in vaccinations, where cost estimates for individual services would be most useful. The same is true in the social services, in areas such as day hospital care, group homes, and adult day centers (Hollander, 1994). It is increasingly recognized that social services and health services are closely linked; as investigators begin to study the interactions between these services, they will need better cost estimates. In addition, there is very little information available about rehabilitation care.

One area which we did not attempt to address was mental health. The reasons for the omission was the lack of expertise on the committee in this area and the reluctance to widen the scope into yet another field.

### ***References***

Hollander M. The costs, and cost-effectiveness, of continuing-care services in Canada. Ottawa: University of Ottawa Economic Projects, Number 94-10. 1994.

**Table 28-1****Overall assessment of existing cost measures for selected services**

<b>Service category</b>	<b>Degree of provincial coverage</b>	<b>Overall assessment of quality</b>	<b>Degree of uniformity across provinces</b>
Inpatient hospitalization	8 provinces covered	High level of quality	High degree of uniformity
Physician services	10 provinces covered	High level of quality	Reasonably high degree of uniformity
Outpatient pharmaceuticals	10 provinces covered	High level of quality	High degree of uniformity
Outpatient hospital services - Day procedure groups - Ambulatory care (Alberta)	8 provinces covered Only Alberta coverage	Moderately high level of quality Unknown level of quality	High degree of uniformity Not applicable
Other professional services - Optometry - Chiropractic - Physiotherapy	5 provinces national estimate 4 provinces	Moderate quality Low to moderate quality Low quality	Moderate uniformity High uniformity No uniformity
Long term care	10 provinces	Generally low degree of quality	Very little uniformity
Home care	5 provinces	Low quality data	Low degree of uniformity
Ambulance services	7 provinces	Low quality data	Low degree of uniformity

## GLOSSARY

**Activity-based costing (abc).** The determination of the cost of an encounter or episode of care based on separate activities which go to produce the episode. Standard costs are estimated for each activity, and the cost of the episode is the sum of the costs of all activities.

**Acute care.** Care provided with active medical intervention.

**Bottom-up costing.** The determination of cost of an encounter based on the separate resources which are used. Synonymous with micro-costing.

**Case mix groups.** Groups of inpatient cases which are in a common disease and procedure group, and which are expected to use similar amounts of resources.

**Charges.** The price which is set (asked) for a service. This may not equal the amount which is actually paid.

**Continuing care.** Non-acute residential and community care. Usually includes social as well as health services, including transportation.

**Cost object.** The measure of output, against which costs are measured.

**Cost per weighted case.** The cost per unit of output, primarily referring to inpatient, acute care; weighted cases are usually expressed in terms of Resource Intensity weights.

**Direct costs.** (1) Costs of health care services which are provided through the health care system. (2) Costs which are directly linked to specific outputs; e.g., the cost of labor used in a medical treatment.

**Episode.** A series of contacts with providers, with a beginning and ending event, for which care is oriented towards a single objective.

**Formulary.** A list of drugs whose use a payer will reimburse.

**Fees.** A set price for a service.

**Fixed costs.** Costs which do not vary with changes in the volume of services.

**Home care.** Professional (nursing, physiotherapy, etc.) care which is provided in the home. Sometimes includes home support.

**Home support.** Non-professional care which is provided in the home.

**Incremental costs.** Additional costs resulting from additional production or provision of services.

**Indirect costs.** (1) Costs of resources whose use is not directly related to patient care (e.g. overhead). (2) Costs of resources which are imputed because the resource owners are not remunerated financially for their services.

**Insured services.** (1) Services which are covered by a third party. (2) A minimum core of medical services (hospital and physician) for which coverage is mandated under the Canada Health Act; at their own discretion, provinces may additionally cover other services, in whole or in part.

**Job costing.** The measurement of cost on a unit by unit basis, by which resources are directly traced to each separate product.

**Long term care.** Non-acute residential services.

**Machining costs.** Costs of equipment; includes a cost of forgone capital, depreciation, costs of operating the machinery, and maintenance costs.

**Management Information System (MIS).** A system of information by which statistical and financial data is collected from hospitals. The MIS system is predicated on workload measurement units.

**Marginal costs.** The additional cost resulting from an additional unit of output produced.

**Opportunity cost.** The value of a resource or input in its highest valued alternative use. It assigns a value to what is given up when choosing one intervention over another.

**Out-of-pocket.** The amount spent out-of-pocket for health services, after any payments by insurers has been deducted.

**Overhead.** Resources which are not directly related to a unit of output, but whose use supports the production process.

**Perspectice.** The viewpoint taken, which in turn will determine which resources to include in the analysis.

**Private pay.** Payments for health services by non-government entities, including consumers and private insurers.

**Process costing.** Costing over a number of units by taking an average of all costs over all units produced.

**Professional component (of fees).** The proportion of a fee which goes to reimburse for professional services.

**Professional fee (drugs).** The pharmacist's dispensing fee.

**Prices.** The amount which is set to pay the provider for its services.

**Resource consumption profile.** The services provided in an episode of care.

**Resource intensity weight (RIW).** An index number which indicates the relative resources used in any given group of cases which are classed according to diagnosis, procedure and age.

**Resources.** Inputs such as labor, supplies, and services of machinery and equipment.

**Self-pay.** The amount a consumer personally pays for health care services, after all private insurance reimbursement has been deducted.

**Services.** Units of care provided.

**Standard costs.** An average unit cost of a service, which can be set in terms of a group average or an efficient level.

**Technical component (of fees).** The component of a fee which is designated to cover equipment, technician, and supplies costs.

**Top-down costing.** Average costing or process costing. All units (raw or workload units) are assigned the same cost.

**Variable costs.** That component of costs which change in response to changes in volume.

## **LIST OF ABBREVIATIONS**

**ACCS** – Ambulatory Care Classification System

**ALC** – alternative level of care

**CCOHTA** – Canadian Coordinating Office for Health Technology Assessment

**CIHI** – Canadian Institute for Health Information

**CMG** - Case Mix Group

**CMG / Plx** - Case Mix Group / Complexity overlay

**CWC** – Cost per weighted case

**CWD** – Cost per weighted day

**DPG** – Day procedure group

**DRG** – Diagnosis related group

**GIS** – Guaranteed income supplement

**ICD9** – International classification of diseases, ninth edition

**ICD9-CM** - International classification of diseases, ninth edition, clinical modifier

**ICU** - Intensive care unit

**LPN** – Licensed practical nurse

**MIS** – Management information system

**OAS** – Old age security

**PDW** – Per diem weight

**RAPDW** – Routine and ancillary per diem weight

**RIW** – Resource Intensity weight