Development and Testing of a Decision Support Tool for Healthcare Performance Measurement

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Key Implications for Decision Makers

- The research literature has defined measures of health care performance, and applying those measures to routinely collected data could provide important information for healthcare management and reform.

- The feasibility of using routinely collected data for measuring performance is determined by the validity of the existing data elements, the availability of data on key aspects of performance, and issues of privacy and confidentiality.

- Decision makers use performance measures for evaluation and planning. For performance measurement data to be more useful to them it needs to be easy to access and designed to answer a range of different questions in a timely fashion.

- A decision support tool using the expertise of researchers to define the key dimensions of performance and a sophisticated interface system to provide easy real time access to information can be useful to decision makers.

- Future work on performance measurement will require efforts to maintain and improve the quality of data and initiatives to design systems that make relevant information easily available to decision makers.

- Development of these systems will require leadership, commitment, and collaboration of researchers, data collection agencies, and decision makers.
Executive Summary

Measuring the performance of the healthcare system is a key element in healthcare management, reform, and renewal. The purpose of this study was to systematically examine research application and knowledge translation issues in the context of this increasing interest in healthcare system performance measurement. More specifically, the goals of the study were to 1) identify some of the key issues faced in applying measures of effectiveness, access, and quality of care described in the research literature to hospital discharge data routinely collected by the Canadian Institute for Health Information (CIHI); and 2) to develop and evaluate a decision support tool that would provide relevant information derived from those measures to decision makers. The funding partners for the project were the Ontario Hospital Association, the department of health policy, management, and evaluation at the University of Toronto, and CIHI. The study was done with the active involvement of a range of organizations involved in healthcare planning, management, and evaluation.

Applying techniques for measuring healthcare system performance to the CIHI data provided a useful reminder of the issues consistently faced when administrative data are used for evaluation: concerns over the validity of existing data elements, and the lack of data on key aspects of performance. Maintaining and improving the validity of data is complex and will require ongoing assessment and initiatives to improve coding. The problem is compounded by the incentive for institutions to change their coding practices in response to the use of the data for performance assessment or funding. Real commitment to meaningful performance measurement will mean adding new data
elements to administrative data specifically for the purpose of performance measurement and making better use of linkages among data sources to provide a more comprehensive assessment. Along with these data issues, statistical and ethical issues will need to be addressed in the assessment of the performance of low-population regions, small hospitals, or individual providers.

For performance measurement information to have a positive effect on the system, it must be made available to and used by decision makers. This study led to the development of a decision support tool that makes researcher expertise in producing information from administrative data available to decision makers through an interface that can be easily accessed in real time by decision makers. Decision makers can use the information to address a wide range of questions regarding healthcare system performance. The decision support tool was evaluated by a range of decision makers who routinely made use of administrative data for evaluation, planning, and management. They found the decision support tool to be useful and, although they identified some constraints and limitations, they felt this type of tool could play an important role in decision-making. A challenge for the future will be finding the support and leadership to develop such tools for those who could use them.

This project brought researchers, data collectors, and decision makers together to work through a process for taking measures described in the research literature, applying them to an existing data source, and making them relevant and accessible. Future work on performance measurement will require this type of collaboration and co-operation.
Background

Appropriate application of measurement methods and techniques developed by researchers to routinely collect data, and the subsequent use of information based on those measures by decision makers, are key steps in supporting evidenced-based management and reform. The purpose of this study was to systematically examine research application and knowledge translation issues in the context of the increasing interest in measuring the performance of the healthcare system. More specifically, the goals of the study were to 1) identify some of the key issues faced in applying measures of effectiveness, access, and quality of care described in the research literature to hospital discharge data routinely collected by the Canadian Institute for Health Information (CIHI); and 2) to develop and evaluate a decision support tool for providing relevant information derived from those measures to decision makers.

Over the last several years there has been an ongoing debate over reform and renewal of the healthcare system at the federal/provincial level as well as within provinces. A consistent theme of that debate has been the transformation of the system from a purely health insurance model, under which the government guaranteed payment for services but did not interfere in a system and where care was provided by a host of almost completely independent physicians and hospitals, to a healthcare management model, under which accountability for costs and outcomes is increasingly important and where governance strategies are forcing hospitals and providers to work together in new ways to meet common goals. Inherent in this transformation is the need for better measures of performance.
This need has manifested itself in many ways. There has been a recommitment and an expansion of support for existing national organizations, such as CIHI, and a new emphasis on provincial organizations that focus on using data to better manage the healthcare system, such as the Institute for Clinical Evaluative Sciences in Ontario and the Newfoundland and Labrador Centre for Health Information. Recent federal/provincial/territorial agreements have led to ongoing public reporting of performance, and these national efforts have been mirrored by province-level efforts at performance reporting designed both for public accountability and quality improvement, such as the *Hospital Report* series in Ontario. The results of the study provide insights into some important issues that should be useful to researchers with an interest in performance measurement, organizations that collect and use healthcare system data, healthcare managers, and policy makers.

**Partners involved in the project**

The funding partners for the project were the Ontario Hospital Association, the department of health administration at the University of Toronto (now called the department of health policy, management and evaluation) through funds it received from CP Ltd., and CIHI. The hospital association provided funding related to the development of clinical and utilization outcomes for its acute care hospital report, the CP Ltd. funds were from a project on national healthcare scorecards it supported, and CIHI provided an in-kind contribution of its discharge abstract database for three provinces — Alberta, Ontario, and Newfoundland — over a five-year period from 1994/95 to 1998/99. Praxia,
Inc. (Toronto) provided below-cost computer consulting and other support to develop a multi-dimensional decision support system for the performance measures.

Along with these funding partners, the project was initially designed in collaboration with the Swift Efficient Application of Research in Community Health (SEARCH) program, an Alberta-based program designed to support decision-making in regional health authorities, and the Newfoundland and Labrador Centre for Health Information. During the course of the project, other groups participated in developing and evaluating the performance measures and the decision support tool, including health regions in Alberta, district health councils and hospital partnerships in Ontario, and the Canadian Council on Health Services Accreditation.

*Measures of performance used in the study*

The research dealt with three separate sets of measures of healthcare system performance that are based on hospital discharge data. One is a set of measures that was designed to use hospital discharge information to measure access to and the effectiveness of office-based (that is, ambulatory) care. Although at first the notion of using hospital discharge data to examine the performance of ambulatory care seems counterintuitive, the principle behind these measures is that admission to hospital for a condition can provide information on the care provided for that condition outside the hospital. One of these measures is called ambulatory care-sensitive conditions. The idea behind ambulatory care-sensitive conditions is appropriate access to effective primary care should result in lower rates of admission to hospital for conditions that can be well-treated and controlled
by office-based primary care. For example, there are very effective ways to control and treat asthma on an outpatient basis, and if there is relatively good access to ambulatory care there should be relatively low hospital admission rates for asthma. Another measure that is used to examine the role of ambulatory care is called referral-sensitive conditions. The idea behind these measures is that for certain hospital-based procedures, the rates of admission are related to access to the office-based specialists who control the admission process for these procedures. For example, admission for cardiac revascularization depends on having access to cardiologists or cardiac surgeons, and access to hip or knee replacement depends on having access to surgeons who do these procedures.

The second set of measures was designed to assess equity in access to acute care hospitals. The issue driving the use of these measures is the notion that the Canadian medicare system was designed to remove financial barriers to healthcare, and the extent to which this goal has been reached can be assessed by measuring rates of hospital admission by income class. There is compelling evidence that the lower the income of a family or individual the more likely that family or person is to have healthcare needs. Therefore, if medicare reduces barriers to care, poorer people should have higher rates of use. Historically, this has been the case in Canada. However, the cuts in hospital spending, or at least the decreased growth in hospital spending, as has been common in recent years, could represent a fundamental challenge to ability of medicare to maintain equity in access. Initial work on bed closures in Manitoba did not show an adverse effect of these closures on hospital access by the poor. However, more recent work by one of us (GA) has shown that the downsizing of the acute care hospital system in Ontario was
borne proportionately more by the poor than by the rich. The project used data from CIHI’s discharge abstract database to measure hospitalization and census data from Statistics Canada to provide information on the income level of the region in which the patient resided prior to admission.

The final set of measures was designed to measure the quality of care provided by acute care hospitals. Measuring the quality of care is an essential part of any assessment of system performance. However, measuring the quality of care is complex and, although we continue to learn more about how to accurately measure quality, we still have a long way to go. The use of routinely collected hospital discharge data to measure quality of care is attractive because of the low marginal costs of using such data and because the data are collected in a consistent manner in all hospitals. However, the routinely collected data cannot be expected to provide a definitive assessment of the quality of care and may best be seen as a potentially important component of a much broader and comprehensive set of measures. In this context, the study examined the use of two important outcomes of hospital care: complications that occur while the patient is hospitalized; and readmissions to hospital after treatment.

**The decision support tool developed in the project**

Typically when researchers are working on performance measures using a large administrative data set, they define a limited and specific set of research questions, develop a set of computer programs that can be used to answer those questions, run the programs against the data, and then take the results and include them in a scientific paper
or journal article. There is an intense amount of effort involved in writing the programs so that they adequately reflect the concepts that are being measured while recognizing the characteristics and limitations of the data set. A key component of the intellectual capital investment of the researcher is the creation of the computer programs that define the appropriate application of research concepts and methods to specific data sources. The research process is sequential, focused on specific questions, and has the goal of producing an academic document. On the other hand, decision makers are more likely to be involved in an iterative process, where the questions that may be asked of the data change over time, and where the research results are not the final product but part of some broader decision-making process. The challenge is to make use of the intellectual capital developed in the research process and use it to support the decision-making process.

There are clearly problems with the passive diffusion of research into practice that involve the use of the end product of research — the journal article — as the input to decision-making. The development and regular release of “atlases” and other more descriptive and user-friendly documents by groups interested in performance measurement is an attempt to make research work more accessible and relevant to decisions makers. At the outset of the project, the plan was to build on this model by providing decision makers with information on the performance measures for their purposes in a hard-copy static format; basically as written reports or a limited set of spread sheets. This was to involve an iterative process where the managers and decision
makers would be provided with a menu of measures (for example, ambulatory care-sensitive conditions, complications) and of levels at which these could be reported (such as by geographic region, income quintile, age group), asked to identify the ones in which they were interested, and then have these reports produced for them. In essence, these would be custom-designed atlases.

As the project developed, there was a shift away from the idea of developing a series of static hard-copy reports to the notion of developing a dynamic interface that would allow managers and decision makers to access the intellectual capital of the researchers that resided in the programs for creating the measures and to query, in real time, the data in order to answer a range of questions on system performance. This led to the development of a system of data maintenance and analysis in electronic format that would allow quick access to data.

The creation of the decision support tool involved three steps. The first step was developing and testing a series of computer programs that could be applied to the discharge abstract database to create information on performance. Due to technical and confidentiality constraints, it was not possible for decision makers to manipulate these programs and apply them to the individual-level data to directly answer questions that were of interest to them. Therefore, the next two steps in the process were used to create a data set of information on performance that could be accessed by decision makers in real time and to then to create an interface that made it possible to manipulate the data easily in order to answer a range of queries.
In order to make the data accessible and easy to manipulate, we worked with Praxia Information Intelligence (Toronto, Ontario) to use the data output from the programs applied to the individual-level database files to create aggregate performance measurement data. These aggregations were defined by age, sex, income, and other characteristics, and the aggregate data were loaded into a multi-dimensional database (Essbase 6.1, Sunnyvale, California). The dimensions of the database were defined by types of performance measures (for example, complications or admissions for ambulatory care-sensitive conditions) and the levels of analysis (such as by age groups, geographic regions, or income quintiles). This process led to the creation of a multi-dimensional database that could be accessed through the use of relational database software. Seven dimensions defined the database structure:

- place of residence/hospitalization;
- time of hospitalization;
- cause of hospitalization by diagnosis;
- clinical category related to access to care;
- measures of hospital use and outcome;
- age and sex of patient; and
- income quintile of patient.

This large multidimensional database was then transferred to Microsoft SQL (Redmond, Washington) with a ProClarity Analytic Platform 4.0 desktop client (Boise, Idaho) to provide a query-based system for accessing data on specific aspects of performance.
The interface allows the user to use simple point-and-click processes to identify which dimensions are to be queried and then accesses the data to answer the query. In essence, the database is a large multidimensional spreadsheet with the rows and columns defined by different characteristics and with the cells in the spreadsheet containing the number of individuals with those characteristics (for example, the number of individuals admitted to hospital with a specific ambulatory care-sensitive diagnosis or group of ambulatory care-sensitive diagnoses in a specific region or group of regions, over a specific time period). The interface allows this information to be accessed quickly and for the data to be presented in the form of rates or graphs.

In order to refine the decision support tool, we tested several queries that we thought would be common questions for decision makers (regional health authority, district health council, hospital, professional society, and regional data body executives, analysts, managers, and representatives) against the decision support tool to determine if (i) the tool could produce answers to the queries; (ii) the answers were the same as those achieved with analyses based on the raw data; and (iii) the tool could produce the answers quickly enough to be used as part of a demonstration and evaluation project with decision makers. After several revisions, the data tool and interface met all three criteria.

Findings

**Applying measures of performance to the discharge abstract database**

The issues related to the application of methods and concepts defined in the research literature to the discharge abstract database can be divided into three broad categories: 1)
the validity of the data in the database; 2) the lack of important data in the database; and 3) the frequency at which events occur. The first two deal with properties of the data source itself and could be addressed with specific data quality or collection initiatives. The third is a property of the measure as applied to a specific population and is related to the purpose of the measurement process.

The database contains a record for each time a patient leaves the hospital, and each record describes the individual being treated, diagnoses and procedures, and other aspects of care. The data are entered on the discharge abstract by specially trained hospital employees using a standard protocol developed by CIHI. The data are sent to CIHI, where they are subjected to some basic edit checks and returned to hospitals for verification and recoding if required. The database was used in all provinces (except one) and provides a key example of comprehensive (that is, it includes all hospital discharges), common (that is, it is collected in most jurisdictions), standardized (that is, the data are collected under the same rules in all provinces and hospitals) data source that could be used to provide the basis for a standardized approach and national information on healthcare system performance. Data from three provinces (Newfoundland and Labrador, Ontario, and Alberta) were provided by CIHI for the study.

Although there is some validation of the data, there have been ongoing concerns over the accuracy or validity of key elements such as diagnoses. Data accuracy is a complex issue that has implications for both the precision of estimates of performance as well as the validity of comparisons of performance. Clearly, the lower the accuracy or the higher the
error rate of a data element, the less precise or useful are the estimates of performance based on that data element. However, errors that are random introduce less bias into comparisons than errors that are systematic. For example, if the rate at which heart attacks are incorrectly coded is the same across regions or hospitals, then assessment of trends or comparisons will have a degree of imprecision, but there will be no bias in comparisons. However, if there are systematic differences in coding over time or across regions or institutions (for example, if one hospital or regions uses different criteria for coding a heart attack) then comparisons may not be valid. Given that no data collection system is going to be completely accurate, the goal should be to minimize errors overall and to carefully look for systematic errors, since they can have a substantial impact on comparative performance assessment.

In our study we encountered one instance in which concerns over systematic variation in the coding of a key data element became an important issue. Complications were chosen as a key element in the public reporting of the quality of care provided by acute care hospitals in Ontario. The database is coded in a way that it is possible to identify diagnoses that develop after admission, and these post-admission diagnoses were used to identify complications of care. It came to the notice of the Ontario Ministry of Health and Long-Term Care that some hospitals had substantial increases in the proportion of cases that were coded with either complications or co-morbidities. A case weight system based on the database that had implications for hospital funding had been introduced, and there was evidence that some hospitals changed their coding practices in response to these
funding changes. As a result of these concerns, the complication rates were removed from the public reports on comparative hospital performance.

Along with issues related to the accuracy of data, there are issues related to failure of the database to contain data that might be useful for performance measurement. The initial work on measures of ambulatory care-sensitive conditions, referral-sensitive conditions, complications, and readmissions that had been done in the United States was based on routinely collected discharge data, and the discharge abstract database provided the basic data elements required to create the measures as were available in the United States. This similarity implies that the database is also subject to the same concerns about the lack of clinical detail that have been raised in relation to the use of administrative data for performance measurement in the United States. Many of these concerns deal with the lack of data that could be used for performance measurement. One group of concerns deals with that lack of data on potentially useful process measures of quality of care, including outcomes other than complications, readmissions, or death, as well as process measures such as the use of specific medications. Another set of concerns deals with the lack of clinical detail required to adequately risk adjust for differences in observed quality or costs. The use of routinely collected data sets for performance measurement will require not only making the most of existing data elements, but also careful planning related to the addition of new data elements.

Our project did identify one key data element — a unique patient identifier — that can play a key role in making the database a more useful tool for performance assessment. A
unique patient identifier, whether a healthcare number or some other administrative identifier, is required to link care for a patient in one hospital to care provided at another time or in another hospital. This database-to-database linkage is essential for defining readmissions. Furthermore, it is important to remember that identifiers are essential to data linkage, not only for linkage within the database, but also between the database and other data. For example, in Ontario the Hospital Report now links information from the database to information from another comprehensive database of emergency department care to provide a more comprehensive view of care. Although the discharge abstract database for Ontario and Alberta had a unique identifier on the records, almost 10 percent of records from Newfoundland lacked the identifier; this limited the measures that could be used on that province’s data. The lack of a unique identifier as a mandatory element of the database will limit its use in performance measurement.

As discussed above, the feasibility of using a measure to provide information on performance is based on the accuracy and availability of data. Another aspect of feasibility is related to the frequency of events. Events that happen very rarely or patterns of care that are almost universally applied are not useful in assessing comparative performance. This aspect of feasibility was explored in detail in the Hospital Report, which was designed to present data at the level of individual hospitals. In this context, readmission rates for some conditions (such as asthma) and procedures (such as hysterectomy and prostatectomy) were low and did not provide useful comparative information. Another issue deals with the size of the units being assessed. Small hospitals often did not have enough cases to provide useful comparative information on a
range of measures. The low frequency of events that is used to measure performance has important statistical implications and also raises issues related to privacy and confidentiality. For example, in the Hospital Report, concerns over confidentiality of both providers and patients meant that many performance measures could not be reported publicly.

**Evaluation of the decision support tool**

The evaluation of the decision support tool was based on a series of meetings with various decision makers. A structured agenda for these meetings with three distinct components was developed. The first component included a PowerPoint presentation describing the objectives and methods underlying the performance measures and the tool. The second component included three examples of the sorts of questions that could be answered quickly using the tool. After the first meeting, these examples were standardized and included:

- comparisons of province-level rates for Alberta, Newfoundland, and Ontario of admission for acute myocardial infarction to be used in small-area variations benchmarking studies. These comparisons were further broken down by income quintile of patients to compare equity of hospital use across provinces;
- descriptions of small-area variations in admissions for a potentially preventable (ambulatory care-sensitive) condition, chronic obstructive pulmonary disease, across counties in Alberta to be used in regional planning and resource allocation decisions for primary care resources. These
descriptions were further broken down by age and sex to test for common problems in coding for the disease and resulting variations; and

- market share analyses for hospitals serving patients in the Gander-Grand Falls area in Newfoundland and patient origin analysis for the hospital serving the majority of patients resident in the Gander-Grand Falls area.

The third component provided an opportunity for decision makers to request real-time analysis from the research team using the tool. Questions asked included a patient origin analysis for pediatric cardiac care, patient migration analysis for stroke, comparative length of stay analysis by income quintile for several counties, ambulatory care-sensitive condition rates by income quintile, and other requests.

Meetings were conducted face-to-face with groups of decision makers (three meetings) or through web conferencing and simultaneous teleconference (nine meetings). Each meeting included stakeholders in more than one location. The following table describes the breakdown of conference by province and type of decision-making organization.

Each checkmark (✓) represents one organization.

**TABLE 1. Distribution of Decision-Making Bodies Included in the Evaluations**

<table>
<thead>
<tr>
<th></th>
<th>Ontario</th>
<th>Newfoundland/ Nova Scotia</th>
<th>Alberta/ British Columbia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regional Health Authority/District Health Council</td>
<td>✓ ✓ ✓ ✓ ✓ ✓</td>
<td>✓ ✓</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>Hospital</td>
<td>✓ ✓ ✓</td>
<td>✓ ✓</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>Professional Association</td>
<td>✓ ✓ ✓</td>
<td>✓ ✓</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>Regional Data Body</td>
<td>✓ ✓ ✓</td>
<td>✓ ✓</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>Researcher</td>
<td>✓ ✓ ✓</td>
<td>✓ ✓ ✓</td>
<td>✓ ✓ ✓</td>
</tr>
<tr>
<td>Ministry of Health</td>
<td>✓ ✓</td>
<td>✓ ✓</td>
<td>✓ ✓ ✓</td>
</tr>
</tbody>
</table>
A detailed questionnaire was used to collect information from decision makers on their use of performance information in general and their evaluations of the usefulness, completeness, and overall value of the tool’s data structure and interface. The questionnaire was developed in collaboration with other researchers and field tested prior to its use.

Following the meetings, each decision-maker participant received a copy of the questionnaire. We also completed several one-to-one telephone follow-up meetings with decision makers.

**Results of the evaluation of the decision support tool**

A number of stakeholders stated that they would be willing to contribute data to the decision support tool, support further development of the tool, and evaluate future versions of the tool. Mean scores for the overall usefulness of the tool and the performance measures were greater than 85 percent (six out of a possible seven points) and more than three-quarters of the respondents said that they would use the tool on a regular basis.

The evaluation sessions captured a broad spectrum of information users, most of whom regularly needed to refer to data. Types of data services currently used by decision makers for planning included custom or one-off analyses of the CIHI discharge abstract database (89 percent); mortality data (83 percent); Statistics Canada census data (67 percent); the National Population Health Survey (67 percent); and physician billing data (39 percent). Overall, 72 percent of decision makers used routinely collected data at least once a month, and they used it for three major purposes: resource planning (78 percent);
performance measurement (78 percent); and resource management (67 percent). More
detailed analyses requiring substantial programming tended to focus on the same issues,
although resource management was somewhat more common: resource planning (56 percent);
resource management (50 percent); and performance measurement (42 percent).
The scope of analyses focused on utilization data organized to reflect the different aspects
of performance included in the tool. Just less than two-thirds of users reported analysing
hospital data to measure utilization (61 percent); access to care (61 percent); or outcomes
of care (56 percent). Thus the tool could support a wide range of the data requirements of
regional and institutional decision makers.

The online and in-person demonstrations of the tool showed that it could answer
important queries for potential users more quickly than their typical processes, that it
could provide support for decision support staff within regional planning bodies and
hospitals, and that it produced the same answers as custom or one-off queries based on
the same data. During the evaluation sessions, decision makers rated the tool and its
features positively and described it as a useful and agile analytic system, as providing a
valuable link across different indicators, as using an innovative web-based approach
(along with the presentations), and as having strong local applicability. They rated the
population-based analyses as very important, with both community of residence- (90
percent) and hospital of admission- (89 percent) based analyses receiving ratings of
important or very important to planners and managers. Other types of analyses were less
important; only 42 percent rated analyses by income quintile as important or very
important, and only 32 percent said that an additional potential analysis by employment status was important or very important.

The evaluation sessions and the questionnaires also identified a number of key issues for future development of the database. These issues included most prominently:

- the inclusion of measures of resource availability, such as physician-to-population ratios, in the tool;
- the inclusion of population measures of health status, such as mortality rates, in the tool;
- some attention to issues of statistical comparisons, such as confidence intervals;
- the inclusion of more timely and clean data in the tool;
- the use of more age groupings, such as newborns, adolescents, and young adults; and
- the development of a manual or short training session so that all potential users could quickly access the tool and use it to its potential.

Conclusions

The application of techniques for measuring effectiveness, equity, and quality of care to the discharge abstract database provided a useful reminder of the concerns that have been expressed about the use of administrative data previously; concerns about the quality of the data that are being collected and the lack of data elements that are important to performance measurement. Future use of the database for performance measurement will
require a strategy to deal with these issues. Maintaining and improving the validity of
data in the database is complex and will require ongoing assessment and initiatives to
improve coding — the problem is only compounded by the incentive for institutions to
change their coding practices in response to the use of the data for performance
assessment or funding. Real commitment to meaningful performance measurement will
mean adding new data elements to the database specifically for the purpose of
performance measurement. Along with adding new data elements to the database, a key
to improving performance measurement is an effort to make it easier to link the database
to other data. These linked data can provide a more comprehensive and detailed
description of care than individual data sources. Along with these data issues, it will be
important to ensure that the measures proposed for performance measurement can be
meaningfully used at the appropriate level in the healthcare system. Assessment of small
regions, hospitals, or individual providers raises important methodological and ethical
issues.

Producing useful information on healthcare system performance by applying analytical
programs to existing data is only part of the challenge. For that information to have a
positive effect on the system, it must be made available to, and used by, those with the
power to control the system. This study led to the development of a decision support tool
that makes use of the discharge abstract database, that draws on the expertise of
researchers in developing programs that can be applied to the database, and that can be
easily accessed by decision makers in real time to address a wide range of questions on
performance. The tool was evaluated by a range of decision makers who indicated that
they often made use of routine data, not only for performance measurement, but also for resource planning and management. They found the tool to be useful, and although they identified some constraints and limitations, they felt this type of tool could play an important role in decision-making. One indicator of the value placed on the tool is the continued interest by two of the groups involved in the evaluation in continuing to work with the research team on developing specific purpose-built tools using the principles developed in this study. A challenge for the future will be finding the support and leadership to develop such tools for those who could use them.

This project brought researchers, data collectors, and decision makers together to work through a process for taking measures described in the research literature, applying them to an existing data source, and making them relevant and accessible. Future efforts to define, develop, and apply health system performance measures could draw on this collaborative and co-operative model. Each of these groups has important insights and experience to offer, but progress will depend on commitment and leadership to the development of a strategy to bring them together.