Short Report

A centralized approach to out-of-province genetic testing leads to cost savings: the Alberta experience


The Genetic Resource Center (GRC) is a centralized process for requesting genetic testing that is not available within the province (Alberta, Canada). In order to assess potential cost savings associated with this process, all applications received by the GRC in 2010 were reviewed, and cost savings were recorded for statistical analysis. Seven areas of cost savings were identified: (i) negotiated pricing, (ii) laboratory selection, (iii) testing setup in-province, (iv) duplicate testing, (v) inappropriate testing, (vi) sequential testing and (vii) testing offered within the province. The total test cost of the 615 applications submitted in 2010 without the GRC process would have been $766,783 (Canadian dollars). A total cost savings of $112,201 was achieved through the GRC, which represents 15% of the total cost of requested testing ($112,201/$766,783). This is the first study to examine areas of cost savings for genetic testing sent out-of-province. The greatest cost savings resulted from the areas of laboratory selection and negotiated pricing. A centralized process to manage out-of-province genetic test requests results in consistency in testing and significant cost savings.

Conflict of interest

The authors have no conflicts of interest to disclose.

The number and complexity of clinical genetic tests is increasing at a rapid pace. In 2001, clinical genetic testing was available for fewer than 800 conditions; in 2011, greater than 2500 different clinical genetic tests were available (1). Given the rarity of genetic conditions and the increasing complexity of genetic testing, individual molecular laboratories are not able to offer testing for every condition. It is not unusual for genetic testing for a particular condition to be available in only a handful of laboratories around the world (2). An increasing number of physicians are, therefore, ordering genetic testing through laboratories outside of their province or country of practice.

In Canada, each province and territory must respond to the increasing demand for out-of-province genetic testing. In 2007, Caulfield and colleagues interviewed genetic laboratory directors and clinicians across Canada regarding funding allocation for genetic testing (3). An assortment of different and relatively ad hoc decision-making processes were identified. This illustrates the challenge each provincial and territorial health care system faces as they respond to the clinical needs of the patients while maintaining fiscal responsibility and transparent decision making (4).

In Alberta, genetic testing is provided through Genetic Laboratory Services. There are two molecular genetics laboratories that provide testing for over 100 genetic conditions. Testing that is not available within Alberta is funded through a provincial program called the Genetic Resource Center (GRC), which was established in November 2009.
Physicians submit applications to the GRC. The GRC utilizes a systematic approach to select testing laboratories. Factors including test methodology, laboratory accreditation and price of testing are considered. If the minimum criteria of test methodology and accreditation are met, the testing laboratory is selected based on price.

The application form, the cost of the test, and selected laboratory, are sent to two clinical geneticists for independent review. The reviewers evaluate the application based on the clinical impact of testing and the sensitivity of the test selected. Because of fiscal constraints it is not possible to fund all applications. The reviewer’s feedback is submitted to an administrator for decision making.

Prior to 2009, there was no provincial process for requesting out-of-province genetic testing and each jurisdiction was responsible for its own requests. Clinicians applied for funding from a variety of bodies and selected a testing laboratory of their choice.

The GRC has led to several areas of cost savings including: laboratory selection, negotiated prices and setting up testing within the province for large families. This study investigates the total savings identified after reviewing all funding applications submitted during a 1-year period. This is the first study to look at the methods of cost savings for out-of-province genetic testing.

Methods

For this study, a review was performed of all funding applications submitted to the GRC between 1 January 2010 and 31 December 2010. Each application was assessed for savings resulting from the GRC process. Although not all applications met the criteria for funding approval, all applications were included in the study. During the study period 88 applications (14%) were not approved for funding.

Test prices were converted to Canadian dollars based on the currency conversion as of January 2012. For tests offered in the United States, a 1:1 currency conversion was applied.

Cost savings for each application were recorded using the below described categories. Each category was summed to describe the total savings. General statistical and descriptive analysis was performed on the data.

Negotiated pricing

The centralization of the application process allowed the identification of a few laboratories that performed a relatively high proportion of the tests sent out. The GRC has successfully negotiated reduced pricing with these laboratories.

Although not all negotiated prices were in place between 1 January 2010 and 31 December 2010, we applied the discounted prices retrospectively to get an appreciation for these potential savings. The savings achieved by the negotiated prices were recorded as cost savings.

Laboratory selection

Applicants can indicate a preferred testing laboratory. The preferred laboratory was compared with the laboratory selected by the GRC. In cases where the GRC selected a different, less expensive laboratory, the cost difference was recorded as cost savings.

Testing setup in-province

The Edmonton and Calgary Molecular Diagnostics Laboratories had previously estimated the cost of designing an assay for a familial mutation to be approximately $650. This price is based on the cost of primers and reagents as well as technologist and director time.

The requesting physician is asked to identify the number of at-risk relatives residing in Alberta. A cost assessment is performed based on the expected number of requests for a familial mutation. If the total out-of-province cost exceeds the cost of designing the test, the test was setup in-province. For this study, the difference between the out-of-province cost and the estimated in-province cost was recorded as cost savings.

Duplicate testing

The GRC allows for the identification of duplicate applications where different physicians request funding for the same test on a patient. The physicians are made aware of the duplicate applications and one application is subsequently withdrawn. Duplicate test applications were recorded as cost savings.

Inappropriate testing

Despite recent advances in genetic testing, the diagnoses of some genetic conditions continue to be made on a clinical basis using published diagnostic criteria. For these conditions, genetic testing is infrequently indicated. Examples of clinically diagnosed conditions include neurofibromatosis and Ehlers-Danlos syndrome (5–7).

Physicians submitting GRC applications for such conditions were sent letters recommending a referral to the appropriate specialist. During our study, such applications were considered to be cost saving unless an application for funding was subsequently submitted by the appropriate specialist.

Sequential testing

For some conditions, there are multiple testing options. For example, a physician may request sequencing as well as deletion/duplication studies for a single gene or
sequencing of multiple genes associated with a single disorder.

In these situations, approval was given for sequential testing beginning with the gene or methodology with the highest detection rate. The secondary testing was only approved if the initial testing was negative.

For this study, each application and the subsequent test results were reviewed. If a mutation was identified after the first stage of testing, the cost of the secondary testing was recorded as cost savings.

Testing offered within the province

Applications were submitted for tests that were available within the province. In these situations, a letter was sent to the requesting physician informing them about the availability of in-province testing. The cost of the requested test was recorded as cost savings.

Results

Between 1 January 2010 and 31 December 2010, a total of 617 applications for molecular testing were submitted to the GRC. Two requests were excluded from the study because the charts could not be located. This left 615 eligible applications. The applications were for 206 conditions with the most frequently requested conditions listed in Table 1. Samples were sent to 73 laboratories in 10 countries.

The total cost of all 615 tests without applying the savings described above was $766,783 Canadian dollars. The cost of testing ranged from $90 for a familial mutation to $6995 for a multigene panel. The average cost of a test was $1188 with a median of $720. The total cost savings for all methods was $112,201, which represents 15% of the total cost of requested testing ($112,201/$766,783). These cost savings occurred across 32% (197/615) of the applications.

Sixty-two percent (382/615) of applications indicated a preferred laboratory for testing. The GRC was able to identify a laboratory with a better price for 21% (81/382) of these applications. Selecting a laboratory other than the preferred laboratory led to the greatest cost savings of $38,980 (35% of total cost savings).

Of the 81 applications where laboratory selection resulted in cost savings, 59 applications included a reason for requesting a specific laboratory. Reasons given for requesting a specific laboratory were:

1. the laboratory previously tested patient or family members (36/59),
2. location of the laboratory within Canada or North America (9/59),
3. familiarity with the laboratory and positive previous customer service experiences (8/59),
4. expertise of laboratory directors (3/59) and
5. laboratory offers testing for a panel of genes (3/59).

The second greatest area of savings resulted from negotiated pricing. Patient samples for 14% (86/615) of applications were sent to a laboratory with negotiated prices. This resulted in a cost savings of $26,863.

Twelve applications were submitted for genetic testing for conditions where a clinical evaluation by a specialist had not yet been performed. Letters were sent to the referring physician recommending a referral to a medical genetic clinic. It was not possible to determine if a referral was made to a medical genetics clinic. However, subsequent funding applications were not received for any of the patients, which may signify that genetic testing was not indicated.

In decreasing order of magnitude, other cost savings resulted from the identification of testing offered in-province, duplicate test applications, and the development of testing within the province. Sequential testing resulted in the lowest cost savings. Cost savings from these methods are described in Table 2.

Three requests were identified in which the GRC selected the more expensive laboratory. The preferred
laboratory for one of these requests was an unaccredited research laboratory. For the other two requests, there is no record of why the GRC selected the more expensive laboratory.

**Discussion**

The availability of, and demand for, clinical genetic testing is increasing. This places increasing pressure on provincial and territorial health care budgets (8). Alberta instituted a centralized model for funding in 2009.

Having all applications submitted through one funding center creates an opportunity for cost savings that would not otherwise exist. The greatest example of this is the systematic selection of laboratories based on price. Laboratory selection resulted in a cost savings of $38,980 which is 5% of the total cost of all applications.

The volume of testing associated with a provincial program provides negotiating power with testing laboratories. The use of fewer different laboratories may streamline other areas of the process, such as invoicing and shipping.

Only in a centralized model can duplicate test applications be identified, which results in cost savings and the prevention of repeated collection of patient samples. The GRC provides a single source of data that can be used to evaluate the possible repatriation of tests and assess funding needs.

Several of the categories of cost savings resulted in 1% savings. The identification of testing performed in-province and the identification of inappropriate test applications saved only a small amount. However, educating physicians regarding the genetic testing and medical genetic services within the province has the potential to improve patient care and underlines the importance of the GRC, regardless of potential cost savings.

By setting up testing in Alberta for large families with a known family mutation, the GRC saved roughly 1% of the total application cost. In many situations, testing for a known family mutation is available at low cost through an out-of-province laboratory and multiple family members do not often present to clinicians simultaneously. Given the current demands on the two Alberta Molecular Diagnostic Laboratories and the small associated savings, this practice may not be the most efficient use of resources.

The cost savings associated with sequential testing was roughly 1% of the total application cost. This category of savings was most labor intensive for both the GRC staff and the requesting physician. Often these applications are processed twice and samples may be shipped to multiple laboratories. On the basis of the human resources associated with this category of savings and the relatively small cost saving, this practice may also not be a prudent use of resources. The increasing availability of large multigene panels is likely to further decrease the feasibility of a sequential testing approach.

Although the system that has been setup is not without costs, the GRC program provides a consistent process for funding out-of-province genetic testing and creates opportunities for cost savings. The cost savings generated through the GRC allows additional tests to be funded by the program. On the basis of the average cost of a test calculated at $1188, an additional 94 tests could be ordered with the savings generated from the GRC process. As new genetic tests continue to become available, the ability to make effective decisions is increasingly important. (3).

**Limitations of the Study**

The primary limitation of this study results from the retrospective nature of utilizing current laboratory test prices and currencies that may have changed since the time of the initial application.

In addition, this study assesses cost saving on all applications received although some of the requests were not approved. Assessment of the cost of implementing and running a program such as the GRC and the ranking and approval of applications for genetic testing are potential areas for future research.

**References**