



Calculating cost savings in utilization management

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ABSTRACT

A major motivation for managing the utilization of laboratory testing is to reduce the cost of medical care. For this reason it is important to understand the basic principles of cost accounting in the clinical laboratory. The process of laboratory testing includes three distinct components termed the pre-analytic, analytic and post-analytic phases. Utilization management efforts may impact the cost structure of these three phases in different ways depending on the specific details of the initiative. Estimates of cost savings resulting from utilization management programs reported in the literature have often been fundamentally flawed due to a failure to understand basic concepts such as the difference between laboratory costs versus charges and the impact of reducing laboratory test volumes on the average versus marginal cost structure in the laboratory. This article will provide an overview of basic cost accounting principles in the clinical laboratory including both job order and process cost accounting. Specific examples will be presented to illustrate these concepts in various different scenarios.

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1. Introduction

Managing the utilization of laboratory services is not a new concept and there are many approaches that have become standard practice in the clinical laboratory. The formation of accountable care organizations (ACOs) and other risk-sharing health care reimbursement models has reinvigorated pressure for ongoing utilization management and the identification of new approaches to control physicians' use of laboratory services. Although there are some examples where laboratory testing may be underutilized (e.g. hemoglobin A1c and cholesterol screening) in most cases the issue is one of overutilization or the ordering of unnecessary tests. Therefore the main goal of utilization management programs is to reduce the overall cost of health care. In planning and implementing a laboratory utilization management initiative it is therefore important to understand what potential cost savings may be realized. Methods for cost accounting for laboratory services are well described and have not changed in recent years [1]. However, most physicians have a poor understanding of the basic concepts of cost accounting and how laboratory utilization impacts the operating budget and potential revenues in the hospital laboratory. Failure to understand the cost structure of the clinical laboratory has led to significant errors in the estimation of savings resulting from utilization management efforts reported in the literature. For example, some studies have reported "savings" using list fee charges for laboratory tests resulting in a significant overestimation of the actual true savings. The discussion will include the basics of cost accounting and how to approach the calculation of cost savings in the laboratory to determine the financial impact of utilization management initiatives. This will present an overview of costs in the laboratory operating budget, general

methods for calculating unit costs, and some specific examples of how to calculate savings in different utilization management scenarios.

Cost accounting is based on an analysis of the operations of a specific laboratory. While different laboratories may have similar cost structures and unit costs for individual tests, it is important to include site-specific data when analyzing costs to evaluate the impact of utilization management initiatives. The calculation of financial impact is based on understanding the costs incurred in the operation of the laboratory. Not included in this analysis is the potential impact on downstream costs associated with clinical decisions that may be impacted by laboratory tests. Laboratory operations for patient testing can be divided into three phases: pre-analytical, analytical and post-analytical. The pre-analytical phase includes specimen collection, transport, accessioning and processing. The analytical phase consists of the actual analysis. The post-analytical phase includes results reporting, specimen archiving and retrieval of the results by the clinicians.

The cost of testing in the laboratory must be distinguished from the charges to outside payers. Charges are defined for laboratory tests based on a charge master fee schedule (list price) which is discounted to a greater or lesser degree depending on the payer. In general, charges for laboratory testing on inpatients are rolled up into a single global fee for the entire hospital admission based on the patient's diagnosis (e.g. heart failure, acute myocardial infarction). The hospital is paid the same global fee regardless of how many, or how few, tests are performed during the inpatient stay. Therefore the hospital does not directly receive any revenue for laboratory testing on inpatients. On the other hand, most outpatient laboratory tests are billed directly to the payer potentially resulting in significant revenue to the hospital laboratory. As reimbursement for outpatient care transitions from fee-for-service to global payments for episodes of care, determining the revenues from laboratory testing will become more complex. Due to these

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uncertainties the impact of utilization management on laboratory revenues will not be covered in this chapter.

2. Operating costs

Hospital laboratories have two different types of budgets: the capital budget and the operating budget. The capital budget includes purchases of instrumentation, information systems, facilities, renovations and other one-time purchases. The capital budget typically varies from year to year depending on the needs of the laboratory and the amount of capital equipment money that is available. The operating budget covers the ongoing daily expenses needed to run the laboratory including labor, supplies and reagents, utilities and other expenses. Individual expenses in the operating budget can be categorized based on the different components of the laboratory operation or based on their relationship to test volume (as defined in Tables 1 and 2). These include direct costs, indirect costs, variable, fixed and semi-variable costs. It is important to understand these cost categories before a cost accounting analysis can be performed.

3. Cost accounting

Cost accounting is the process of deriving the cost for performing a single test in a specific laboratory operation. The steps required for cost accounting are outlined below.

3.1. Define the individual expenses and sources of data to include in the analysis

For assessing the financial impact of utilization management, the calculated cost per test should include expenses that will change as a result of the intervention. It is important to understand the difference between the average cost of a test (defined as the total laboratory budget divided by the total test volume: e.g. 1 million dollars/year divided by 200,000 tests = \$5 dollars per test) and the marginal cost of a test (defined as the incremental cost of adding or subtracting one test to a pre-existing operation). In calculating an average cost per test the analysis should include direct-variable and direct-fixed costs. Indirect overhead costs are difficult to allocate to specific tests for several reasons. If the actual indirect costs are embedded in the laboratory budget, these expenses can be incorporated into the cost per test calculation but this approach assumes that these costs are distributed equally among all of the tests performed in the laboratory. In most cases overhead costs arise from the operation of the entire hospital facility and are allocated to each department's budget based on a standard factor (e.g. a fixed percentage of every operating budget in the hospital). In this case adding overhead to the analysis of the cost per test is totally arbitrary.

In most cases utilization management eliminates tests from a pre-existing laboratory operation. In these situations calculation of the marginal cost of testing is the most appropriate. Marginal costs are often considered when new work is added to (or subtracted from) a standing operation and absorbed by the existing operation. In the case of marginal costs only the variable costs are included in the analysis. For example, the

Table 1
Types of cost based on the laboratory operation.

Direct cost	Directly related to the production of a specific laboratory test result. Examples: technologist salaries, consumable supplies, quality control material, reagents
Indirect cost	Not related to a specific laboratory test result but required to produce a result. These costs can be part of the laboratory expense base or expenses allocated to the laboratory from other non-revenue producing departments. Examples: utilities, management salaries, clerical salaries, cost of the space
Overhead cost	

Table 2
Laboratory costs as related to test volume.

Variable cost	Costs that change with specific test volume. Examples: reagents, consumables
Fixed cost	Costs that do not change with test volume. Examples: equipment costs (rent, lease, depreciation), maintenance contracts, cost of space
Semi-variable cost	Costs that may change with test volumes but with discrete increments. Examples: technologist salaries (regular and overtime), transportation costs,
Step cost	

marginal cost savings of eliminating one thyroid stimulating hormone test from a preexisting operation will include only the consumables (reagents, cuvettes, etc.). Labor and indirect costs will not be impacted. However, if a large number of tests can be eliminated it may be possible for the laboratory to reduce labor costs by reducing the number of technologists or overtime. In this case a step-variable cost is impacted and the potential savings are much greater.

The availability and reliability of data sources used to obtain individual expenses may influence the decision of which expenses to include in the analysis. Expenses that are difficult to obtain or that are based on overly-broad assumptions may produce a precise but inaccurate estimation of the total cost of a test. Costs should be included that capture the majority of the expenses related to the targeted test. These should be reproducible and routinely available from existing information sources (e.g. purchasing, accounting, laboratory budget). Costs which are not typically included should only be considered if a utilization management intervention will significantly impact their contribution to the operating budget. For example, if a proposal will reduce the footprint of the laboratory, then utilities might represent an important source of savings. Finally it is important to differentiate savings that are real versus those that occur only hypothetically on paper. For example, specimen transport incurs labor costs that can be allocated across all of the specimens in a courier route. However, if some tubes are eliminated from a specific specimen collection site there are no true savings since the courier must still come to the site to pick up the remaining specimens. A different situation occurs if a specimen is sent to a reference laboratory using a commercial courier service such as Federal Express (Fedex). Eliminating the specimen will also save the Fedex charge and the savings in this case are real.

Specimen collection is an often over-looked yet potentially important cost to consider in the utilization of laboratory services. The decision to include these expenses in the analysis should be based on the impact of the intervention on pre-analytical activities. When analyzing the cost of specimen collection there are three potential scenarios:

1. Eliminating the specimen collection process entirely.
2. Eliminating a test from a specimen that will still be collected for other tests.
3. Eliminating a tube from a multi-tube specimen collection.

Labor is generally the largest expense in specimen collection. Changes in specimen collection may, or may not impact the final total cost of a test. Real savings will occur when the specimen collection is eliminated completely. This saves both labor and specimen collection supplies. The labor savings will, of course, not actually be realized unless enough specimens are eliminated to have an impact on the step-variable labor expense. Eliminating a single test from a specimen that will be collected for other reasons (e.g. eliminating one test from a panel) will have no impact on pre-analytical expenses. Finally, eliminating one tube from a multi-tube specimen collection will save only by the cost of the tube. Similar considerations apply to the resources involved in specimen transport and non-analytical activities in the laboratory including specimen accessioning, storage and retrieval.

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