Elements of a Typical Laboratory Budget

Donna H. MacMillan, BS, MT(ASCP), MBA

Division of Laboratory Medicine, Massachusetts General Hospital, Boston, MA

DOI: 10.1309/99F7NNJ09M3TGQHW

An organization's success—even in a not-for-profit setting—is measured by its overall financial performance and by how effectively it manages the resources allocated to its individual operations. In this light, the budget is an essential tool for maintaining an effective and fiscally responsible organization. It falls to the business manager to carefully prepare and closely monitor the budget to help senior management guide the organization, evaluate its performance, and identify areas for improvement. The budget has a number of specific functions. First, it reflects the business strategy of the organization and contains the justification for the allocation of all resources (such as operating and capital dollars, human resources, infrastructure, and physical space). Second, the expense budget contains the information needed to establish charges and project net revenue. Third, the manager can perform an analysis of important variances to the budget to make any necessary adjustments, or make recommendations for changes to operations, so that the performance of the organization will meet the expectations of senior management.

Hospital administrators' perception of laboratory costs and revenues is changing. When managed health care first became prevalent, the hospital laboratory was originally seen as a cost center, that is, as a business unit whose operations generated little or no revenue. Laboratory managers were then charged with the task of providing the laboratory services at the lowest possible cost. Financial models from this perspective commonly used cost per test as a benchmark. More recently, however, a broader financial view has emerged in which the costs of providing laboratory services are understood in the context of their impact on other areas of the hospital, primarily how these services reduce the use of more costly resources.

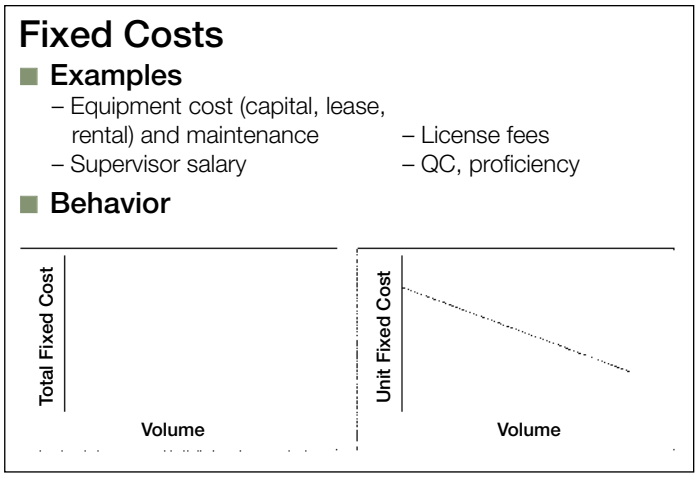
In the new financial models, cost per outpatient visit, cost per admission, and cost per inpatient day are valuable benchmarks for evaluating the contributions of the laboratory service. Two areas of laboratory operations are increasingly seen as revenue centers: outpatient laboratory services (as long as outpatient laboratory services are paid based on fee schedules), and the outreach programs of some institutions. Both are sources of income that can offset potential losses from in-house laboratory operations.

Most laboratories have both an operating and capital budget. The operating budget includes the ongoing income and expenses associated with operations. The expenses are generally categorized as either salary expenses or supply expenses. The income is categorized by the source of the activity. For laboratories, this could be inpatient, outpatient, research, or outreach testing. Operating budgets are funded on an annual basis and are usually reviewed every month. Capital budgets are for significant 1-time expenditures such as major equipment or construction. Capital budgets are funded on an annual basis and are generally reviewed monthly at the project level. In most organizations, operating and capital budgets have separate sources of funding. Resources are allocated to both budgets to reflect important initiatives that advance the strategy of the organization and its individual operations.

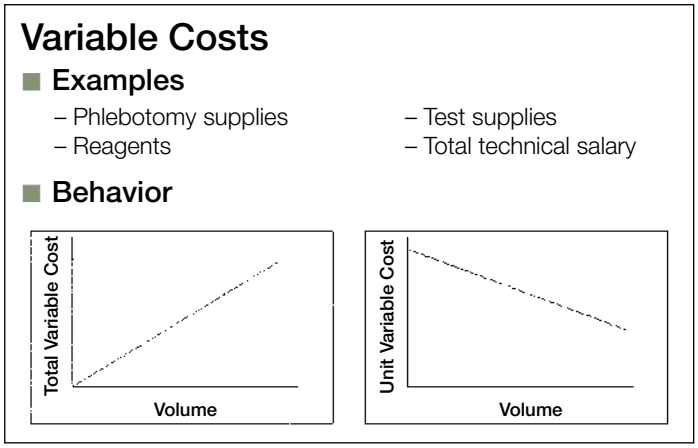
In this article, we will review the key components of laboratory operating and capital budgets, the basic steps in budget preparation, and methods for analyzing variances in an operating budget. By understanding how these elements behave, the laboratory manager can develop a more realistic budget and can more effectively manage operations within the constraints of those budgets.

Costs - Definition

The costs in an operating budget are categorized based on how they relate to the laboratory operation and how they behave as the laboratory operation changes. The largest category consists of direct and indirect costs. Direct costs are expenses that are associated with output of the operation such as reagents, quality



[**F1**] Fixed costs.



[**F2**] Variable costs.

control, and technologist labor. Indirect costs—also known as overhead costs—are associated with the operation, but not directly with its output. Examples of overhead costs include rent, utilities, and manager salary. Overhead costs can be directly associated with the laboratory or allocated to the laboratory from the total overhead of the organization. The overhead costs for the organization are usually allocated to each operation based on a pre-defined formula or value. For example, administrative salaries may be allocated based on the amount of time commitment required for that specific area. Utilities may be allocated based on the amount of space occupied by the laboratory.

Direct and indirect costs can be categorized as fixed or variable [**F1**-**F4**]. Variable costs change with time or with the level of activity; fixed costs do not change over time or as the test volume increases or decreases. Many direct costs in the laboratory are mixed or semi-variable. The cost will vary directly with activity until a threshold is reached and then significant additional resources are added or eliminated to meet the new demand.

A final cost category is full and marginal costs. Full cost is the sum of all the costs (direct and indirect) associated with performing the test. Marginal cost is the cost associated directly with adding an additional unit. Often, the cost of reagents is used for marginal cost. Labor, on the other hand, is generally not considered part of the marginal cost for most automated assays.

Costs - Behavior

Total fixed costs do not change as the volume of the laboratory increases or decreases. The unit fixed costs (total fixed costs per total volume) decrease as the volume increases because there are more tests to apply the fixed costs against. Total variable costs change as the volume changes; in contrast, the unit variable cost does not change as volume changes. Semivariable costs change in "steps" as the volume changes. Indirect or overhead costs will behave in the same way as fixed costs.

Because of the number of variables to consider when determining the cost for any given level of activity, cost accounting is not as precise a science as most would like. Therefore, it is preferable to define a cost model that accounts for the majority of the costs for the typical level of activity for the laboratory. If this is carefully done, the total operating budget will accurately reflect the unit and total costs and provide a reliable framework for understanding budget variances. The cost model can be adjusted with higher or lower volumes to project the overall impact of operational changes on the budget.

The Operating Budget Process

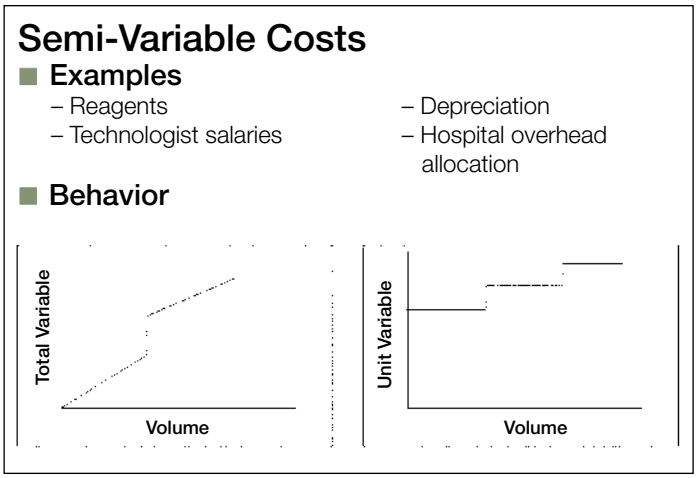
The budget preparation process often begins 6 months before the start of the fiscal year (which may differ from the calendar year). The early start allows the organization's budget manager to aggregate the individual budgets, adjust projections, determine the overall viability of the proposed budget, and obtain final approval from leadership and trustees. Managers can anticipate this process and gather the necessary information in advance of the actual preparation schedule. Unless the organization has experienced significant changes, budgets should be based on a review of historic and current performance as well as on projections of future business.

The operating budget is based on revenue and expense projections, both of which are determined by the volume of activity anticipated for the upcoming budget year. Volumes are projected at the test level and separated into patient categories (inpatient, outpatient, and research) or by account for outreach programs. Senior management may establish high level assumptions about admissions or outpatient visits for each service as guidelines that the laboratory manager can use to develop volume projections for the new budget. Accurate projections are based on the evaluation of historic performance, new services or programs, and contracts for new business. In some laboratories or specialties, the volumes for specific tests will vary significantly during the year. For example, a microbiology laboratory will have high volumes for influenza tests during the winter months and very little activity for the rest of the year. The budget process may include opportunities to account for seasonal variation, resulting in more accurate income and expenses projections for each month.

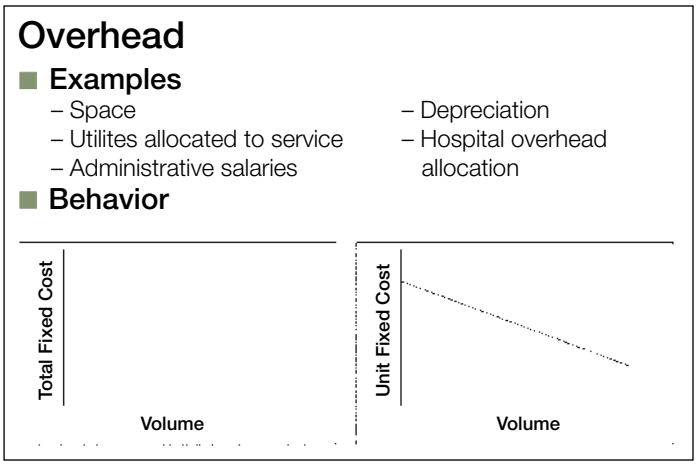
In most laboratories, labor costs such as salaries and benefits comprise 60% to 70% of the total expense budget. Staff and staff complement levels are determined by the scope of testing, technology, location, and service commitments of the laboratory operation. The salary section includes budgets for overtime, differentials (for evening, night, weekend, holiday), and temporary staffing. In most organizations, the salary and benefits package is developed by the human resources department and approved by senior management. The manager is responsible for verifying the budgeted hours for each technical staff position in their control. The budget process often includes the opportunity to build a justification for additional staffing needs based on the volume projections and other anticipated changes.

The supply portion of the operation budget is divided into 3 sections. The first section typically includes the reagent and disposable supplies associated with the service. Budget assumptions for each reagent should include patient volumes, reagents for quality control repeat or dilutions, and proficiency testing. For expensive assays, reagent waste due to short outdates may add considerable expense and should be included in the budget analysis. If changes in technology are planned during the new fiscal year, expenses associated with method evaluations or validations should be anticipated and included in the budget. The second section of the supply budget includes leases, maintenance contracts, reagents, rental agreements, and other long-term financial commitments. In many acquisition agreements, the lease expenses and reagent expenses are managed as separate contracts and may appear in different budget accounts. Again, if changes in technology are planned during the fiscal year, any lease or rental expenses should be included in the operating budget. The final section of the budget includes a variety of expenses, such as reference laboratory expenses, telephone and utility charges, general laboratory supplies, and office supplies.

In general, the budget is based on annual expenses and subsequently divided into 12 monthly statements. While reagent expenses will vary each month, some types of expenses, such as maintenance contracts or bulk reagent shipments, occur as large, less frequent (or 1-time) expenses. Many organizations build the monthly budgets to anticipate these large expenses and more effectively manage their impact on the overall budget.



[**F3**] Semi-variable costs.



[**F4**] Overhead costs.

Budget Variance Analysis

The budget is a financial model based on many assumptions of volume and expenses. It is important to compare the operation's actual performance (in terms of both volume and expenses) to the budget on an ongoing basis. The laboratory manager should complete an analysis of any significant variances from the budget. The manager can use the information obtained from the variance analysis to adjust the operation, adjust staffing, or inform senior management of important changes to the laboratory. In general, once the budget is approved, it is not changed. Unanticipated activity or errors in the assumptions will be addressed in the variance report. A review of the budget should be completed each month as the income and expense statements are produced. Detailed variance analyses may be completed each month or less frequently depending on the type of expense or the expectations of the budget office. It is useful to establish a threshold for initiating a variance analysis. This could be a dollar variance from budget or a percent variance from budget. These thresholds may vary within the budget. For large budget lines, the threshold variance may be a low percent of the line, but a large dollar value. Both positive and negative variances should be reviewed. The time spent to analyze significant monthly variances is invaluable for understanding the laboratory's performance and can make future budget work easier, since the analyses provide useful financial detail.

T1 shows sample budget lines with variances. Most budget reports include the information from the most recent month and the activity for the year to date. It is important to look at both sections to gather as much information as possible. In this example:

The outpatient activity for month 3 is below budget, but outpatient activity for the first quarter is well ahead of budget. Investigation would look at the unique events in month 3. How many working days compared to the other months? Were there

changes in the operation? Was a test discontinued? Was there a change in a business account? Volumes of individual tests may provide additional information about the drop in charges.

The overtime salary for the entire first quarter is well over budget, while the regular salary is under budget. This could be caused by ongoing vacancies in the department, which are covered by overtime for the existing staff. A review of the payroll reports and staffing reports from human resources will give details.

The reagent expenses are within reasonable variance limits for month 3, but are over budget for the first quarter. This may be caused by the decrease in activity, or a large bulk shipment earlier in the quarter. If the cause is not obvious, it may be necessary to review the purchase orders and expenses for the quarter to ensure that there are no errors in the charging the expenses to the cost center, that the expense belongs in a different line account, or that the vendor is charging at a rate different than was assumed in the budget

Capital Budget Process

Capital budget requests represent significant investments for the organization. In many institutions, capital expenses are defined as single expenses greater than $500. Senior management views these requests as a series of potential investments and will prioritize requests from each operation based on the answers to several questions:

What is the opportunity cost? What other benefits are sacrificed if the capital is given to this project? Will the organization receive any return (income) from this investment? Will the organization avoid any larger expenses from this investment (safety, legal, compliance) or reduce costs (length of stay, LIS support, equipment repair)?

There are 3 types of capital requests: new equipment, replacement equipment, and construction (new or renovations). The financial and operational justification for each type of request may vary. A request for new equipment may include one of several standard financial analyses: net present value, return on investment, and payback period. These tools allow senior management to set performance thresholds before considering individual requests. In many cases, the vendor will offer to perform these analyses as part of the sales process. The laboratory manager should verify the analysis or repeat the analysis to ensure that all factors have been considered and that the vendor's business assumptions match the assumptions of the organization. These analyses provide different information and decisions are based on predetermined criteria usually established by the organization's finance department.

The net present value (NPV) is the most frequently used benchmark for assessing capital requests for new equipment. These analysis looks at the cash flow (expenses and income) of the request for a period of time (usually 3 or 5 years). The financial outcome for each year is discounted to the current year. This accounts for the potential interest on the capital that is being given up to obtain the new capital. The finance department will define the number of years and the discount rate (also known as the cost of capital) that should be used in the NPV analysis. **T2** shows a simple NPV analysis for an analyzer that will provide new income to the hospital and reduce staffing requirements for the laboratory. The analysis was done for a 5-year period and assumes a discount rate of 10%. The general rule of thumb is that a project with a positive NPV should be funded. However, when most organizations have limited capital, additional criteria will be used. For example, 2 projects may have similar NPVs, but 1 also provides a reduction in labor costs. This project may be funded because senior management is working to reduce or redeploy its workforce. Similarly, a project with a negative NPV may be funded if it is critical to a larger strategic initiative with a significant financial or operational return. This is frequently the case with capital requests for renovation or information technology projects. Many requests for capital are to replace existing equipment such as analyzers, freezers, refrigerators, or microscopes. It is important to establish an ongoing strategy to replace this equipment and avoid emergencies due to failures and no funding available to replace the equipment. The first step is to build an equipment inventory of all capital equipment. The inventory can be used to prioritize requests for replacement equipment.

Sample Budget **T1**

Description	Current Actual	Current Budget	$ Var	% Var	YTD Actual	YTD Budget	$ Var	% Var
Inpatient Charges	$ 246,958	$ 219,370	$ 27,588	12.6%	$ 3,207,440	$ 2,621,718	$ 585,722	22.3%
Outpatient Charges	$ 1,574,862	$ 1,476,560	$ 98,302	6.7%	$ 20,663,446	$ 17,223,536	$ 3,439,910	20.0%
Total Charges	$ 1,821,820	$ 1,695,930	$ 125,890	7.4%	$ 23,870,886	$ 19,845,254	$ 4,025,632	20.3%
Salary-Professional	$ 36,484	$ 35,213	$ (1,271)	-3.6%	$ 126,000	$ 128,000	$ 2,000	1.6%
Salary-Technical, Regular	$ 50,548	$ 53,030	$ 2,482	4.7%	$ 691,650	$ 664,790	$ (26,860)	-4.0%
Salary-Technical, Overtime	$ 9,438	$ 2,610	$ (6,828)	-261.6%	$ 101,354	$ 33,862	$ (67,492)	-199.3%
Total Salary	$ 96,470	$ 90,853	$ (5,617)	-6.2%	$ 919,004	$ 826,652	$ (92,352)	-11.2%
General Lab Supplies	$ 24,546	$ 19,476	$ (5,070)	-26.0%	$ 218,482	$ 233,712	$ 15,230	6.5%
Reagents	$ 130,356	$ 75,464	$ (54,892)	-72.7%	$ 869,418	$ 906,380	$ 36,962	4.1%
Lease, Rental	$ 2,070	$ 2,070	$ —	0.0%	$ 24,840	$ 24,840	$ —	0.0%
Total Supply Expense	$ 156,972	$ 97,010	$ (59,962)	-61.8%	$ 1,112,740	$ 1,164,932	$ 52,192	4.5%
Total Expense	$ 253,442	$ 187,863	$ (65,579)	-34.9%	$ 2,031,744	$ 1,991,584	$ (40,160)	-2.0%

Net Present Value Analysis

T2

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Purchase	($100,000)	0	0	0	0	0
Income	0	$100,000	$150,000	$200,000	$300,000	$400,000
Reagents, Supplies		($40,000)	($50,000)	($60,000)	($70,000)	($70,000)
Salary and Benefits		($80,000)	($80,000)	($80,000)	($80,000)	($80,000)
Net Operating Cash Flow	($100,000)	$ (18,182)	$ 16,529	$ 45,079	$ 102,452	$ 155,230
5 Year Net Present Value	**$201,108**					

The second part of any capital request is a discussion of the impact of the investment on the laboratory operations. This section may include additional data from the operation that supports the request. The justification of need for replacement requests may be based on excessive instrument failure, maintenance costs and the impact on patient care. Other operational justifications could be based on new service requirements, greater efficiencies to offset staff shortages, or regulatory requirements.

Conclusion

The hospital laboratory is likely to experience changes over the next 3 to 5 years that are likely to affect the laboratory budget. These include: an increasing number of service requirements for the laboratory that will reduce the use of other; more expensive hospital resources such as radiology or inpatient beds; increasing costs for esoteric tests such as genetic based tests; and increasing salaries to retain qualified medical technologists. It is important that the laboratory director and manager have a thorough understanding of the budget for their laboratory, and use that information to develop strategies that will respond to these demands.

The budget should be based on a cost model and have sufficient detail to meet the needs of the financial manager while remaining accessible enough that the data can be managed on an ongoing basis. The cost model can be based on historic or prospective information. If built prospectively, the model should be verified against historic performance to make sure the model works. If there is no unit cost information available, then the financial manager could start to build a model with the higher cost tests or higher volume tests, based on the priorities of the organization. Finally, it is important to use the information obtained in the budget and the variance analysis to manage and improve the operation. The laboratory manager should balance the time spent on an analysis with its utility for the laboratory or senior management.