

Managerial Accounting Applications in Radiology

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We review the core issues in managerial accounting for radiologists. We introduce the topic and then explore its application to diagnostic imaging. We define key terms such as *fixed cost*, *variable cost*, *marginal cost*, and *marginal revenue* and discuss their role in understanding the operational and financial implications for a radiology facility by using a cost-volume-profit model. Our work places particular emphasis on the role of managerial accounting in understanding service costs, as well as how it assists executive decision making.

Key Words: Fixed cost, variable cost, managerial accounting, revenue, service activity costing, management

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Managerial accounting is one of the most powerful tools in the modern armamentarium of scientific business analysis. In this article, we introduce the basic concepts used in managerial accounting and discuss the core terms used in the field, including *fixed cost*, *variable cost*, *marginal revenue*, and *break-even point*. We also introduce a new approach that we have developed—service activity costing—that is particularly useful for understanding the cost basis of services in industries such as diagnostic imaging that have a relatively high ratio of fixed costs to marginal costs [1].

We address how managerial accounting can provide a clear, concise picture of the true costs of various services. We discuss what fixed costs and marginal costs are, why they are important in the short and medium term, and why all costs are marginal in the long term. We show how to model cost structures and discuss why doing so is so important.

Most important, we explore how these concepts and modeling systems help improve decision making and maximize the effectiveness and efficiency of the clinical practice [2-4]. Managerial decisions affect the quality of the work, the effectiveness of the workplace, and the profitability of the practice. In addition, managerial accounting provides the tools to model the effect of novel or even revolutionary designs for new services.

One misconception about cost accounting and mana-

gerial accounting in general is that it is applicable only to for-profit entities or only to outpatient global billing practices. In fact, these principles can be applied (albeit with some differences) to any type of medical (or non-medical) firm. Even public entities that are not in the business of making a profit (such as the government and the Army) use these tools to better manage, plan, and understand their costs. Although space limitations force us to focus on only one type of practice, keep in mind that these principles are highly adaptable and are used by a wide range of entities to analyze costs.

MANAGERIAL ACCOUNTING: ITS ROLE IN A MEDICAL PRACTICE

All of us are familiar, at least superficially, with the roles of financial accounting and financial accountants in our practices. These are the people who keep our books, prepare our taxes, and often perform a host of related services, such as payroll and cash management. Most physicians, however, are far less familiar with managerial accounting and the role that this discipline can play in building and running a successful practice. That is a shame, because managerial accounting is much closer to what radiologists need to do when they run their practices and make key choices in planning, purchasing, hiring, and so on. Indeed, most practice managers are probably already making “managerial accounting” decisions intuitively. The tools in this chapter will help them to analyze their practices and understand how costs are driven and how to make better decisions. Accounting systems can help radiology executives meet a host of challenges, including better command and control of the business, improved pricing of services, better cost con-

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tracting with external agencies, improved purchasing and planning, and developing performance incentives for employees.

CHALLENGES TO ACCURATE COSTING IN RADIOLOGY

A radiology practice has some characteristics that can make accurate costing difficult, particularly for the uninitiated. First, it is a high-fixed cost business, and although the variable costs are nontrivial, they are small when compared with the large fixed costs. Furthermore, there has been a downward trend in variable costs as sites convert to digital archiving. A second source of difficulty is that most practices provide a wide array of services across multiple modalities. This diversity has the potential to create a great deal of cost confusion. There are often many shared elements, such as front office services, billing, and collection. This can make accurate cost analysis difficult, and empirical studies have shown that actual costs can be quite different from what is commonly assumed [5,6]. Although business decisions are made for a variety of financial and nonfinancial purposes, the techniques of managerial accounting can give the radiology executive a much better grasp of how costs are generated, how they can be appropriately allocated, and how to better manage the business.

TYPES OF COSTS AND COST ALLOCATION

The radiology manager faces a difficult task in distinguishing the types of costs a practice incurs. Some traditional ledger and capital costing approaches can be misleading and result in distorted or even destructive decision making [7,8]. In particular, failure to allocate costs accurately can produce inaccurate profitability analyses that penalize higher-margin services and underestimate the costs of less profitable services. It can also distort incentives for employees and allocation of resources. Activity-based costing systems, conversely, use techniques to avoid or at least minimize these distortions [9-11]. Activity-based costing systems can get to the root costs of the business processes that are used in providing health care services [12]. The ultimate goal of activity-based costing systems and other forms of managerial decision making is to improve decision making and improve the business [13,14].

As part of the costing process, costs are usually divided into two categories: Fixed costs and variable costs. Fixed costs are constant and do not depend on the number of service procedures that the practice provides. Examples include the costs of purchased or leased equipment, office space, and the base salaries of critical personnel. In contrast, variable costs do depend on the amount of ser-

vice(s) provided. They vary directly with the number of revenue-producing service procedures performed at the facility. Examples of variable costs are the costs of contrast, film, and overtime. It is important to note that the terms *fixed* and *variable* refer to their effects relative to the product or service and not to their inherent payment flexibility or illiquidity. Hence, the lease of a magnetic resonance imaging (MRI) system is a fixed cost, although the lease may be subject to cancellation, because the cost is incurred even if no procedures are performed.

The reader may have already realized an extremely important aspect of this particular partitioning of costs. The definition of *fixed* depends on the length of time associated with the analysis. A lease, for example, constitutes a fixed cost only after it is signed and then only for the duration of the lease. It is a variable cost before it is signed or for purposes of negotiating renewal.

Another frequently used dichotomy is that of direct vs. indirect costs. These refer to costs that can be attributed to the delivery of service. Direct costs are attributable to the resources that are directly used or consumed by the service; for an MRI, these would include the machine and equipment maintenance cost, the costs of the technologist and the radiologist, and consumables such as film, contrast, and linen. Direct costs can be traced to a service easily—i.e., directly. Indirect costs refer to what is more commonly known as *overhead*—things that support the service but may also be applied to other services or just to general support, i.e., costs that can not be directly tied to the service. Indirect costs include items such as the costs of administrators, the telephone, office and stockroom space, insurance, marketing, office supplies, janitorial help, and snow removal. Sometimes a single supplier bill contains both direct and indirect components; the practice's electricity bill, for example, includes general office costs, which are probably impossible to allocate to a single service, and a substantial component from the imaging system, which should be allocated as a direct cost because that can be directly tied to the service.

Note, too, that both direct and indirect costs can be either fixed or variable. For example, a technologist paid strictly on a salary basis constitutes a fixed cost. If there is an incentive plan that includes a volume-driven monetary reward, then the technologist is both a fixed cost and a variable cost; finally, if the technologist is paid strictly on a per-procedure basis, then that constitutes a pure variable cost for the practice. Irrespective of the salary structure, the technologist represents a direct cost associated with the MRI facility. On the indirect side, the janitor's work is a fixed cost (unless additional work with overtime costs is generated by a busy day, in which case there would also be a variable component) that is spread over all types of studies performed. As a general rule, the

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