
1 Managerial Medical Cost Accounting, Structure, Modeling, and Behavior

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INTRODUCTION

Controlling hospital and healthcare organization costs is a function of internal controls and the decision-making process to purchase assets and incur expenditures. This includes operations, processes, human resources, healthcare information technology (HIT), and purchasing.

Thus, while this was not, strictly speaking, a financial strategy in the past, cost accounting is now considered by most healthcare executives an important financial management function.

In today's competitive medical marketplace, managerial cost accounting is often used to set short- and long-term healthcare entity business policy. The information is used to increase profitability by decreasing costs, increasing revenues, or decreasing operating assets. More than ever, cost accounting can mean the difference between a successful healthcare entity and a moribund one. Managerial cost accounting consists of many goals, such as:

- providing vital costing information for internal entity use
- developing proactive future entity strategic plans information
- accentuating the relevancy and flexibility of financial data
- reviewing real-time medical service segments, rather than just total entity operations
- acquiring nonfinancial healthcare business data

WHAT IS MEDICAL OR HEALTHCARE COST ACCOUNTING?

Definition: A method or means of accounting in which all incurred costs and expenses carrying out a medical activity or service, or accomplishing a patient care purpose, are collected, classified, and recorded. This data is then summarized and analyzed to arrive at a service, invoice, or selling price, or to determine where cost savings are possible.

Medical cost accounting is designed for healthcare managers and administrators. Because managers are making decisions only for their own unique entity, there is no need for the data to be comparable to similar data from other organizations. Instead, the important criterion is that the information must be relevant for decisions that healthcare administrators make in their particular environment. The accountants who handle the cost accounting information add value by providing good information to managers who are making decisions.

Cost accounting is regarded as the process of collecting, analyzing, summarizing, and evaluating various alternative courses of action involving costs, and then advising management on the most appropriate course of action based on the cost efficiency and capability of the management.

All health organizations are interested in costs. The control of past, present, and future costs is the job of all healthcare managers. In the entities that try to have profits, the control of costs affects them directly. Knowing the costs of medical services and products is essential for making decisions regarding price, payer mix of products, and services. As a result, there is a wide variety in the cost accounting systems for different hospitals and sometimes even in different parts of the same hospital or healthcare entity. Therefore, the following different healthcare cost accounting approaches are discussed in this textbook:

- standard and lean accounting
- activity-based cost (ABC) accounting
- relative resource-based accounting
- throughput cost accounting
- cost-profit-volume analysis, and
- revenue cycle accounting

In contrast to the financial accounting of a Certified Public Accountant (which considers money as the measure of economic performance), cost accounting considers money as the economic factor of production.

Managerial cost accounting is not governed by generally accepted accounting principles (GAAP) as promoted by the Financial Accounting Standards Board (FASB). Rather, a healthcare

organization costing expert may be a Certified Cost Accountant (CCA) or Certified Managerial Accountant (CMA), designated by the Cost Accounting Standards Board (CASB), an independent board within the Office of Management and Budget's (OMB) Office of Federal Procurement Policy (OFPP).

CASB consists of five members, including the OFPP Administrator, who serves as chairman, and four members with experience in government contract cost accounting (two from the federal government, one from the industry, and one from the accounting profession). The Board has the exclusive authority to make, promulgate, and amend cost accounting standards and interpretations designed to achieve uniformity and consistency in the cost accounting practices governing the measurement, assignment, and allocation of costs to contracts with the United States.

CASB's regulations are codified in 48 CFR, Chapter 99. The standards are mandatory for use by all executive agencies and by contractors and subcontractors in estimating, accumulating, and reporting costs in connection with pricing and administration of, and settlement of disputes concerning, all negotiated prime contract and subcontract procurement with the United States in excess of \$500,000. The rules and regulations of the CASB appear in the federal acquisition regulation (see <http://www.acqnet.gov/far/index.html>).

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North American Industry Classification System (NAICS) codes are used to categorize data for the federal government. In acquisition they are particularly critical for size standards. The NAICS codes are revised every five years by the Census Bureau. As of October 1, 2012, the federal acquisition community began using the 2012 version of the NAICS codes (available at <http://www.census.gov/epcd/www/naics.html>).

Healthcare organizations and consultants are obligated to comply with the following cost accounting standards (CAS) promulgated by federal agencies:

- CAS 501 requires consistency in estimating, accumulating, and reporting costs.
- CAS 502 requires consistency in allocating costs incurred for the same purpose.
- CAS 505 requires proper treatment of unallowable costs.
- CAS 506 requires consistency in the periods used for cost accounting.

The requirements of these standards are different from those of traditional financial accounting, which are concerned with providing static historical information to creditors, shareholders, and others outside the public or private healthcare organization.

Most healthcare organizations also contain **cost centers** that have no revenue budgets or mission to earn revenues for the organization. Examples include human resources, administration, housekeeping, nursing, and the like. These are known as responsibility centers with budgeting constraints but no earnings. Furthermore, **shadow cost centers** include certain non-cash or cash expenses, such as amortization, depreciation and utilities, and rent. These non-centralized shadow cost centers are cost-allocated for budgeting purposes and must be treated as costs.

COST BEHAVIOR, STRUCTURE, AND MODELING

Cost behavior is the study of how costs change in relation to variations in activity, service, or use. Kaizen costing, a Japanese method of cost reduction, is the pursuit of "continuous improvement" to reduce costs. Its prime purpose is to gather cost data for managerial control. Inherent in every Kaizen costing strategy are the following goals:

- Create waste-free systems with economic policy and procedures.
- Define clear leadership buy-in to financial initiatives.
- Sustain a culture of unrelenting continuous quality and economic improvement.

Installing a Kaizen costing culture is a top-down, bottom-up process. Like cost accounting itself, there is no single best way to implement it. Rather, mature and emerging healthcare organizations must find their own ways to effectively manage costs.*

Healthcare organizational costs may be divided into several categories, including fixed, variable, hybrid mixed, extraneous, differential, controllable, opportunity, sunk, relevant, carrying, future, and human resource costs. These costs are accounted for through some relevant range, which is an economic principle that can be defined as the range of medical service activity within which certain assumptions are neither too high nor too low, and relate to variable and fixed cost behavior with validity.

TYPES OF COSTS

Fixed Cost

A **fixed cost** can be viewed in the aggregate or on a per-unit basis, but it always remains constant. For example, clinic rent does not increase if hours are expanded into Saturday or Sunday.

Total fixed costs are not usually affected by changes in activity (i.e., clinic rent, taxes, insurance, depreciation, salaries of employees and key personnel). Rent is still due even if no patients are seen. A fixed cost remains constant, over the relevant range, even if the level of activity changes (i.e., busy summer or winter slow down). However, fixed costs decrease on a per-unit basis as the activity level rises and increase on a per-unit basis as the activity level falls.

Generally, decisions or changes do not alter fixed costs in the short term. They remain constant in total amount throughout a wide range of clinic activity, and they vary inversely with activity if expressed on a per-unit or per-patient basis.

Example

Assume that a physical therapy clinic dispenses durable medical equipment (DME) devices for various biomechanical conditions. The rent is fixed over the course of its lease at \$9,000 per month. Therefore, the total and per-unit rent costs at various levels of device activity would be depicted as follows:

Fixed Rent:		
Cost per Month	Number of Uses	Fixed Rent Cost Per Use
9,000	1	\$9,000
9,000	10	900
9,000	100	90
9,000	200	45

AQ2 The table shows the effect of volume (cost per month and number of uses) on the cost of rent per use. In other words, the more frequently the DME devices are used, the lower the fixed cost on a per-unit basis.

Variable Cost

Total **variable cost** increase and decrease in proportion to activity, while per-unit variable costs remain constant per unit. A variable cost changes in total in direct proportion to changes in the level of activity, but is constant on a per-unit basis. Clinic costs that are normally variable with respect to volume include: DME, indirect labor, and indirect materials such as utilities, air conditioning, clerical costs, and other medical supplies. Generally, variable costs change as a direct result of making a decision or altering a course of action.

* See <http://www.kaizen-institute.com>.

Example

The same physical therapy clinic dispenses a custom-made latex wrist splint for \$30 per device. The per-unit and total costs of the splints at various levels of activity would be depicted as follows:

Number of Splints Dispensed	Cost Per Splint	Total Variable Cost per Splint
1	\$30	\$30
10	30	300
100	30	3,000
200	30	6,000

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Generally, the manufacturing community has embraced the trend toward fixed business costs. Conversely, the medical community is trending toward more variable costs for two primary reasons:

- Medicine is a personal service industry.
- Migration is toward *locum tenens* and hired physician employment (i.e., non-owner physicians).

The current trend of healthcare organizations moving toward variable cost accounting leads to the following cost calculations:

Simple Cost Calculations

Total Costs = Total Fixed Costs plus Total Variable Costs:

$$TC = TFC + TVC$$

Furthermore, total variable costs for a medical clinic can be further equated to:

$$\text{Total Variable Costs} = (\text{TVC per visit}) \times (\text{number of visits})$$

So that:

$$\text{Total Costs} = TFC + \{(\text{VC/visit}) \times (\text{number of visits})\}$$

And, if given as Total Profit = Revenue (Price × Volume) – Costs, then:

$$\text{Total Profit} = (P \times V) - (FC + VC)$$

Hybrid Cost

A **hybrid cost*** is one that contains both fixed and variable elements. Although the designation may change from clinic to clinic, internal consistency is important for cost behavioral purposes. For example, an X-ray unit is leased for \$3,000 per year, plus \$10 per film. In this case, the yearly lease is the fixed element while the per-unit film charge varies depending on use.

Extraneous Cost

An **extraneous cost** is not related to a specific healthcare product, department, procedure, intervention, drug, patient, or service, and includes step-down, direct, and indirect costs.

* Also known as mixed, semi-variable, or step-fixed costs.

- A **step-down cost** is at the top of a hierarchy, where a primary center provides resources to other cost centers, such as human resources or nursing. The costs from the primary center are allocated to the other centers. Then, the primary center is closed and no other costs are allocated to it.
- A **direct cost** can be traced from its destination and can be traced specifically to the performance of a procedure. The more procedures done, the higher the direct costs. In a medical clinic or hospital, radiographs, surgical supplies, blood panels, durable medical equipment, and other procedures can be traced to a specific patient, while labor is traced to the organization's staff.
- An **indirect cost** must be allocated to general clinic overhead rather than specifically assigned to the cost driver in question. Such expenses as the rent, leaseholds, mortgages, or the office manager's salary are constant. They have no relationship to frequency of use.

Differential Cost

Any cost that is present under one alternative but is absent in whole or part under another alternative is known as a **differential cost**.

Example

Dr. Lindsay is an internist with a solo practice. He has been offered a hospitalist position* in a small rural hospital. The differential revenue and costs between the two jobs is depicted below:

	Office	Hospital	Differential Cost
Weekly Salary	\$900	\$1,200	\$300
Weekly Expenses			
Commuting	30	90	60
Lab Coat Rental	0	50	50
Food	<u>10</u>	<u>0</u>	<u>(10)</u>
Total Weekly Expenses	40	140	100
Net Weekly Income	\$860	\$1,060	\$200

Controllable Cost

A **controllable cost** occurs at a particular level of the clinic or healthcare entity if the physician-executive has the power to authorize the expenses. There is a risk/benefit and time dimension to controllable costs. For example, costs that are controllable over the long run may not be controllable over the short time. In the very long term however, all costs are variable and controllable.

Opportunity Cost

An **opportunity cost** is the potential advantage or benefit that is either sacrificed or lost when selecting one course of action over another. It is also known as an either/or decision.

For example, if Dr. Young Ophthalmologist were invited to speak at a local Lion's Club meeting about a new eye surgical technique, will the publicity garnered help his reputation enough to compensate for the actual time and revenue lost during his absence from the office? Some intangible opportunity costs cannot be mathematically calculated.

Sunk Cost

A **sunk cost** is an expense that has already been incurred and cannot be changed by any decision, either now or in the future. It is committed and irreversible. For example, the fancy new treatment

* A **hospitalist** is a physician stationed primarily in a hospital to handle all admissions from a specific medical practice or group, or a doctor that is responsible for treatments or processes during a hospital stay.

chair purchased by podiatrist Dr. Foot Haley, for cash, is a sunk cost. Nothing can be changed since she owns the chair outright.

Of course, hospitals and healthcare organizations should experiment with costing methodologies that are consistent with real-world and CCA, CMA, and CASB accounting principles. This includes practices that allocate fixed and sunk costs to determine variable costs. However, when cost adaptive principles are used to adjust price, a **sunk cost bias** may be observed. Biased sunk cost methodologies that falsely increase profits may be reinforced, as the degree of bias changes with demand, product differentiation, or the number of competing entities, and so on.

Relevant Cost

A **relevant cost** is avoidable as a result of choosing one alternative over another. All costs are considered avoidable, except sunk costs and future costs that do not differ between the alternatives at hand. The healthcare entity administrator should follow the steps below to identify the costs (and revenues) that are relevant in any costing decision:

- Assemble all of the costs and revenues associated with the alternative.
- Eliminate sunk costs.
- Eliminate those costs and revenues that do not differ between alternatives.
- Decide based on the remaining costs and revenues. These are the costs and revenues that are differential or avoidable, and are therefore relevant to the medical business decision to be made.

Example

Dr. Hartwell, an orthopedic surgeon, is considering replacing an old X-ray processing machine with a new, more efficient, automatic processing machine. Data on the machine are listed below:

New Machine:	
List Price New	\$9,000
Annual Variable Expenses	8,000
Expected Life	5 years
Old Machine:	
Original Cost	\$7,200
Remaining Book Value	6,000
Disposal Value Now	1,500
Annual Variable Expenses	10,000
Remaining Life	5 years

Dr. Hartwell’s office revenues are \$200,000 per year and fixed expenses (other than depreciation) are \$70,000 per year. Should the new processing machine be purchased?

ERRONEOUS SOLUTION

Some administrators would not purchase the new machine since disposal of the old machine would apparently result in a loss:

Remaining Book Value	\$6,000
Disposal Value Now	<u>1,500</u>
Loss from Disposal	<u>4,500</u>

CORRECT SOLUTION

The remaining book value of the old machine is a sunk cost that cannot be avoided by Dr. Hartwell. This can be demonstrated by looking at comparative cost and projected revenue data for the next five years.

	Five Years' Data		
	Keep Old Machine	Purchase New Machine	Differential
Sales	\$100,000	\$100,000	0
Less Variable Expenses	50,000 (5 × 10,000)	40,000 (5 × 8,000)	10,000
Less Other Fixed Expenses	35,000	35,000	0
Depreciation (New)	0	(9,000)	(9,000)
Depreciation (Old)/Book Value	(6,000)	(6,000)	0
Disposal Value (Old)	0	1,500	1,500
Total Net Income	\$9,000	\$11,500	\$2,500

Using only *relevant costs*, the correct solution would be:

Savings in Variable Expenses provided by New Machine (\$2,000 × 5 years)	\$10,000*
Cost of New Machine	9,000
Disposal Value of Old Machine	1,500
Net Advantage of New Machine	\$2,500

* \$10,000 – 8,000 = \$2,000.

Carrying Cost

Carrying cost represents the cost of maintaining inventory in a clinic, office, or storage facility. This cost includes rent, utilities, insurance, taxes, employee costs (e.g., labor and human resource costs, salaries, fringe benefits, holidays, vacations, etc.), as well as the opportunity cost of having space or capital tied up.

Future Cost

A **future costs** represents decision making in a forward direction relevant to an alternate selection process. There are two types:

- **Avoidable future costs** can be eliminated or saved if the activity in question is saved, eliminated, or discontinued. For example, salary and administration costs might be reduced in a hospital if 35 percent of the beds were taken out of service.
- **Incremental future costs** represent a change from a specific management activity (e.g., starting or expanding a service, closing or opening a department, acquiring new equipment). For example, the incremental costs for signing a capitated managed care contract would generate 100 new patients next year.

Human Resource Costs

Labor or related human resources typically make up a large portion of the overhead costs of any healthcare entity or medical office. Several non-specific labor costs are reviewed below.

- **Idle time labor costs** represent the costs of an office employee (direct office labor) who is unable to perform his or her assignments due to power failures, slack time, and the like.

Example

Let’s suppose that a full-time employee is idle for 4 hours during the week due to the doctor’s unavailability while in surgery. If the employee is paid \$20 per hour and works a normal 40-hour week, the labor cost would be allocated as depicted below between direct labor and office overhead.

Direct Labor Cost ($\$20 \times 36$ hours)	\$720
Office Overhead ($\$20 \times 4$ hours)	+ 80
Total Costs for Week	<u>\$800</u>

- **Overtime premium costs** are the overtime premiums paid to all healthcare office workers (direct and indirect labor) and are considered part of the general office overhead.

Example

Let’s assume that an employee is paid time and a half for overtime. During a given week, this employee works 46 hours and has no idle time. Direct labor costs would be allocated as depicted below:

Direct Labor Cost ($\$20 \times 46$ hours)	\$920
Office Overhead ($\$10 \times 6$ hours)	+ 60
Total Cost Week	<u>\$980</u>

- **Fringe benefit costs** are typically made up of employment-related costs paid by the office. These costs may be handled in two different ways: as indirect labor added to general overhead costs or as fringe benefits added to direct labor costs.

Healthcare Sector Costs*

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Payments and revenue received by physicians and healthcare entities represent the cost of business for the government, insurance industry, or paying sector. Generally, the paying sector includes hospital inpatients and outpatients, medical providers, skilled nursing facilities, and home healthcare agencies, all of which are annually indexed for inflation.

The Medicare Prospective Payment System

The Medicare Prospective Payment System (PPS) was introduced by the federal government on October, 1 1983, as a way to change hospital behavior through financial incentives that encourage more cost-efficient management of medical care. Under PPS, hospitals are paid a predetermined rate for each Medicare admission. Each patient was classified into a diagnosis-related group (DRG) on the basis of clinical information. Except for certain patients with exceptionally high costs (“outliers”), the hospital is paid a flat rate for the DRG, regardless of the actual services provided. Each Medicare patient is classified into a DRG according to information from the medical record that appears on the bill:

- principal diagnosis (why the patient was admitted)
- complications and co-morbidities (other secondary diagnoses)
- surgical procedures
- age and patient gender
- discharge disposition (routine, transferred, or expired)

* Source: Centers for Medicare and Medicaid Services.

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Diagnoses and procedures must be documented by the attending physician in the patient's medical record. They are then coded by hospital personnel using International Classification of Diseases, Tenth Edition (ICD-10-CM) electronic nomenclature. This is a numerical coding scheme of 13,000–25,000 diagnoses and more than 10,000 procedures. The coding process is extremely important because it essentially determines what DRG will be assigned for a patient. Coding an incorrect principal diagnosis or failing to code a significant secondary diagnosis can dramatically affect reimbursement.

Originally, there were more than 490 DRG categories defined by the Centers for Medicare and Medicaid Services (CMS, formerly known as the Health Care Financing Administration [HCFA]). Each category was designed to be “clinically coherent.”

In other words, all patients assigned to a DRG are deemed to have a similar clinical condition. The PPS is based on paying the average cost for treating patients in the same DRG. Each year CMS makes technical adjustments to the DRG classification system that incorporates new technologies (e.g., laparoscopic procedures) and refines its use as a payment methodology. CMS also initiates changes to the ICD-10-CM coding scheme. The DRG assignment process is computerized in a program called the “grouper,” which is used by hospitals and fiscal intermediaries. It was last significantly updated by CMS in 2006, 2010, 2012, and 2013.

Each year CMS also assigns a relative weight to each DRG. These weights indicate the relative costs for treating patients during the prior year. The national average charge for each DRG is compared to the overall average. This ratio is published annually in the *Federal Register* for each DRG. A DRG with a weight of 2.0000, for example, means that charges were historically twice the average; a DRG with a weight of 0.5000 was half the average; and so on.

Top 10 Diagnosis-Related Groups

The ten highest volume Medicare DRGs represent about 30 percent of total Medicare patients. Each of these higher-volume DRGs represents from about 2 percent to 6 percent of total Medicare volume.

The Medicare Inpatient Prospective Payment System

The final rule from CMS for the inpatient prospective payment system (IPPS) for fiscal year 2008 was published in the *Federal Register* on August 22, 2007, and became effective on October 1,

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TABLE 1.1
Top 10 Diagnosis-Related Group

	DRG	DRG Description	% Total	Relative Weight
1	127	Heart Failure and Shock	5.99	1.0234
2	089	Simple Pneumonia and Pleurisy Age > 17 with CC	3.85	1.1447
3	014	Specific Cerebrovascular Disorders except Transient Ischemic Attack	3.18	1.2056
4	430	Psychoses	3.18	0.9153
5	088	Chronic Obstructive Pulmonary Disease	3.11	1.0067
6	209	Major Joint and Limb Reattachment Procedures, Lower Extremity	2.78	2.3491
7	140	Angina Pectoris	2.33	0.6241
8	182	Esophagitis, Gastroenterology, and Miscellaneous Digest Disorders Age > 17 with CC	2.09	0.7617
9	174	Gastrointestinal Hemorrhage with CC	2.07	0.9657
10	296	Nutritional & Misc Metabolic Disorders Age>17 with CC	1.93	0.9313

CC: complications or comorbidities.

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Source: Health Care Financing Administration (CMS), 2004.

2007. It applied to discharges occurring on or after that date as the August 16, 2010, update is still pending. Highlights of the most recent IPPS rules include:

- Payments to all hospitals increased by an estimated average of 3.5 percent or by more than \$3.8 billion when all provisions of the rule were taken into account.
- CMS adopted the Medicare severity-adjusted DRG (MS-DRG) classification system that expands the current number of DRGs from 538 to 745. Weighting factors will be phased in over a two-year period.
- CMS will not pay for devices replaced at no cost or provide more than 50 percent credit to the hospital as part of a recall or warranty period servicing. Devices affected by the policy include pacemakers and defibrillators.
- CMS identified eight conditions that will not be paid at a higher rate unless they were present on admission, including three serious preventable events labeled “never events” that meet the statutory criteria. This change took effect in fiscal year (FY) 2009.
- CMS continues to use hospital costs rather than charges to set payment rates.
- CMS adopted a high-cost outlier threshold of \$22,650, down from \$24,485 in FY 2007.
- CMS measures 30-day mortality for Medicare patients with pneumonia and adopted two measures relating to surgical care improvement in the calendar year (CY) 2008 outpatient PPS final rule.
- CMS finalized two additional surgical care improvement measures by program notice after they receive National Quality Forum (NQF)* endorsement.
- The rule adds new quality measures for a total of 32 measures that hospitals would need to report in CY 2008 to qualify for the full market basket update in FY 2009. Medicare payments for inpatient hospital services were reduced by 2.0 percent if hospitals fail to report this quality information.

Other features of the final IPPS rule are outlined below.

MS-DRG Classification System CMS created 745 new MS-DRGs to replace the 538 existing DRGs from 2006 to better recognize severity of patient illness. The MS-DRGs are based on cost rather than charges and more accurately capture resource utilization by splitting the large number of former DRGs into three different categories based on the presence or absence of diagnoses classified as “major complication or comorbidities” (MCC), “complications or comorbidities” (CC), or “without MCC/CC” (non-CC).

CMS believed this scheme improved predictability and reliability of payments when combined with the reforms, more accurately reflected the costs of caring for a patient, and reduced incentives to “cherry pick” profitable patients.

The MS-DRGs were phased in over a two-year period, rather than at one time as originally proposed. For the first year of the transition (FY 2008–2009), half of the relative weight for each MS-DRG was based on the prior DRG relative weight, and half were based on the new MS-DRG relative weight. For the second year (FY 2009–2010), the relative weights were based entirely on the new MS-DRG relative weight.

CMS adopted its proposal to reduce the IPPS standardized amounts by 4.8 percent to maintain budget neutrality and account for expected changes in coding and documentation. Instead of applying a 2.4 percent adjustment over a two-year period as proposed, CMS applied an adjustment of –1.2 percent for FY 2008, and based on current projections CMS will apply adjustments of –1.8 percent each year to the IPPS standardized amounts for FYs 2009, 2010, and 2011.

* The National Quality Forum is a not-for-profit membership organization created to develop and implement a national strategy for healthcare quality measurement and reporting.

Hospital-Acquired Conditions The final rule of Section 5001(c) of the Deficit Reduction Act of 2005 (DRA) required the secretary to select at least two conditions that (a) are high cost or high volume or both, (b) resulted in the assignment of a case to a DRG that had a higher payment when present as a secondary diagnosis, and (c) could reasonably have been prevented through the application of evidence-based guidelines.

Beginning in FY 2009 (October 1, 2008), hospitals did not receive additional payment for cases in which one of the selected six conditions was treated unless the condition was present on admission.

“Never-Events” Below is the list of conditions that CMS first selected in the FY 2008 final rule.

- Serious preventable event: object left in surgery
- Serious preventable event: air embolism
- Serious preventable event: blood incompatibility
- Catheter-associated urinary tract infections
- Pressure ulcers (Decubitus ulcers)
- Vascular catheter-associated infection
- Surgical site infection; mediastinitis after coronary artery bypass graftsurgery
- Hospital-acquired injuries: fractures, dislocations, intracranial injury, crushing injury, burn, and other unspecified effects of external causes

Cost-Based Weights CMS will continue to use hospital costs rather than charges to set payment rates. The change was introduced in FY 2007 to better align payment with the costs of care by using estimated hospital costs, rather than list changes to establish relative weights for the DRGs.

In FY 2008, hospitals were paid based on a blend of one-third charge-based weights and two-thirds hospital cost-based weights for DRGs. For 2009–2012, hospitals were paid 100 percent based on cost-based DRG weights.

Outlier Thresholds In addition to the base payment for the DRGs, the law requires Medicare to make a supplemental payment to a hospital if its costs for treating a particular case exceed the usual Medicare payment for that case by a set threshold. Medicare sets the threshold for high-cost cases at an amount that is projected to make total “outlier payments” equal to 5.1 percent of the total inpatient payments.

For FY 2008, CMS adopted a high cost outlier threshold of \$22,650, down from \$24,485 in FY 2007. By better recognizing severity of illness in the DRG reforms that are part of the final rule, fewer cases were paid as outliers than if CMS had not reduced the fixed-cost loss amount.

Example

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Let us calculate payments on a UB-92 form* for DRG 1 (craniotomy, in a urban hospital, age > 17 years, except for trauma), with a federal rate of \$400 and a geographical adjustment factor of 1.194. Total payment to the hospital, or cost to Medicare, would be provided by the formula:

$$\text{Payment} = \text{DRG weight} \times (\text{federal capital cost rate} \times \text{urban adjustment} \\ \times \text{geographical adjustment factor})$$

OR

$$3.2713 \times (\$400 \times 1.03 \times 1.194) = \$1,609.24$$

* See Appendix 2.

2008: Projected Financial Impact Analysis Reimbursement levels for hospitals under the 2008 rules varied depending on analysis. According to the CMS, payments as a whole to hospitals increased by \$3.3 billion, or an average of 3.3 percent, to more than 3,500 acute-care hospitals in FY 2008–2009, provided they reported quality data to the agency. Projected aggregate spending is not expected to change under the MS-DRGs, but the CMS estimates that payments will be more likely to increase for hospitals serving more severely ill patients.

Payments are more likely to decrease for hospitals that treat the less sickly patients—such as rural and specialty hospitals. Urban hospitals, for example, which are expected to get a 3.5 percent to 3.6 percent increase, generally treat sicker patients. Rural hospitals, by comparison, may get just a 0.9 percent increase, compared with the 3.7 percent increase they received for fiscal 2007.

The net effect is a slim increase, although hospital groups claim acute-care hospitals will lose billions of dollars under the CMS proposal to introduce an expanded system for evaluating patient severity.

DRGs and Case-Mix Severity Rates It is important to recall that the average DRG weight for a hospital's Medicare volume is called the case mix index (CMI). This index is very useful in analysis because it indicates the relative severity of a patient population and is directly proportional to DRG payments.

When making comparisons among various hospitals or patient groups, the CMI can be used to adjust indicators such as average charges. (Case mix–adjusted average charges are the actual charges divided by the CMI. Such adjustments are sometimes referred to as “average charges for a weight of 1.0000.”)

The DRG classification system is a useful tool for managing inpatient quality measurements and operating costs. It groups patients by diagnostic category for analysis and provides several key measurements of resource utilization (e.g., average length of stay *versus* published national averages).

Outpatient Prospective Patient System

The Outpatient Prospective Patient System (OPPS) was introduced in 2000 to reimburse hospitals based on over 660 Ambulatory Payment Classifications (APCs), as described below.

Services for Hospital Outpatients These are paid per APC, as of the Balanced Budget Act of 1997, and as amended in 2000.

Example

Let us calculate payments for APC 80 (left heart catheterization) with a relative rate of 30 and a national conversion rate of \$50, for a total of \$1,500. Now, assuming a co-insurance rate of \$840, to adjust actual payment to a hospital with a wage index of 1.200 (i.e., .60 labor-related), we use the formula:

$$\text{Total Payment} = (0.60 \text{ index} \times \$1,500 \times 1.200) + (0.40 \times \$1,500) = \$1,680$$

$$\text{Co-insurance} = (0.60 \times \$840 \times 1.200) + (0.40 \times \$840) = \$940.80$$

Extra payment may be available for outliers and transitional corridors.

Home Healthcare Agencies As of October 1, 2000, these were paid per home health resource group (HHRG) if composed of six features: (1) 60-day episode, (2) case-mix adjustment, (3) outlier payments, (4) infrequent visit adjustments, (5) significantly changed conditions, and (6) beneficiaries who switch agencies.

As of December 26, 2007, home health (HH) PPS coding and billing information from CMS includes guidance to home health agencies (HHAs) on two issues related to the implementation of the refined HH PPS effective January 1, 2008:

- Billing options for HHAs whose systems are not ready to bill, based on the refined HH PPS, were released on January 1, 2008.
- There are upcoming revisions to the HH PPS Grouper, which may result in underpayments to HHAs, and the options available to HHAs on how to handle those potential underpayments. CMS will release the revised grouper system software HAVEN™ 4.0, and associated pseudo-code as soon as possible in 2008.

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New information regarding HH PPS case-mix refinements includes the following:

- Answers regarding transition episodes and steps for HHAs in completing the Outcome and Assessment Information Set (OASIS) assessments at the transition to the refined HH PPS January 1, 2008, have been determined. These will assure HHAs can create the proper payment group code for their claims.
- HH health insurance PPS (HIPPS) code weight table with spreadsheet maps for each of the 1836 new HIPPS codes to relate the refined HH PPS to its associated case-mix weight and supply payment amount.
- HH PPS claims processing changes are explained, with an outline describing the principal changes to HHA coding and billing that result from the refined HH PPS.

Medical Providers

These are paid per resource-based relative value unit (RBRVU), as of 1992, according to the lesser of the actual billed charges or the fee schedule amount. There are, however, two types of providers. Providers who accept Medicare assignment only bill the patient for the co-payment, which is usually 20 percent. Providers who do not accept Medicare assignment are offered a lower fee schedule of 95 percent of the approved schedule, which is a 115 percent maximum fee limit of the approved schedule.

Example

A participating physician's approved fee schedule charge of \$100 would yield \$80 from Medicare and \$20 from the patient. A non-participating (Non-Par) doctor with charges of \$200, and with an approved fee schedule of \$100, would yield: $(0.95 \times \$100) \times 1.15 = \109.25 entirely from the patient. If the Non-Par doctor selects payment type on a case-by-case basis, Medicare will pay its portion of the bill directly to the physician, but the doctor must accept the Non-Par fee schedule. Continuing our example yields: $(0.8 \times \$95)$ plus the patient's co-payment of $(0.2 \times \$95)$, or $\$76 + \$19 = \$95.00$.

Currently, there are more than 10,000 physician services designated by the current procedural terminology (CPT) or healthcare common procedure coding system codes. Each reflects the three major cost drivers of a particular procedure:

- **Physician work or the relative value unit of medical providers' work efforts (RVUw), pre-service, intra-service, and post-service:** Patients may exhibit anxiety when examined or during procedures, resulting in the need for additional time and effort by the physician to respond to and prepare for the examination or procedure. This uniformly adds more time and stress to the pre-service and intra-service period as doctors respond to constantly changing behavior, questions, and level of cooperation in varying specialties. Follow-up communication with employers, family, friends, and concerned others requires increased post-service time.

- **Practice expenses (RVU_{pe}), including non-physician costs but excluding medical malpractice coverage premiums:** The practice expense component of the RBRVU scale includes clinical staff time, medical supplies, and medical equipment. The costs of supplies and equipment often are not proportional to practice size. Major factors affecting practice expense are the volume of telephone, cell, or Internet management services and the case management and administrative work required. For example, high patient turnover requires more examination rooms to maintain physician efficiency. High volume requires more clerical staff to deal with larger patient-flow volume and resulting phone calls, difficulties dressing and undressing patients, and increased complexity and time in collecting laboratory specimens. These factors must be accounted for in any resource-based practice expense study and in the resulting practice expense calculations for medical services.
- **Malpractice (RVU_m) representing the cost of liability insurance:** The RBRVU system assigns RVUs to cover the malpractice expenses incurred by physicians. These malpractice RVUs, originally calculated for office-based physicians, may systematically undervalue the practice liability costs for some specialties. The prolonged statutes of limitation on some legal actions may result in increased malpractice risk exposure for physicians providing such services (i.e., pediatricians). The differences in exposure may not be calculated in the RBRVU system and were not included in initial studies. Specialty specific survey data for malpractice expense should be used for this component when assigning final RVU valuations. Without specialty-specific CPT codes, however, there is no way to do this objectively.

Skilled Nursing Facilities

These have been paid per Resource Utilization Group-III (RUG-III), with seven categories, six determinants, and 45 distinct patient types, since July 1, 1998. On January 1, 2006, a Medicare Part A skilled nursing facility (SNF) PPS price and a HIPPS coding update added nine new RUG-III categories that were effective for dates of service on or after January 1, 2006. In addition to these new RUG-III groups, CR3962 includes nine new HIPPS codes that are listed in Table 1.2.

The new Rule CR3962 also includes the following instructions:

- The case-mix system was refined and wage indices effective October 1, 2005, continue to apply.
- Medicare systems shall:
 - Apply the FY 2006 SNF PPS payment rates that are effective for dates of service on or after January 1, 2006, through September 30, 2006.
 - Discontinue temporary add-on payments, except for the add-on payment for residents with AIDS, with the implementation of the 53-group RUG-III coding system.
 - Edit the following therapy HIPPS codes, billed under the 0022 revenue code with units greater than 10 on bill types 18X or 21X, to ensure that at least one therapy ancillary revenue code, either 042X, 043X, or 044X, is reported on the claim: RHLXX, RHXXX, RLXXX, RMLXX, RMXXX, RVLXX and RVXXX.
 - Edit the following therapy HIPPS codes, billed under the 0022 revenue code with units greater than 10 on bill types 18X or 21X, to ensure at least two different therapy ancillary revenue codes, either 042X and/or 043X and/or 044X, are reported on the claim: RULXX, RUXXX.*

* **CMS Information:** Acting Administrator: Kerry Weems Publication 100-4, Transmittal# 630, CR# 3962 Medlearn Matters Number: MM3962 Related CR Release Date: July 29, 2005 Effective Date: January 1, 2006 Implementation Date: January 3, 2006.

TABLE 1.2
HIPPS Codes

HIPPS Code	Description		Plus Extensive services	ADL Index
1. RUX XX	Rehabilitation	Ultra High	High	16-18
2. RUL XX	Rehabilitation	Ultra High	Low	7-15
3. RVX XX	Rehabilitation	Very High	High	16-18
4. RVL XX	Rehabilitation	Very High	Low	7-15
5. RHX XX	Rehabilitation	High	High	13-18
6. RHL XX	Rehabilitation	High	Low	7-12
7. RMX XX	Rehabilitation	Medium	High	15-18
8. RML XX	Rehabilitation	Medium	Low	7-14
9. RLX XX	Rehabilitation	Low		7-18

Note: The HIPPS code has five digits that include the following two components: a three-digit classification code assigned to each RUG-III code, and a two-digit assessment indicator that specifies the type of Medicare-required assessment used to support billing.

Example

For an ultra-high rehabilitation patient with 720 minutes per week, the components under RUG-III might look like this:

Category	Dollar Amount	Adjustments
Nursing care	\$142.32	
OT, PT and speech therapy	186.01	
Capital, general and administration	<u>55.88</u>	
Total allowed per diem	<u>384.21</u>	
Labor percent		X 0.75888
Labor per diem	291.57	
Wage index		X 0.9907
Adjust labor per diem	288.86	
Non-labor per diem	<u>92.86</u>	
Case-mix adjusted per diem	<u>\$381.51</u>	

Note: OT, occupational therapy; PT, physical therapy.

HIPPS Grouper Software and Documentation Codes

- Medicare home health diagnosis coding: Revised operational ICD-9-CM guidelines for several aftercare V-codes, effective December 1, 2005. A few changes were made to the V-Code Table in the updated version of the ICD-9-CM Official Guidelines for Coding and Reporting.
- HH PPS grouper software and documentation (effective October 1, 2006): Contains version 1.06 of the home health PPS case mix grouper software codes, which accommodates changes in OASIS reporting requirements effective October 1, 2006; also includes the grouper coding logic (pseudocode), test records, and demonstration programs.
- HH Consolidated Billing Master Code List: An Excel workbook file containing complete lists of all codes ever subject to consolidated billing provision of HH PPS. A master list worksheet shows the dates each code included and excluded from consolidated billing editing on claims, with associated CMS transmittal references. The master list also associates

each code with any related predecessor and successor codes. Supplemental worksheets show the list of included codes for each CMS transmittal to date.*

Example

The national unadjusted (wage index) per-visit rate payments paid per code were: home health aide, \$44.37; medical social service, \$153.55; occupational therapy, \$105.44; skilled nursing care, \$95.79; and speech pathology, \$113.81.

COST ALLOCATION METHODS

The important point in cost allocation is that it is not objective—flexibility remains paramount. Generally, there are six types of cost allocation methods:

- **Step-down method** is the most common and allocates direct costs, plus allocated costs, to some department based on its ratio of services provided to that department.
- **Double distribution method** is a refinement of the step-down method because the original department remains open after allocating its costs and receives the costs of other indirect departments. A *multiple cost* distribution method recognizes that resources flow in multiple directions, not just from top to bottom. In this modified double distribution cost method, cost centers are not closed on the first pass of responsibility but are reconsidered in an upward direction. The process terminates when all costs are appropriately allocated.
- **Simultaneous equation method** is used to more precisely determine the exact cost allocation amounts.
- **Reciprocal cost method** recognizes that resources flow in many directions and requires considerable spreadsheet analysis to solve matrix-like cost allocation problems. Like other costing methods, the goal is to allocate revenues to costs.
- **Rate setting analysis** is a concept related to marginal cost and marginal revenue (see section the next section) is reimbursement contract rate setting analysis, defined by this equation:

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$$\text{Set Rate Price} = \text{Average Cost} + \text{Profit Requirements} + \text{Loss incurred on fixed-price patients}$$

- **Equipment payback method** involves making capital budgeting decisions that do not involve discounting cash flows. The payback period, expressed in years, is the length of time that it takes for the investment to recoup its initial cost out of the cash receipts it generates. The basic premise is that the sooner the cost of an investment can be recovered, the better that investment is. This method is most often used when considering equipment whose useful life is short and unpredictable, such as with medical instrumentation. When the same cash flow occurs every year, the formula is as follows:

$$\text{Investment Required} / \text{Net Annual Cash Inflow} = \text{Payback Period} \quad (\$100,000 \text{ X-ray machine}) / (\$35,000 \text{ annual additional revenue}) = 2.85 \text{ years}$$

UNDERSTANDING MARGINAL COSTS AND MARGINAL REVENUE

Marginal cost (MC) is the expense incurred to treat one additional unit (patient), whereas **marginal revenue** (MR) is the revenue received for treating that additional patient (unit). These two concepts are among the most important in the entire business environment of healthcare today.

* See <http://www.cms.hhs.gov>. This link includes the user manual for the above programs, with PDF downloads and Excel workbook spreadsheet files.

In the “clinical pathway” or “flow process,” we assume that time remains on the doctor’s schedule to treat any additional patients, and that an existing financial base exists to cover all fixed costs. This means that a managed care contract might be considered if the MR received by treating the patient is greater than the MC (i.e., $MR > MC$) incurred to treat that patient. Profit (total) will continue to increase up to the point where $MR = MC$; and then it will decrease as additional costs (e.g., more office space, equipment, or assistants) are incurred to accommodate the increased volume.

Maximum office efficiency (MOE) occurs where $MR = MC$. Because marginal cost can be thought of as the change in total costs associated with any given change in output quantity (Q), MC can be calculated from the following formula:

$$MC = \text{Change Total Costs} / \text{Change in Output Quantity}$$

$$MC = \text{Change TC} / \text{Change Q}$$

$$MC = CTC / CQ$$

Note that marginal costs depend only on changes in variable costs (VC). Because fixed costs do not change as output quantity changes, fixed costs do not influence marginal costs. MC is only influenced by variable costs.

The goal of such marginal cost and marginal revenue analysis is to treat the appropriate (optimum) number (quantity) of patients, not necessarily the most (maximum) number of patients. This may be contrary to the norm established in the fee-for-service medical payment environment, but this mindset must be broken to be efficient.

As a new medical office grows, marginal costs decline (Hultman, 1995). Later, as volume- and capacity-related inefficiencies begin to occur, marginal costs again increase. As illustrated in Table 1.3, MC almost always equals MR at a patient volume of 12 units, and total profit is the

TABLE 1.3
Example Marginal Cost

Patient Volume (A)	(Price) Marginal Revenue (B)	(A × B) Total Revenue (C)	Marginal Cost (D)	Total Cost (E)	(C – E) Total Profit (F)
0	20.1	00.00	NA	50	–50.00
1	20.1	20.10	15	65	–44.90
2	20.1	40.20	10	75	–34.80
3	20.1	60.30	8	83	–22.70
4	20.1	80.40	7	90	–9.60
5	20.1	100.50	6	96	4.45
6	20.1	120.60	4	100	20.60
7	20.1	140.70	4	104	36.70
8	20.1	160.80	6	110	50.80
9	20.1	180.90	10	120	60.90
10	20.1	201.00	12	132	69.00
11	20.1	221.10	16	142	73.10
12	20.1	241.20	20	168	73.20
13	20.1	261.30	22	190	71.30
14	20.1	281.40	25	215	66.40
15	20.1	301.50	30	245	56.50

Note: Total Costs (column E) are cumulative, derived by adding the marginal cost (D) to the prior total cost figure. This keeps a running total, adding each additional marginal cost to the total cost number.

greatest at this point. When volume increases beyond 12 patients, however, total revenue increases while total profit declines.

If the practice were to add patients beyond 12 units, the price (fees) would have to be raised to make the addition of these patients profitable. This cost/volume relationship exists in any mature medical office and emphasizes the point that the goal of an efficient office should be profit *optimization*, rather than revenue or volume *maximization*.

Additionally, the point of MOE is where patient volume, per-patient fee, and cost per patient produce the most profit, not necessarily the most revenue. “It is a unique equilibrium efficiency point for each healthcare organization and/or individual medical provider” (Hultman, 1995, 188).

In terms of managed care contracting, understanding the dynamics behind these numbers may provide an insight into making informed volume, fee, and profit decisions. Fee pricing and profit are “made at the margins,” and an office with 60 percent overhead, for example, does not produce a marginal profit of 40 percent. Rather, the *total profit margin* is 40 percent, but the *marginal profit* might be only 10 percent or 15 percent for each new patient visit, and expense reduction programs will be more effective in increasing profit than increasing patient volume. Furthermore, consider that, if marginal profit for new patient business is 10 percent, cutting marginal costs by 33 percent (one-third) will produce the same profit as would increasing patient volume by almost 300 percent.

BREAK-EVEN COST/VOLUME ANALYSIS AND PROFITS

Break-even analysis is the concept used to determine or illustrate how many units of a product (medical intervention) or service (patients) must be sold (seen or treated) to make a profit at each sales volume level. The average number of active patients varies by physician and by specialty. For example:

- Internists typically treat from 1500 to 2500 patients a year.
- Pediatricians typically treat from 2500 to 3500 patients per year.
- Family practice physicians typically treat from 2500 to 4000 patients per year.
- Podiatrists typically treat from 2250 to 4500 patients per year.
- Concierge physicians typically engage 600 enrolled patients for treatment per year.

To illustrate the concept of break-even analysis relative to profit maximization and the costing concepts just discussed, let’s use three more modified examples, again given by Dr. Jon Hultman.

Example One

The three doctors of ABC practice own a clinic whose fixed costs (FC) are \$200,000. The average variable cost per patient (VC/PP) is \$22. The break-even point (BEP) is reached when revenue and total costs intersect at approximately 2,500 patients. The VC ($\$22 \times 2,500 = \$55,000$) plus the FC (\$200,000) equals the total costs of \$255,000, which at the BEP are equal to the total revenues, resulting in an economically neutral (break-even) clinical operation, as seen in the spreadsheet below:

Break-Even Analysis						
FC	VC/PP	REV/PP	Volume	Total Costs	Total Revenue	Profit
200,000	\$22	\$102	2,500	\$255,000	\$255,000	0
200,000	22	102	3,000	266,000	306,000	40,000
200,000	22	102	6,000	332,000	612,000	280,000
200,000	22	102	9,000	398,000	918,000	520,000

To determine revenue per patient (REV/PP), first divide the total collections by the number of unique patient visits. From this average REV, deduct the average overhead costs per visit. However, because surgery brings in more revenue than other services, REV per surgical patient may be calculated separately.

Furthermore, it can be appreciated that, when volume increases, total profit increases at a faster rate than total costs. This is known as high or positive clinic operating leverage.

Example Two

Now, if the doctors of ABC clinic accept a discounted managed care contract where the average REV/PP declines from \$102 to \$75, the BEP in patient volume is now increased to 3774 patients. At this volume, profit is at \$22 and total revenue and total costs are about equal. At 6000 patients, profit is \$118,000 (77 percent decline) and at 9000 patients, profit is at \$277,000 (47 percent decline). To get an appreciation for the leveraging effect of this decline in price, recognize a price decrease of 26 percent (from \$102 to \$75), as seen in the spreadsheet below:

Leveraged Break-Even Analysis						
FC	VC/PP	REV/PP	Volume	Total Costs	Total Revenue	Profit
200,000	\$22	\$75	2,500	\$255,000	\$187,500	-\$67,500
200,000	22	75	3,000	266,000	225,000	-41,000
200,000	22	75	3,774	283,000	283,050	22
200,000	22	75	6,000	332,000	450,000	118,000
200,000	22	75	9,000	398,000	675,000	277,000

Example Three

The final example for ABC clinic is a very likely scenario under many managed care contracts today. A decrease in fees (from \$102 to \$75), combined with an increase in the fixed costs (\$250,000) involved in servicing the contract, is illustrated below.

Non-Leveraged Break-Even Analysis						
FC	VC/PP	REV/PP	Volume	Total Costs	Total Revenue	Profit
250,000	\$22	\$75	2,500	\$305,000	\$187,000	-\$67,500
250,000	22	75	3,000	316,000	225,000	-41,000
250,000	22	75	4,717	353,774	353,775	1
250,000	22	75	6,000	382,000	450,000	68,000
250,000	22	75	9,000	448,000	675,000	227,000

At a patient volume of 9000, profit declines by 56 percent, along with the salaries of each doctor. If volume dropped to 6000 patients, profit would decline to 87 percent. In order to produce the original profit of \$520,000, volume would have to increase by 61 percent (14,528 patients), an unlikely scenario. ABC clinic profit will be determined by its cost position and efficiency in managing a larger volume of patients, along with clinic overhead expenses.

As long as the revenue received from a medical service is above the variable cost of providing that service, it is said to be making a contribution to fixed costs.

Additionally, any managed care contract that is below a clinic's variable costs will lower its profit and should not be considered. Therefore, an aggressive cost reduction program, along with more modest patient volume increases, might be a prudent strategy for the doctors of ABC clinic to pursue.

AMBULATORY PAYMENT CLASSIFICATIONS AND PHYSICIAN FISCAL CREDENTIALING

All healthcare administrators, financial executives, and doctors should be aware of the set of Medicare payment regulations implemented in 1997. APCs, originally termed ambulatory payment groups (APGs), have replaced existing cost-based or cost-plus-reimbursement contracts for all outpatient services. Much like DRGs, which were enacted for hospitals in 1983 and divided disease management into 497 groups (based on ICD-9-CM* diagnoses, procedures, age, sex, and discharge disposition), APCs have changed the hospital and Independent Physician Association (IPA) landscape. The federal government and the HCFA† planned this shift to prospective payments through its OPSS for more than a decade, as a result of the Omnibus Budget Reconciliation Act of 1989. Unlike DRGs however, with their multi-year phase-in period, APCs had no similar grace period and hospitals, IPAs, and other outpatient centers needed to be compliant immediately. Thus, decreases in reimbursement correlate to costing and cost modeling behavior.

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AMBULATORY PAYMENT CLASSIFICATIONS

The APC system was designed to explain the amount and type of resources utilized in outpatient visits. Each APC consists of patients with similar characteristics and resource usage and includes only the facility portion of the visit, with no impact on providers who will continue to be paid from the traditional CPT fee schedule and modifier system. The APC system effectively eliminates separate payments for operating, recovery, treatment, and observation room costs and charges. Anesthesia, medical and surgical supplies, drugs (except those used in chemotherapy), blood, casts, splints, and donated tissue are also packaged into the APC. Unbundled, fragmented, or otherwise separated codes, which are common in the CPT fee schedule, have been eliminated from claims prior to payment.

APCs group most outpatient services into 346 classes according to ICD-9-CM diagnosis and CPT procedures. This includes 134 surgical APCs, 46 significant APCs, 122 medical APCs, and 44 ancillary APCs. Surgical, significant, and ancillary APCs are assigned using only the CPT procedure codes, while medical APCs are based on a combination of ICD-9-CM and evaluation and management CPT codes.

Example: APC payment calculations

APC payments are determined by multiplying an annually updated “relative weight” for a given service by an annually updated “conversion factor.” CMS publishes the annual updates to relative weights and the conversion factor in the November *Federal Register*. The APC conversion factor for 2007 was \$61.468.

To calculate the APC payment for APC 006 (includes incision and drainage of simple abscess-CPT 10060):

Given:

Relative weight for APC 006 = 1.510

Conversion factor for 2007 = \$61.468

$1.510 \times \$61.468 = \92.82 payment for APC 006 for year 2007 (for the “average U.S. hospital”).

There is further modification of the APC payment according to adjustments for local wage indices.

Medicare determined that 60 percent of the APC payment is due to employee wage costs. Because different areas of the country have widely divergent local wage scales, 60 percent of each APC payment is adjusted according to specific geographic locality.

* The International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) is the official system used to assign codes to diagnoses and procedures associated with health care in the United States.

† The HCFA was renamed the Centers for Medicare and Medicaid Services (CMS) in 2001.

The full impact of this regulation on hospitals, healthcare facilities, outpatient ambulatory centers, and IPAs is still emerging, but generally it has decreased reimbursement for more than half all ambulatory healthcare facilities since inception. This occurred because the initial variable used in reimbursement determinations is the principal procedure. Payments are then calculated for each APC by multiplying the facility rate by the APC weight, and multiplying this product by a discount factor (if multiple APCs are performed during the same visit). Total payment is the sum of the payments for all APCs. However, no adjustment provisions were made for outliers or teaching facilities, rural hospitals, disproportionate share or specialty hospitals or facilities.

Facilities affected by Medicare's OPSS include those designated by the Secretary of Health and Human Services, such as:

- hospital outpatient surgical centers
- hospital outpatient departments not part of the consolidated billing for skilled nursing facility residents
- certain preventative services and supplies, covered Medicare Part B inpatient services if Part A coverage is exhausted
- partial hospitalization services in community mental health centers

Exempted facilities include clinical laboratories, ambulance services, end-stage renal disease centers, occupational and speech therapy services, mammography centers, and durable medical equipment suppliers.

The remaining facilities may experience a slight payment increase if they convert their management information systems to APC-compliant hardware and software. Compliance measures include electronic interconnectivity, data storage, retrieval, and the security features mandated by the Health Insurance Portability and Accountability Act (HIPAA) of 1996. Although the Balanced Budget Act of 1997 required HCFA to implement an OPSS by January 1, 1999, Y2K concerns delayed implementation until after January 1, 2000. This delay led to a 2001 implementation date and functionally to an April 2005 date, and beyond in some cases. However, APCs were fully implemented in 2008–2009.

Some hospitals languished and collapsed under the DRG system, while others flourished. If hospitals are to be successful in the OPSS/APC era, transition planning, monitoring, and implementation must continue, and the concept of surgeon or "proceduralist" fiscal credentialing will gain momentum in the future.

PHYSICIAN FISCAL CREDENTIALING

In the competitive market, practitioners are placed under pressure to demonstrate the economic and clinical value of care. This is especially true for procedurally based physicians and surgeons who perform costly interventions in the outpatient setting (i.e., surgery and related invasive procedures). The management methodology of "fiscal outcomes review" is one tool being used to evaluate such care. Initially developed for internal corporate management as an executive decision support system (EDSS), the process is being used as an external cost control technique to economically credential providers of procedural care.

In fact, some suggest that APCs bring the possibility of physician financial profiling a step closer to reality. This occurs because poor or delayed physician documentation often delays the submission of hospital bills. Additionally, unlike other hospital services, late charges are usually disallowed once the appropriate APCs are determined and paid. Therefore, resource utilization by physicians will continue to come under increased scrutiny.

Higher expense medications, for example, often represent pure cost and provide little added revenue. Choices of medications and the cost of supplies used go directly to the hospital's bottom line, and there may be more economic impetus to develop practice guidelines. In addition, insurance

coders and billers look to physicians to appropriately and comprehensively identify their own procedures in order to assign the most accurate codes.

Consequently, the economic outcomes analysis of one or more procedures represents an attempt to gather, allocate, analyze, and interpret meaningful information relative to the practitioner or venue of performance. When used to establish comparative norms or when compared to the appropriate benchmarks, cost and charge reductions are documented without compromising quality. The long-held heuristic beliefs are then corroborated or dismissed.

Managerial Accounting Methodology

Accepting the assumption that financial instability is the ultimate healthcare liability, practice survival can be equated to the basic economic equation of net income = revenue – expenses. In the usual retail marketplace, income can be augmented by increasing price and/or volume, because pre-existing cost reductions are a given in the business community.

In the fee-for-medical service generation, an increase in service charges is possible and limited only by individual provider competition, not by aggregate payer competition. In the new environment of cost containment and managed care, this strategy is unacceptable: price increase is of limited value in that most reimbursement schedules have switched to a fixed dollar payment methodology, and cost shifting is no longer a reasonable strategy.

On the expense side of the accounting equation, there are two components. First are the traditional cost reduction methods of corporate downswing, restructuring, re-engineering, and other cost containment strategies designed to reduce both fixed and variable operational overhead. Fixed costs are costs that remain constant regardless of changes in the level of medical activity, and variable costs are those that vary in direct proportion to changes in the level of activity. Mixed costs contain both fixed and variable components. Unfortunately, addressing only this side of the equation without increasing revenues usually results in a one-time charge reduction because some baseline cost of business always remains in place.

The second component of the accounting equation focuses on the efficiency in the way procedurally based care is delivered. For example, Table 1.4 illustrates the economic implications of hospital outpatient surgical resources consumed by a prototypical procedure, based on payment category.

For those insured patients covered under a fee-for-service or a discounted fee-for-service arrangement, the incentive is to acquire, maintain, and consume every patient resource possible. Under a per-procedure case fixed dollar reimbursement based only on the patient’s diagnosis, an outpatient admission is still desirable, if medically justified. Therefore, it is economically advantageous to reduce length of stay to outpatient status, if possible, or to perform the procedure in a less costly venue but still consume as many resources as possible.

Under the per-treatment, per-diem payment model, an outpatient admission and a longer length of stay is desirable because it is during the later stage of hospitalization that the per-diem rate begins to cover its costs. However, hospital denial is possible if the patient remains hospitalized longer than clinically necessary. The commonality of these categories, using the basic accounting equation (net income = revenue – expenses), is the fact that no additional revenue is gained from additional resources (inputs) provided. When marginal costs (cost of producing one additional unit of service

TABLE 1.4
Outpatient Hospital Incentives by Payer Class

Payor Category	Outpatient Admission	Resource Consumption
Fee-for-service	Increased	Increased
Discounted fee-for-service	Increased	Increased
Per surgical case	Increased	Decreased
Per treatment day	Decreased	Decreased

or product) exceed marginal benefits (revenue gained by producing one additional unit of service or product), additional revenues should not be pursued. However, decreasing costs will indirectly increase profits through a greater contribution margin, which is defined as the amount remaining from service revenue after variable costs have been deducted. This approach first contributes to fixed expenses, and then toward profits for the relevant range.

Continuous Quality Improvement

It is not enough to simply share data and highlight variances in care. Accounting numbers and raw data, regardless of etiology, are not informative until gathered, collated, interpreted, and disseminated. Once this is done, information must be used to develop positive alternative structures for care. This is accomplished by empowering physician leaders, who in turn educate those staff members who will take responsibility for driving the process to improve outcomes of care. Areas for continuous quality improvement (CQI) include:

- physician education and information sharing
- benchmarking and process improvement
- utilization review and case management
- guidelines, criteria, policies, and procedures
- critical pathway method and algorithms
- outcomes management and financial incentives

These CQI areas, used for refinement, are not mutually exclusive although each practice or clinic must decide which tools will be most effective in meeting corporate objectives.

As part of the CQI process, information sharing and comparing performance outcomes, both internally and externally, presents each physician with the opportunity to evaluate his or her activities compared to peers. Internal benchmarking and process improvement implies identification of the optimal performers for the selected procedure and uses them as a model for the best demonstrated practice patterns. External benchmarking implies comparing selected outcomes to other practices in an effort to identify optimal treatment goals for the selected procedure. Once identified, techniques can be learned, taught, and adopted by other offices using the step-by-step process traditionally performed as part of a CQI program. Obviously, the comparison of a homogenous group of patients is needed to accurately interpret this type of comparative analysis, and one will need to apply some type of case-mix, severity index, or risk-adjustment modifiers to validate conclusions.

Comparative information for single procedure events has become more prevalent. Increasingly, care trails, algorithms, or the critical (clinical) path method (CPM) developed by physician consensus is used as a framework for reducing variation in patients moving through an office system in an uncomplicated fashion.

Example

Using the CPM for data recapture, a coordinated economic outcomes review analysis of a simple orthopedic surgical procedure was performed at the Podiatric Medical Ambulatory Surgery Center (PMASC) in Atlanta, Georgia.

The first step involved the development of critical pathways for the selected surgical procedure (CPT #28296: hallux valgus repair) performed at PMASC using standard methodologies. In this case, the engineering concept of the CPM is used to determine the cost, quality, and time aspects of the project, in particular cost, time, and quality trade-offs.

Using the CPM, activities can be performed at extra cost to speed up completion time (e.g., immediate laboratory values, bone fixation type, no second surgical opinion or pre-certification, etc.). CPM can identify a project's critical path, in other words, activities that

cannot be delayed (i.e., surgeon, anesthesia, radiographs, central supply), as well as the slack time that can be somewhat delayed without lengthening the project completion time (i.e., antibiotics). Realistically, critical activities in the relevant range constitute a small minority of total activities.

After defining the project (CPT # 28296: hallux valgus repair), the next step is to make a standard template or *network* from which all critical pathways will be developed. A crucial component of the system is the ability to track pathway activities that can then be attributed to physician, patient, or system-specific variations. Finally, all project events are concluded when the patient is discharged from immediate surgical service. An example of the pathway for this simple orthopedic procedure appears in the table below.

PROCEDURE CRITICAL PATHWAY

Patient Code Name: _____
 _____ ASA 1 _____ ASA 2 _____ ASA 3 _____ ASA 4 _____ Diabetes

Activity	Pre-Surgical	Intra-Operative	Post-Surgical
Referral	Physician/Patient/Plan/etc.		
Prior Care	Physician//MD//DO//DPM, etc.		
History and Physical	PCP/Surgeon/etc.		
Laboratory	CBC//SMAC//Diff/etc.		
Antibiosis		IV//PO and Agent	
Surgery		Procedure (CPT #)	
Fixation		[Wire(s) or Screw(s)]	
Radiology		A-P/Lat/Oblique Views	
Infection		Yes or No	
Results		Satisfactory/ Unsatisfactory	
Orthoses (post-op)		Required or Not Required	

POSSIBLE PATHWAY SOLUTION

A possible path is to use the CPM to select those cost drivers most suitable for financial process improvement. Economic priorities may be based on volume, cost, risk, specialty, procedure, or any pertinent feature or institution, within its relevant range.

Finally, relevant cost drivers are gathered. This table lists the eight-tiered allocation process, in seven-dollar amounts and one-time allotment, as applied to the procedure.

Average Charges per Procedure									
(DR)	(#)	(Labs)	(Pharma)	(Anes)	(Fix)	[Time]	(Radio)	(Sup)	=Total
AB	2	150	197	545	33	[155]	142	2,724	= \$3,790
CD	4	358	430	1,029	66	[480]	328	4,260	= 6,471
EF	5	231	592	1,293	83	[430]	340	5,190	= 7,729
GH	5	540	748	1,925	83	[555]	340	5,190	= 8,826
IJ	14	856	1,810	3,802	0	[1,045]	1,148	12,340	= 19,956
Total	30	2,135	3,770	8,594	265	[2,665]	2,298	29,704	= 46,772
Avg.	6	427	755	1,719	53	[533]	460	5,941	= 9,354
AVG.	1	71	126	286	9	88	77	990	= 1,559

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As the current healthcare and business industrial complex merges, increasing emphasis will be placed on data analysis and economic outcomes as a method to identify ways to improve both the inputs (costs) and outputs (quality) of care. Third-party payors will use this information

in an effort to identify and selectively contract with efficient ambulatory centers and purge the miscreants. Later, managed care organizations (MCOs) will use such data to evaluate physician performance profiles as a form of second tier “economic credentialing” to screen health care providers prior to center entry and to continually monitor performance as a barometer for continued participation in the plan. Although often counterintuitive, this credentialing will not be heuristic, but may take the form of the business model presented in this review.

Nevertheless, we might consider if the PASC administrators were correct about the following parameters:

- Selection of the CPM mode?
- Selection of the CPM cost driver?
- Average charges per procedure?
- Relevant service production range?

Although raw data as captured above may not be statistically significant, various aggregate patterns and trend information may be ascertained when evaluating the eight cost drivers represented in this case model. Of course, the use of other drivers is encouraged as individual circumstances dictate. For example:

- (1) The average laboratory charge was \$71. Preoperative laboratory costs may be decreased in healthy patients and increased in non-ASA Class I patients. In those cases of true medical necessity, $MC = MB$ or $MB > MC$.
- (2) Preoperative antibiotics was a component of the \$126 pharmacy charge that might be safely omitted because IV prophylaxis is not medically indicated for a virgin brief surgical procedure. Oral agents after surgery are also not recommended, as the potential for antibiotic resistance is likewise reduced. In this instance, the $MC > MB$.
- (3) Average anesthesia charges of \$286 may be reduced in the psychologically prepared patient, who can benefit from effective but less expensive anxiolytic methods of analgesia, such as nitrous oxide sedation and monitored anesthesia care. Relative to patient educational expenses, $MB > MC$ in almost all cases.
- (4) Fixation (screws or K-wires) is a \$9 average charge that may be obviated, but marginal benefits likely supersede marginal costs if complications attributed to non-use result in excessive osseous motion (i.e., $MB > MC$). Fixation may therefore be considered cost effective relative to the charge expense incurred through use.
- (5) Slow surgeon (89-minute time driver) may not necessarily increase charges if equipment such as a tourniquet or electrocautery is not used to decrease time in the operating room. In other words, anatomical dissection and hand ligatures are less costly than these specific equipment expense drivers (i.e., $MC > MB$).
- (6) The average radiology charge of \$77 can be reduced by taking two views (anteroposterior and lateral) after surgery, rather than three views. Of course, in questionable cases, X-rays are an extraordinary value when comparable to potential dislocation complications ($MB > MC$).
- (7) The total central supply charges of \$990 include such items as sutures, suction tips, saw blades, blankets, drape sheets, catheters, irrigation fluids, and scrub materials, among others, which may be carefully evaluated to further reduce expenses. Many of these supplies can be considered incidental and may be omitted, reduced, or substituted without compromise ($MC > MB$). Of course, further charge allocations can be continued with increasing smaller drivers, as required.

THE PMASC ANSWER?

The aggregate charges for the procedure performed at PMASC were approximately \$1,559. This might be compared to a \$3,000–\$3,500 relevant range from a local community hospital, or to a \$2,500–\$3,000 range for another competing ambulatory surgical center. Thus, hospital outpatient charges exceeded charges in this examined economic model ($MC \gg MB$), all things being equal (*ceteris paribus*), and should be economically reconsidered.

CPM TERMINOLOGY

Project: Surgical procedure identification by means of CPT code number.

Activity: Task required by the project that consumes economic resources, such as radiographs, laboratory tests, fixation devices, or central supply items.

Event: Identifiable activity end state occurring at a particular point, such as anesthesia operating room time.

Network: Combined activity (arcs) and events (nodes) that define the surgical procedure.

Path: Series of connected activities between any two events in a network, or the entire process of examining, testing, scheduling, performing, and follow-up after the surgery.

Critical: Activity, event, or path that, if adverse or absent, will hinder completion of the procedure or surgical project (i.e., aberrant laboratory value).

It is important to keep in mind that the more paths, subsets, or decision points that exist for the CPM, the fewer the number of patients that will complete the actual pathway. Moreover, while there is no single standard definition of a successful procedural or surgical outcome, financial managers usually refer to some combination of patient satisfaction, cost, and quality (e.g., function, alignment, pain amelioration, radiographs, or infection control). Although several of these parameters are predisposed to patient (pain, function) and physician (alignment, scarification) subjectivity, others are more objectively quantified (infection, radiographs, range of motion), and all are overlapping. Regardless of definition, there is a growing demand for aggregate economic procedural outcomes that will hold physicians more accountable for the fiscal result of procedural care.

One of the most effective ways to change adverse behavior is to align financial incentives to a physician and his or her behavior. Although it is considered illegal to directly reimburse physicians for efficient behavior, much of this is changing as medicine moves into a more integrated healthcare delivery system.

COST OF HOSPITAL CAPITAL AND CREDIT

Finally, the sub-prime mortgage and commercial bank crisis of 2008 has caused lenders to tighten their practices, and this is having an impact on the revenue and cost management structure of hospitals and large healthcare organizations. Recent comments from Moody's Investors Service are cautiously pessimistic about the financial future of U.S. non-profit hospitals in the short term.

In comments on its preliminary FY 2007 median ratios for not-for-profit hospitals, Moody's implied that, while hospitals are surviving in 2008, the outlook remains grim in the industry. Noted key volume and revenue growth measures are not robust, and newly reported FY 2007 medians may not hold up. As hospitals are still losing liquidity, real concerns exist for both for-profit and not-for-profit facilities through at least 2013, pending political fiat.

For example, it is now more difficult to restructure longer-term corporate debt regardless of hospital bond credit ratings (Triple B rating or higher). In addition, despite the potential for funding from private investment firms, banks, and private equity funds—all of which are seeking quality, for-profit (bond/debt) issues—tax-exempt debt for non-profits still seems the most cost effective source of funding, despite the costs of bond insurance.

CONCLUSION

Of course, the full impact of the hospital credit crunch and its impact on the cost of capital have not yet been discerned, as illustrated by the stunning collapse of the legendary investment bank Bear-Stearns on March 16, 2008, the "flash-crash" in 2008–2009, and the presidential election of 2012.

CHECKLIST 1: Healthcare Entity Cost Accounting Concerns	YES	NO
Do I know and share medical cost and financial business data within my department?	o	o
Do I allocate fixed cost to:		
enterprise revenue centers?	o	o
department revenue centers?	o	o
Do I understand what costs are:		
fixed?	o	o
variable?	o	o
hybrid?	o	o
extraneous?	o	o
controllable?	o	o
opportunity?	o	o
sunk?	o	o
carrying?	o	o
future?	o	o
overtime premium?	o	o
health sector costs?	o	o
Do I know the direct cost of a patient visit?	o	o
Do I understand the variable costs of a patient visit?	o	o
Do I know the marginal cost of a patient visit?	o	o
Do I know the marginal revenue produced by a patient visit?	o	o
Do I know the margin profit of a patient visit?	o	o
Do I know the total costs of a patient visit?	o	o
Have I familiarized myself with FASB and CASB accounting?	o	o
Which is more appropriate for my circumstances?		
Do I distinguish between product and healthcare service costs?	o	o
Do I account for relevant costs?	o	o
Do I consider relevant costs in my budget?	o	o
Do I know what costs are avoidable in my budget?	o	o
Do I understand my differential costs?	o	o
Do I perform simple statistical cost analysis for my department or center?	o	o
Do I know my total human resource costs?	o	o
Do I know my idle time labor costs?	o	o
Do I know my fringe benefit costs?	o	o
Do I know the procedure for allocating costs using:		
the step-down method?	o	o
the double distribution method?	o	o
the simultaneous equation method?	o	o
Do I know why it may be proper to allocate costs from a cost center to other cost or responsibility centers or departments?	o	o
Does my healthcare organization perform physician fiscal credentialing?	o	o
If not, does it plan to in the future?	o	o
Does my healthcare organization maintain a posture of continuous financial quality improvement?	o	o
If not, does it plan to in the future?	o	o
Do I perform break-even analysis for my department?	o	o
Do I perform equipment pay-back analysis for my department?	o	o
Do I calculate rate-setting procedures for my department?	o	o

Do I seek to reduce avoidable costs?	o	o
Do I anticipate future costs?	o	o
Do I consider sunk costs properly considering CCA, CMA, or CASB standards?	o	o
Am I familiar with the following prospective payment schemes:		
diagnosis-related groups (DRGs)?	o	o
Medicare severity-adjusted diagnostic-related groups (MS-DRGs)?	o	o
ambulatory payment classifications (APCs)?	o	o
home health resource groups (HHRGs)?	o	o
resource utilization groups-III (RUGs-III)?	o	o
resource-based relative value units (RBRVUs)?	o	o
Do I understand the concept of case-severity mixes?	o	o
Do I understand the concept of outlier thresholds?	o	o
Do I understand the concept of cost-based weighted averages?	o	o
Does my hospital have a policy on “never-events”?	o	o
Am I familiar with it?	o	o

CASE MODEL 1

THE HOPE OUTREACH MEDICAL CLINIC

The Hope Outreach Medical Clinic (HOMC) is a private, for-profit, single-specialty medical clinic in a southeastern state. It submitted its bi-annual request for proposal (RFP) to continue its current managed care fixed-rate contract. Upon review of the RFP, however, Sunshine Indemnity Insurance Company, the managed care organization (MCO), denied the contract request for the upcoming year.

In shock, the clinic’s CEO asked the clinic’s administrator to work with its legal team to develop a defensible estimate of economic damages that would occur as a result of the lost contract. The clinic intended to bring suit against the MCO for breach of contract. However, the administrator is not an attorney and is loathe to enter the fray. After consideration however, he decided to assist in filing the statement of claim (SOC) because he realized that changes in patient services (unit) volume would be a valid economic surrogate. He then requested the following information from his controller so that he could develop a change in economic profit [damages] estimate.

- change in patient visits (unit) volume
- fees (price) per patient (unit)
- marginal (incremental) cost per patient (unit)
- change in current fees (prices)
- patient volume (units) affected

Key Issues

- (1) Fee (price) per patient (units) may be obtained from the fee schedule used by the MCO to pay HOMC.
- (2) Marginal (incremental) costs per patient (unit) are approximated using variable costs.
- (3) Higher cost payors exist because lower patient volumes raise the average cost per patient (unit) due to existing fixed costs.

The administrator’s financial work-product to estimate monetary damages and assist the legal team is explained as follows.

CHANGE IN PROFIT FRAMEWORK ESTIMATE

$$\text{Change in profit} = \text{change in patient (unit) volume} \times [\text{fee (price per patient unit)} - \text{incremental (marginal) cost per patient (unit)}] - [\text{change in current price (fees)} \times \text{patient (unit) volume affected}]$$

CASE MODEL 2**DR. JOSEPH SPINE: OSTEOPATHIC PHYSICIAN**

Dr. Joseph Spine, an osteopathic physician, wants to install a new large piece of equipment in place of several smaller ones in his clinic. He will need to hire a therapist to administer the larger equipment and estimates that incremental annual revenues and expenses associated with the equipment would be as follows:

Revenues	\$10,000
Less variable expenses	<u>3,000</u>
Contribution margin	7,000
Less fixed expenses	
Insurance	900
Salaries	2,600
Depreciation	<u>1,500</u>
	<u>5,000</u>
Net Income	\$2,000

Parts for the equipment would cost \$15,000 and have a 10-year life. The old machines could now be sold for a \$1,000 salvage value. Dr. Spine requires a payback of 5 years or less on all investments.

Solution

Net Income (above)	\$2,000
Add: non-cash deduction depreciation	1,500
New annual cash flow	3,500
Investment in the new equipment	15,000
Deduct: salvage value old machines	1,000
Investment required	\$14,000

$$\text{Payback Period} = (\$14,000 \times 10 \text{ years}) / (\$3,500 \times 10 \text{ years}) = \$140,000 / \$35,000 = 4.0 \text{ years}$$

Key Issues

Was Dr. Spine correct or not with regard to:

- Revenues?
- Fixed and variable expenses?
- Contribution margins?
- Insurance?
- Salaries?
- Depreciation?

Using the framework reflected in this chapter, also consider what changes the osteopathic clinic might implement to ensure that it regularly makes good decisions on such issues as medical equipment payback analysis.

CASE MODEL 3

THE FEDERAL VETERAN'S ADMINISTRATION HEALTHCARE SYSTEM

Because the Federal Veteran's Administration (VA) Healthcare System does not routinely prepare patient bills, VA researchers and analysts at the Health Economic Research Center (HERC) must rely on other sources to calculate the cost of patient encounters (<http://www.herc.research.med.va.gov>).

Three cost accounting alternatives are available: mixed (micro) cost methods (MCM), average cost methods (ACM,) and decision support systems (DSS).

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1. **Mixed (Micro) Cost Methods** include three approaches:
 - a. **Direct Measurement** is used to determine the cost of new interventions and programs unique to VA. Inputs such as staff time and supply costs are directly measured to develop a precise cost estimate. The time of each type of staff is estimated, and its cost is determined from accounting data. The analyst may directly observe staff time, have staff keep diaries of their activities, or survey managers. The cost of supplies, equipment, and other expenses must also be determined. Program volume is determined from administrative records, and average cost is estimated. When units of service are not homogenous, unit costs may be estimated by an accounting approach, by applying estimates of the relative cost of each service, or via an econometric approach.
 - b. **Pseudo-bill** method combines VA utilization data with unit costs from non-VA sources to estimate the cost of patient care. This is commonly referred to as the pseudo-bill method, because the itemized list of costs is analogous to a fee-for-service hospital bill. The unit cost of each item may be estimated by using Medicare reimbursement rates, the charge rates of an affiliated university medical center, or some other non-VA sector source.
 - c. **Cost Function** method requires detailed cost and utilization data for a specific, non-VA service to simulate the cost of a comparable VA service. If suitable non-VA data are available, a function can be estimated using cost-adjusted charges as the dependent variable and information about the encounter as the independent variable. VA costs are simulated using VA utilization data and the function's parameters. Its chief advantage is that it requires less data than is needed to prepare a pseudo-bill, making it a more economical way of (micro) mixed costing.
2. **Average Cost Methods (ACM)** combine relative values derived from non-VA cost datasets, VA utilization data, and department costs obtained from the VA cost distribution report. Every encounter with the same characteristics is assumed to cost the same. Average cost estimates are needed because detailed mixed-costing is too time-consuming and laborious a method to apply it to all possible healthcare utilization. In many studies, and for some of the healthcare utilization in nearly every study, an average cost method can be used.
3. **Decision Support Systems**, a computerized cost-allocation system adopted by the VA, is beginning to be used by researchers. DSS staff is undertaking the difficult

task of allocating costs to VA healthcare products and patients' stays. If DSS is found to be accurate, it will be an extremely useful source of VA cost information. Validation is an important step in the use of DSS data. Work with DSS to date suggests that analysts should not rely exclusively on DSS cost estimates.

Key Issues

Was the VA healthcare system correct with regard to using its current cost accounting systems?

- mixed (micro) cost methods?
- health economic research center?
- average cost methods (ACM)?
- decision support systems (DSS)?

It became intuitively obvious that, even if a reliable DSS could be found, the financial manager should not rely exclusively on DSS cost estimates.

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Author Queries

- AQ1: The URL <http://www.acqnet.gov/far/index.html> could not be reached. Please provide a working URL. Additionally, please provide a full reference for this website as it will be added to References.
- AQ2: Please review the edits made to the first example and the text immediately following the table in this example.
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- AQ7: Please provide full reference for Health Care Financing Administration (CMS), 2004.
- AQ8: Please clarify what source “Appendix 2” refers to.
- AQ9: Can the sentence “CMS will release the revised grouper system software HAVEN™ 4.0, and associated pseudo-code as soon as possible in 2008.” be updated to reflect the current state of this software and pseudo-code?
- AQ10: Can “see section the next section” be made more specific?
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- AQ12: In the table for the Possible Pathway Solution example, please provide the full terms for each abbreviation. In addition, please indicate the difference between the “Avg.” and “AVG.” terms.
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- AQ16: Marcinko and Hetico 2012: Please provide pages of chapter and editors of book.
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