

# **CHAPTER 7**

## **Service Line Costing and Pricing**

**Although costing at the organizational and department levels is an important managerial function, the holy grail of cost estimation is costing at the service line or individual patient level. In addition to costing services, in many situations health services managers must establish prices for the services offered or make decisions as to the financial attractiveness of contracts proposed by third-party payers.**

# Service Line Costing

- **One of the key elements of healthcare reform is cost reduction. But in order to contain costs, they must be measured at the individual service level. Here, we discuss three methods:**
  - **Cost-to-charge ratio (CCR)**
  - **Relative value unit (RVU)**
  - **Activity-based costing (ABC).**
- **Our illustrations of these methods will use the data given on the next slide.**
- **In addition, we introduce time-driven activity-based costing (TDABC), a new approach that focuses on costing multiple services provided to individual patients across time.**

## Selected Routine Services Dept. Data

	<i>Service X</i>	<i>Service Y</i>	<i>Total</i>
Annual volume (visits)	5,000	5,000	10,000
RVUs per visit	10	18	
Annual costs:			
Direct	\$242,500	\$ 485,000	\$ 727,500
Indirect (overhead)			<u>300,000</u>
Total costs			<u><u>\$1,027,500</u></u>
Annual charges	\$700,000	\$1,400,000	\$2,100,000
Annual revenues (reimbursements)	\$400,000	\$ 900,000	\$1,300,000

**Note: Routine Services provides only two services.**

# Cost-to-Charge Ratio (CCR) Method

- **The CCR method is based on two assumptions:**
  - **The indirect costs allocated to individual services constitute a single cost that is proportional across all services provided. In other words, each service consumes overhead costs in the same proportion as the department as a whole.**
  - **Charges (or revenues) reflect the level of intensity of the service provided, and hence the use of overhead services.**
- **We will begin by using charges as the basis for the estimation. Then, we will repeat the calculation using revenues.**

## Based on Charges:

**CCR = Indirect costs ÷ Total charges.**

$$\begin{aligned}\text{CCR} &= \$300,000 \div \$2,100,000 \\ &= 0.143 = 14.3\%.\end{aligned}$$

**Service overhead costs = CCR × Service charges.**

$$\text{Service X: } 0.143 \times \$700,000 = \$100,100.$$

$$\text{Service Y: } 0.143 \times \$1,400,000 = \$200,200.$$

**Total service costs = Direct cost + Indirect cost.**

$$\text{Service X: } \$242,500 + \$100,100 = \$342,600.$$

$$\text{Service Y: } \$485,000 + \$200,200 = \$685,200.$$

**Average cost per visit = Total costs ÷ Number of visits.**

$$\text{Service X: } \$342,600 \div 5,000 = \$68.52.$$

$$\text{Service Y: } \$685,200 \div 5,000 = \$137.04.$$

## Based on Revenues:

**CCR = Indirect costs ÷ Total revenues.**

$$\begin{aligned}\text{CCR} &= \$300,000 \div \$1,300,000 \\ &= 0.231 = \mathbf{23.1\%}.\end{aligned}$$

**Service overhead costs = CCR × Service revenues.**

$$\text{Service X: } 0.231 \times \$400,000 = \mathbf{\$ 92,400}.$$

$$\text{Service Y: } 0.231 \times \$900,000 = \mathbf{\$207,900}.$$

**Total service costs = Direct cost + Indirect cost.**

$$\text{Service X: } \$242,500 + \$ 92,400 = \mathbf{\$334,900}.$$

$$\text{Service Y: } \$485,000 + \$207,900 = \mathbf{\$692,900}.$$

**Average cost per visit = Total costs ÷ Number of visits.**

$$\text{Service X: } \$334,900 \div 5,000 = \mathbf{\$ 66.98}.$$

$$\text{Service Y: } \$692,900 \div 5,000 = \mathbf{\$138.58}.$$

## Relative Value Unit (RVU) Method

- In contrast to the CCR method, which ties overhead resource consumption to charges (or revenues), the relative value unit (RVU) method ties the use of overhead resources to the complexity and time required for each service as measured by relative value units (RVUs).
- The following slide illustrates the RVU method using the same data as in the CCR illustration.

**Calculate total department RVUs and overhead cost per RVU.**

Service	RVUs	Volume	Total RVUs
X	10	5,000	50,000
Y	18	5,000	<u>90,000</u>
			<u>140,000</u>

**Overhead cost per RVU = \$300,000 ÷ 140,000 = \$2.143.**

**Estimate overhead costs for each service.**

**Service X overhead cost = \$2.143 × 50,000 = \$107,150.**

**Service Y overhead cost = \$2.143 × 90,000 = \$192,870.**

**Calculate total costs for each service.**

**Service X total costs: \$242,500 + \$107,150 = \$349,650.**

**Service Y total costs: \$485,000 + \$192,870 = \$677,870.**

**Calculate average cost per visit.**

**Service X average cost per visit: \$349,650 ÷ 5,000 = \$69.93.**

**Service Y average cost per visit: \$677,870 ÷ 5,000 = \$135.57.**

## Activity-Based Costing (ABC)

- Unlike traditional cost allocation, which is a *top-down system*, **activity-based costing (ABC)** begins with the *individual activities* that comprise the services provided.
- Although it holds great promise for costing (and hence pricing) individual services, it requires more information and is more complex than traditional costing.

## ABC (Cont.)

- **The key to cost allocation under ABC is to identify the activities that are performed to provide a particular service and then aggregate the costs of the activities. The steps required to implement ABC are as follows:**
  - **Identify the relevant activities.**
  - **Estimate the cost of each activity, including both direct and indirect.**
  - **Assign cost drivers for each activity.**
  - **Collect activity data for each service.**
  - **Calculate the total cost of the service by aggregating activity costs.**

## ABC Illustration

- **To illustrate, suppose that the seven activities performed by the Routine Services Department are:**
  - **Patient check-in, including insurance verification**
  - **Preliminary assessment**
  - **Diagnosis**
  - **Treatment**
  - **Prescription writing**
  - **Patient check-out**
  - **Third-party-payer billing**
- **The following slides contain the ABC analysis for the practice.**

# ABC (Cont.)

Activity	Annual Costs	Cost Driver	Activity Data			Allocation Rate
			Service X	Service Y	Total	
Check-in	\$ 50,000	Visits	5,000	5,000	10,000	\$ 5.00
Assessment	75,000	Minutes per service	5	10	75,000	1.00
Diagnosis	250,000	Minutes per service	10	15	125,000	2.00
Treatment	450,000	Minutes per service	10	20	150,000	3.00
Prescription	2,500	Number of drugs	0.5	2	12,500	0.20
Check-out	50,000	Visits	5,000	5,000	10,000	5.00
Billing	<u>150,000</u>	Number of bills per visit	1	2	15,000	10.00
Total costs	<u><u>\$1,027,500</u></u>					

# ABC (Cont.)

Activity	Cost Driver	Rate	Service X		Service Y	
			Consumption	Cost	Consumption	Cost
Check-in	Visits	\$ 5.00	1	\$ 5.00	1	\$ 5.00
Assessment	Number of minutes	1.00	5	5.00	10	10.00
Diagnosis	Number of minutes	2.00	10	20.00	15	30.00
Treatment	Number of minutes	3.00	10	30.00	20	60.00
Prescription	Number of drugs	0.20	0.5	0.10	2	0.40
Check-out	Visits	5.00	1	5.00	1	5.00
Billing	Number of bills	10.00	1	10.00	2	20.00
Cost per service				<u>\$75.10</u>		<u>\$130.40</u>

# Summary of Results

	<u>Average Cost</u>	
	<u>Service X</u>	<u>Service Y</u>
<b>CCR based on charges</b>	<b>\$68.52</b>	<b>\$137.04</b>
<b>CCR based on revenues</b>	<b>\$66.98</b>	<b>\$138.58</b>
<b>RVU</b>	<b>\$69.93</b>	<b>\$135.57</b>
<b>ABC</b>	<b>\$75.10</b>	<b>\$130.40</b>

# Summary of Results

<i>Payer</i>	<i>Number of Admissions</i>	<i>Average Revenue per Admission</i>	<i>Revenue by Payer</i>	<i>Variable Cost per Admission</i>	<i>Total Variable Costs</i>	<i>Contribution Margin</i>
<i>Payer Worksheet:</i>						
Medicare	4,268	\$7,327	\$ 31,271,636	\$2,529	\$ 10,793,772	\$20,477,864
Medicaid	5,895	5,448	32,115,960	1,575	9,284,625	22,831,335
Montana Care	828	4,305	3,564,540	1,907	1,578,996	1,985,544
Managed Care	1,885	3,842	7,242,170	1,638	3,087,630	4,154,540
Blue Cross	332	5,761	1,912,652	2,366	785,512	1,127,140
Commercial	1,408	11,770	16,572,160	2,969	4,180,352	12,391,808
Self-Pay	1,289	2,053	2,646,317	1,489	1,919,321	726,996
Other	1,149	11,539	13,258,311	3,085	3,544,665	9,713,646
Total	<u>17,054</u>		<u>\$108,583,746</u>		<u>\$35,174,873</u>	<u>\$73,408,873</u>
Weighted average		<u>\$6,367</u>		<u>\$2,063</u>		

## *P&L Statement:*

Total revenues	\$ 108,583,746
Variable costs	<u>35,174,873</u>
Contribution margin	\$ 73,408,873
Fixed costs	<u>71,746,561</u>
Profit	<u>\$ 1,662,312</u>

# Summary of Results

<i>Payer</i>	<i>Number of Admissions</i>	<i>Average Revenue per Admission</i>	<i>Revenue by Payer</i>	<i>Variable Cost per Admission</i>	<i>Total Variable Costs</i>	<i>Contribution Margin</i>
<i>Payer Worksheet:</i>						
<b>Capitated</b>	<b>2,258</b>	<b>\$ 6,250</b>	<b>\$ 14,110,583</b>	<b>\$1,903</b>	<b>\$ 4,296,794</b>	<b>\$ 9,813,789</b>
Medicare	4,268	7,327	31,271,636	2,529	10,793,772	20,477,864
Medicaid	<b>4,716</b>	5,448	<b>25,692,768</b>	1,575	<b>7,427,700</b>	<b>18,265,068</b>
Montana Care	828	4,305	3,564,540	1,907	1,578,996	1,985,544
Managed Care	1,885	3,842	7,242,170	1,638	3,087,630	4,154,540
Blue Cross	332	5,761	1,912,652	2,366	785,512	1,127,140
Commercial	<b>845</b>	11,770	<b>9,943,296</b>	2,969	<b>2,508,211</b>	<b>7,435,085</b>
Self-Pay	<b>773</b>	2,053	<b>1,587,790</b>	1,489	<b>1,151,593</b>	<b>436,198</b>
Other	<u>1,149</u>	<u>11,539</u>	<u>13,258,331</u>	<u>3,085</u>	<u>3,544,665</u>	<u>9,713,646</u>
Total	<u>17,054</u>		<u>\$108,583,746</u>		<u>\$35,174,873</u>	<u>\$73,408,873</u>
Weighted average		<u>\$ 6,367</u>		<u>\$2,063</u>		

Annual capitated revenue requirements =  $\$14,110,583 \div 25,000 = \$564.42$  per member.

Monthly capitated revenue requirements =  $\$564.42 \div 12 = \$47.04$  per member per month (PMPM).

## *P&L Statement:*

Total revenues	\$108,583,746
Variable costs	<u>35,174,873</u>
Contribution margin	\$ 73,408,873
Fixed costs	<u>71,746,561</u>
Profit	\$ 1,662,312

# TDABC Method

- The idea behind the **time-driven activity-based costing (TDABC)** method is that service-level costs are not the correct way to view the cost of providing services.
- Rather, the costing system should account for the total costs of **all** the resources used as a patient traverses the entire health system.
- The rationale for the TDABC method is that the value of healthcare services must be measured in terms of patient outcomes achieved per total dollars expended. Value is increased when outcomes are improved at similar costs or costs are reduced while maintaining outcome quality.

## **TDABC Method (Cont.)**

- **Here are the steps in the TDABC method:**
  - **Select the medical condition to be studied.**
  - **Define the activities in the care delivery chain.**
  - **Develop process maps of each activity.**
  - **Estimate the cost of each activity, including both direct and indirect costs.**
  - **Calculate the total cost of patient care. Here, the costs of all the activities are summed to estimate the total cost of a patient's complete cycle of care. The cycle may be defined by completion of care or, for chronic conditions, by time (say, a year).**

# Pricing Decisions

- One use of managerial accounting information within health services organizations is to:
  - **Set the prices** (and **discounts**) on services offered under charge-based reimbursement.
  - **Determine the financial impact** of services offered when prices are dictated.
  - **Identify the lowest feasible price** when prices are negotiated.
- Such decisions have a profound effect on a provider's financial position.

## Price Setters Versus Takers

- When a provider has market dominance, and hence can set its own prices (within reason), it is said to be a **price setter**.
- In other situations, providers are **price takers**:
  - Perfectly competitive markets
  - Payer dominance
  - Government programs
- However, in many situations providers are *neither* pure price takers nor pure price setters and room for negotiation exists.

# Pricing Strategies

- When a provider is a *price setter* (or when negotiation is possible), there are several *theoretical bases* upon which prices can be set.
- The two most common are:
  - Full cost pricing
  - Marginal cost pricing

## Full Cost Pricing

- Under **full cost pricing**, prices for a service are set to cover *all costs*:
  - Direct costs
    - Fixed
    - Variable
  - Indirect (overhead) costs
- In addition, a *profit component* typically is added.

## Marginal Cost Pricing

- Under **marginal cost pricing**, prices for a service are set to cover *incremental*, or *marginal, costs*. Generally, this means recovering only *direct variable costs*.
- ? Can a provider survive if all services are priced at marginal cost?
- ? What is **cross-subsidization**, or **price shifting**?
- ? Should marginal cost pricing ever be used?

# Target Costing

- **Target costing** is a management strategy used by *price takers*.
- Under target costing:
  - Revenues are projected assuming prices as given in the marketplace.
  - Required profits are subtracted from revenues.
  - The remainder is the *target cost level*.
- ? What is the primary benefit of target costing?

## Setting Prices on Individual Services

- Assume Windsor Clinic plans to offer a new outpatient service.
- Projected data:
  - Variable cost per visit \$10
  - Annual direct fixed costs \$100,000
  - Annual overhead allocation \$25,000
  - Number of visits 5,000
- What price must be set to achieve **accounting breakeven** (zero profit)? To achieve **economic breakeven** (earn a fair profit)?

## Price Required for Accounting BE

$$\text{Total revenues} - \text{Total costs} = \$0$$

$$\begin{aligned} &\text{Total revenues} - \text{Total VC} \\ &\quad - \text{Direct fixed costs} \\ &\quad - \text{Overhead} \end{aligned} = \$0$$

$$\begin{aligned} &(5,000 \times P) - (5,000 \times \$10) \\ &\quad - \$100,000 - \$25,000 \end{aligned} = \$0$$

$$(5,000 \times P) - \$175,000 = \$0$$

$$5,000 \times P = \$175,000$$

$$P = \$175,000 \div 5,000 = \$35.$$

## Price Required for \$100,000 Profit

$$\begin{aligned} &\text{Total revenues} - \text{Total VC} \\ &\quad - \text{Direct fixed costs} \\ &\quad - \text{Overhead} \qquad \qquad \qquad = \$100,000 \end{aligned}$$

$$\begin{aligned} &(5,000 \times P) - (5,000 \times \$10) \\ &\quad - \$100,000 - \$25,000 \qquad \qquad \qquad = \$100,000 \end{aligned}$$

$$(5,000 \times P) - \$175,000 \qquad \qquad \qquad = \$100,000$$

$$5,000 \times P \qquad \qquad \qquad = \$275,000$$

$$P = \$275,000 \div 5,000 \qquad \qquad \qquad = \$55.$$

## Setting Prices Under Capitation

- Montana Medical Center (MMC) has **1,400** admissions from one charge-based (FFS) payer with **15,000** members.
- Relevant financial data:
  - Average rev per admission = \$ **10,000**.
  - Average VC per admission = \$ **3,000**.
  - Direct FC and overhead = **\$9,000,000**.
- The payer wants to move to capitation. What rate must be set on these patients to achieve the current profit?

## Current P&L Statement

<b>Total revenues (\$10,000 × 1,400)</b>	<b>\$14,000,000</b>
<b>Total VC (\$3,000 × 1,400)</b>	<b><u>4,200,000</u></b>
<b>Total CM (\$7,000 × 1,400)</b>	<b>\$ 9,800,000</b>
<b>Direct FC and overhead</b>	<b><u>9,000,000</u></b>
<b>Profit</b>	<b><u><u>\$ 800,000</u></u></b>

## Setting Prices Under Capitation (Cont.)

- All else the same, MMC needs to obtain the same total revenues, **\$14,000,000**.
- This amount of annual revenues must be obtained from **15,000** enrollees:  
$$\$14,000,000 \div 15,000 = \$933.33 \text{ per member.}$$
- But capitation rates are quoted on a per member per month (PMPM) basis:  
$$\$933.33 \div 12 = \$77.78 \text{ PMPM.}$$

## Projected P&L Statement

<b>Total rev. (<math>\\$77.78 \times 15,000 \times 12</math>)</b>	<b>\$14,000,000</b>
<b>Total VC (<math>\\$3,000 \times 1,400</math>)</b>	<b><u>4,200,000</u></b>
<b>Total CM</b>	<b>\$ 9,800,000</b>
<b>Direct FC and overhead</b>	<b><u>9,000,000</u></b>
<b>Profit</b>	<b><u><u>\$ 800,000</u></u></b>

## Scenario Analysis

- Note that the admission rate was assumed to remain unchanged at:  
 $1,400 \div 15,000 = 0.0933$  per member.
- Before making a decision, MMC should analyze alternative scenarios, a technique called **scenario analysis**.
- What profit would result if a *utilization management program* reduced the admission rate to **0.08** admissions per enrollee?

## Scenario Analysis (Cont.)

- If utilization were reduced, the number of admissions would fall from **1,400** to:

$$15,000 \times 0.08 = \mathbf{1,200}.$$

- Therefore, variable costs would fall by:

$$200 \times \$3,000 = \mathbf{\$600,000}.$$

- At **\$77.78** PMPM, profit would increase to:

$$\mathbf{\$800,000} + \mathbf{\$600,000} = \mathbf{\$1,400,000}.$$

## Projected P&L Statement

Total revenues ( $\$77.78 \times 15,000 \times 12$ )	\$14,000,000
Total VC ( $\$3,000 \times 1,200$ )	<u>3,600,000</u>
Total CM	\$10,400,000
Direct FC and overhead	<u>9,000,000</u>
Profit	<u><u>\$ 1,400,000</u></u>

- ? Should the direct fixed costs and overhead be adjusted for the utilization change?
- ? Assume the utilization management program costs **\$100,000**. Should it be undertaken?

## Scenario Analysis (Cont.)

**Assume now that MMC wants to share some of the utilization management program gains with the payer. What PMPM maintains the contract profit at **\$800,000**?**

Now, revenue could fall by  $\$1,400,000 - \$600,000 = \$800,000$  to  $\$13,400,000$ :

$$\$13,400,000 \div 15,000 = \mathbf{\$893.33} \text{ per member.}$$

On a PMPM basis:

$$\mathbf{\$893.33} \div 12 = \mathbf{\$74.44} \text{ PMPM.}$$

## Projected P&L Statement

<b>Total revenues (<math>\\$74.44 \times 15,000 \times 12</math>)</b>	<b>\$13,400,000</b>
<b>Total VC (<math>\\$3,000 \times 1,200</math>)</b>	<b>3,600,000</b>
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<b>Total CM</b>	<b>\$ 9,800,000</b>
<b>Direct FC and overhead</b>	<b>9,000,000</b>
	<hr/>
<b>Profit</b>	<b>\$ 800,000</b>
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## Scenario Analysis (Cont.)

- Now assume that utilization management would hold the number of admissions to **1,200**.
- What capitation rate would be needed to achieve accounting breakeven (zero profit)?

## Scenario Analysis (Cont.)

- To break even, revenues must equal total costs:

$$\begin{aligned}\text{Total costs} &= \text{Total VC} + \text{Total FC} \\ &= \$3,600,000 + \$9,000,000 \\ &= \mathbf{\$12,600,000.}\end{aligned}$$

- Thus, the PMPM rate is:

$$\begin{aligned}\text{PMPM} &= \$12,600,000 \div 15,000 \div 12 \\ &= \mathbf{\$70.00.}\end{aligned}$$

## Scenario Analysis (Cont.)

- Finally, assume that the payer insists on a PMPM rate of **\$65**.
- What variable cost per admission would be required for MMC to achieve accounting breakeven (zero profit)?

## Scenario Analysis (Cont.)

- At a PMPM of **\$65**, total revenues are:

$$\begin{aligned}\text{Revenues} &= \$65 \times 12 \times 15,000 \\ &= \mathbf{\$11,700,000}.\end{aligned}$$

- With total fixed costs of **\$9,000,000**, total variable costs must be held to:

$$\begin{aligned}\text{Total VC} &= \$11,700,000 - \$9,000,000 \\ &= \mathbf{\$2,700,000}.\end{aligned}$$

- Thus, the variable cost rate is:

$$\text{VC rate} = \$2,700,000 \div 1,200 = \mathbf{\$2,250}.$$

## The Value of Scenario Analysis

- **In this illustration, scenario analysis focused on:**
  - **The value of utilization management.**
  - **The minimum PMPM rate necessary to break even.**
  - **The ability to accept a lower PMPM rate when cost control is possible.**
- **It is obvious that scenario analysis gives decision makers more insights into the decision at hand.**

**That's all for Chapter 7!**