A Cost Analysis and Management Reporting System in Occupational Therapy

Martha K. Logigian
Michael G. Trisolini

Key Words: accounting • costs and cost analysis • fees and charges

Productivity management through cost analysis is fundamental in today's health care. A description of a cost analysis and management reporting system based on relative value units is presented in this article along with a practical method of identifying variable, fixed, and total costs for occupational therapy. Occupational therapy management participation in the cost analysis process is also discussed.

Cost containment efforts have posed several challenges to hospitals. The implementation of reimbursement by diagnostic-related groups (DRGs), has necessitated declining lengths of stay for patients and increased competition between hospitals. Hospitals have developed an array of responses to these problems, including the increased use of outpatient facilities and preferred-provider agreements with health maintenance organizations and business groups.

One of the fundamental responses from hospitals has been improved productivity management (Valadeck, 1984; also see the first author's other article on p. 285 of this issue). In hospitals, productivity is managed first by ancillary departments that control unit costs of services for patients and second by physicians who control the number of units of diagnostic and therapeutic services ordered (Orefice & Jennings, 1983). Hence, a management reporting system must define the units of service produced by each ancillary department, provide reports that enable department managers to monitor the variable cost of each unit of service over time, and provide full reports on the full cost of ancillary services to determine whether the costs of patient care will exceed per-case reimbursement.

Management reports traditionally available in hospitals do not serve these purposes, primarily because under retrospective reimbursement hospitals had no incentive to reduce the unit cost of providing services. What information was available came from the billing system, but those data were expressed in terms of charges that often bore no relationship to the actual cost of providing services (Finkler, 1982). For Medicare cost reports, costs and charges were aggregated into cost centers and average cost-to-charge ratios were calculated to estimate the cost of individual services. It has been shown, however, that these average cost-to-charge ratios can also provide misleading information (Williams, Finkler, & Murphy, 1982).

Clearly new productivity monitoring systems are needed (Margulies & Duval, 1984). One suggested approach is a detailed, industrial-model cost accounting system to identify standard costs for all cost components for each charge code in a hospital (Mansfield, 1983; Poulsen, 1984). In individual applications, this approach is often used to develop both types of departmental management reports identified above: variable cost reports and full cost transfer prices. In hospitals, however, detailed cost accounting systems are not likely to be useful, health care is not produced in assembly line fashion, and quality measures are difficult to develop, hence standards are difficult to establish and hard to maintain (Burlik, 1984). Maintaining detailed cost analyses of the several thousand

Martha K. Logigian, MS, OTR, is Director of Rehabilitation Services, Brigham and Women's Hospital, 75 Francis Street, Boston, Massachusetts 02115.

Michael G. Trisolini, MBA, is Project Leader, Center for Cost Effective Care, Brigham and Women's Hospital, Boston, Massachusetts.
charge items in a typical hospital is not practical, given the inevitable inaccuracies that will result. It would be better to develop a management reporting system that is tailored to hospital needs and will identify variable costs and calculate the total cost per case without overwhelming managers with details.

This article describes a pilot effort to develop such a management reporting system for the Rehabilitation Services Department at Brigham and Women's Hospital, a 720-bed teaching hospital in Boston, Massachusetts. We believe that this system, which is based on relative value units (RVUs), to be both useful for management and practical to develop in other departments. Our purpose is to illustrate the steps needed to create this type of information and to demonstrate the practicality of the RVU system.

Methods

The Rehabilitation Services Department at the Brigham and Women's Hospital employs a total of 75 staff members and is organized into four program sections. Each section—acute care, orthopedics and rheumatology, acute rehabilitation program, and outpatient care—has a manager responsible for the coordination of patient care across professional lines.

To identify unit costs for each section and provide for increased accountability, a management reporting system was developed based on relative value units. The RVU system was developed in four steps: (a) by defining each section's outputs after identifying the variable costs for each service provided; (b) by calculating RVUs using the variable cost data; (c) by creating a management report to track the variable cost of services; and (d) by calculating full-cost transfer prices for each unit of service for use in cost-per-case analyses. This article will review development of the management reporting system for occupational therapy services in the Acute Rehabilitation Program (ARP) section to provide a step-by-step description of how the RVU system was implemented.

Defining Outputs

At the outset, we decided that the 209 revenue charge codes used by the Rehabilitation Services Department would be unmanageable as a definition of outputs. We therefore summarized the codes into categories containing charge items with similar variable costs. Because the Rehabilitation Services budget consists primarily of salaries (84%) and supplies (14%), all departmental costs were treated as variable. Fixed costs, such as equipment and overhead, were contained in separate, indirect cost centers by the hospital. Expected labor and supplies costs were calculated for each charge code and added to find the total expected per-unit variable cost for each charge code (see Table 1). New output categories were defined as groups of charge codes with similar costs. For example, all occupational therapy 15-minute time charges were grouped into one category since they all have the same variable cost. A new set of charge codes was developed based on these new cost-related output categories.

Calculating RVUs

The second step was to calculate RVUs using the per-unit variable cost estimates. The unit cost for "Occupational Therapy: 5 minutes" was designated to equal 1.0 RVUs. The unit costs of all other categories were divided by this unit cost for occupational therapy to arrive at the RVU value for each of the other output categories (see Table 2).

Management Reports for Tracking Unit Costs

Once RVUs were calculated for each output category, a common unit of measure was available for all services provided by the department. This enabled us to develop management reports to track unit costs over time.

Budgeted and actual RVUs of service provided were calculated on a monthly basis. Ratios were constructed to find the actual variable cost per RVU for the department as a whole and then compared with

<table>
<thead>
<tr>
<th>Table 1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Identifying Variable Costs for Each Charge Code</strong></td>
</tr>
<tr>
<td>Charge Code</td>
</tr>
<tr>
<td>OT time charge</td>
</tr>
<tr>
<td>Wrist splint</td>
</tr>
</tbody>
</table>

Note. OT = occupational therapy.

as groups of charge codes with similar costs. For example, all occupational therapy 15-minute time charges were grouped into one category since they all have the same variable cost. A new set of charge codes was developed based on these new cost-related output categories.

<table>
<thead>
<tr>
<th>Table 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Calculating Relative Value Units (RVUs) Using Variable Costs</strong></td>
</tr>
<tr>
<td>Charge Codes:Treatment</td>
</tr>
<tr>
<td>101: Occupational Therapy (15 min)</td>
</tr>
<tr>
<td>102: OT Modality</td>
</tr>
<tr>
<td>103: Splint Category I</td>
</tr>
<tr>
<td>104: Splint Category II</td>
</tr>
<tr>
<td>105: Splint Category III</td>
</tr>
<tr>
<td>106: Splint Category IV</td>
</tr>
<tr>
<td>107: Splint Category V</td>
</tr>
<tr>
<td>108: Splint Category VI</td>
</tr>
<tr>
<td>109: Splint Category VII</td>
</tr>
</tbody>
</table>

a The $1.36 figure was used to define 1.0 RVUs because that is the cost of 5 min of therapy. The department shifted to charging time in 15 min units within the past year, but this definition of 1.0 RVUs was retained. The 15-min charge is identified by the occupational therapy charge code, which is assigned 3.0 RVUs.

The American Journal of Occupational Therapy

293
the budgeted year-to-date and previous months' variable costs per RVU

Calculating Transfer Prices

Transfer prices represent the total (variable plus fixed) cost of each type of service. Total costs are needed for transfer prices since the latter are used to calculate the total cost-per-case for analysis of DRGs.

As discussed above, variable costs were calculated for each charge code in the process of developing the new output definitions. To find fixed costs, an interdisciplinary working group studied cost reports and cost allocation statistics and used a refined step-down methodology to estimate the fraction of hospital-wide indirect overhead costs that should be assigned to the Rehabilitation Services Department. Because cost allocations done for Medicare cost reports, the usual source of indirect cost data, are often modified in practice to maximize a hospital's revenue, they were deemed too imprecise for the management purposes of this study.

Once the total of fixed costs was identified for the Rehabilitation Services Department, this figure was divided by the budgeted total RVUs to find the budgeted fixed cost per RVU. The fixed cost of each type of therapy was found by multiplying the budgeted fixed cost per RVU by the total RVUs assigned to each charge code. The variable and fixed costs were then added for each charge code to find the total cost used as the transfer price.

Results

Tables 3 to 5 present the management reports developed to track unit costs (cost per RVU) for the ARP. The first report (see Figure 3) calculates the total RVUs for each charge code given the unit volume inputs. Charge codes and RVUs for physical therapy are also listed here. We developed these tables using calculations similar to those described above for occupational therapy. In this example, the volume of both occupational therapy and physical therapy services is below budgeted levels for the current month (November 1985). This decrease caused total RVUs to also fall below budgeted levels, with 9,101.5 RVUs of service provided against 10,511.6 budgeted. This situation could have developed because of a fall in the patient population census for the ARP.

Table 4 maps the variable cost per RVU, comparing the current month's figure with the budgeted figure. In this example, variable costs increased slightly over budget, while the total RVUs fell below budgeted levels. This caused the actual variable cost per RVU to rise above the budgeted level ($3.30 versus $2.79).

Figure 5 provides a trend analysis of unit costs. Actual cost per RVU figures for each month are compared with the budgeted and year-to-date average levels (see Figure 5). In this example, unit costs were found to be below the budgeted level in October before rising above the budgeted level for November.

Figure 6 lists the transfer prices calculated for each charge code for occupational therapy. The variable and fixed cost components are also displayed (see Table 6). These figures range from $14.67 to $215.65, but the absolute dollar amount is not important. Occupational therapy at $14.67 is provided to patients much more often than a splint at $215.65. The important point is that the costs transferred to the cost-per-case analyses represent all hospital-re...
Table 4
Variable Cost per Relative Value Unit (RVU) Report: Flexible Budget Analysis for November 1985 (Cost Center: 7642 Acute Rehabilitation Program)

<table>
<thead>
<tr>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total RVUs</td>
<td>Variable Costs</td>
<td>Variabke Cost per RVU (2)/(1)</td>
<td>Budgeted RVUs</td>
<td>Budgeted Variable Costs</td>
<td>Budgeted Variable Cost per RVU (5)/(4)</td>
</tr>
<tr>
<td>9,102</td>
<td>$50,003</td>
<td>$3.30</td>
<td>10,512</td>
<td>$29,312</td>
<td>$2.79</td>
</tr>
</tbody>
</table>

Detailed costs of providing occupational therapy to patients.

Discussion

We elected to develop our own RVU system and not to use externally developed RVUs for two reasons. First, existing systems, such as the RVUs from the American Occupational Therapy Association (AOTA) ("OT Product Output Reporting System," 1979) were not based on the type of cost-related factors we needed. Estimates of labor and supplies costs were important for our system to monitor unit costs and serve as an input to the cost-per-case system. In addition, the AOTA system did not correspond to our charge code structure, which separates time-based and supplies-based charges for occupational therapy.

Another reason for an internally developed system was to allow department managers exposure to the cost analysis process. Building the system took about 2 months, and it forced everyone involved to think carefully about the total costs of services they were providing. We deliberately involved as many managers as possible in the development and review of both the output categories and the RVUs.

One difficulty in designing cost accounting systems is distinguishing fixed from variable costs (Mistaz, 1984). We opted for a straightforward breakdown: Labor and supplies were deemed variable and equipment and overhead were deemed fixed. In some cases, this type of breakdown may seem to create a distortion. Certain types of personnel costs (e.g., supervisors and section managers) are usually viewed as semifixed costs. But we maintained our original breakdown since this system encourages managers to critically evaluate the breakdown of their time between patient care and administrative duties.

Table 5
Trend Report: Variable Cost per Relative Value Unit (RVU) (Cost Center: 7642 Acute Rehabilitation Program)

<table>
<thead>
<tr>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budgeted YTDA</td>
<td>October</td>
<td>November</td>
<td>December</td>
<td>January</td>
<td></td>
</tr>
<tr>
<td>$2.79</td>
<td>$2.97</td>
<td>$2.64</td>
<td>$3.30</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. YTDA = year to date average.

Table 6
Transfer Prices for Occupational Therapy

<table>
<thead>
<tr>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output Categories</td>
<td>Per Unit RVUs</td>
<td>Variable Cost (2) × $2.79</td>
<td>Fixed Cost (2) × $2.10</td>
<td>Transfer Price (2) + (4)</td>
</tr>
<tr>
<td>Occupational therapy</td>
<td>3.0</td>
<td>$8.37</td>
<td>$6.30</td>
<td>$14.67</td>
</tr>
<tr>
<td>OT modality</td>
<td>5.7</td>
<td>$15.90</td>
<td>$11.97</td>
<td>$27.87</td>
</tr>
<tr>
<td>Splint $0-$5</td>
<td>1.8</td>
<td>$5.02</td>
<td>$3.78</td>
<td>$8.80</td>
</tr>
<tr>
<td>Splint $6-$10</td>
<td>5.5</td>
<td>$15.35</td>
<td>$11.55</td>
<td>$26.90</td>
</tr>
<tr>
<td>Splint $11-$15</td>
<td>9.2</td>
<td>$25.67</td>
<td>$19.32</td>
<td>$44.99</td>
</tr>
<tr>
<td>Splint $16-$20</td>
<td>12.9</td>
<td>$35.99</td>
<td>$27.09</td>
<td>$63.08</td>
</tr>
<tr>
<td>Splint $21-$25</td>
<td>16.5</td>
<td>$46.04</td>
<td>$34.65</td>
<td>$80.69</td>
</tr>
<tr>
<td>Splint $26-$50</td>
<td>27.6</td>
<td>$77.00</td>
<td>$57.96</td>
<td>$134.96</td>
</tr>
<tr>
<td>Splint $50-$70</td>
<td>44.1</td>
<td>$123.04</td>
<td>$92.61</td>
<td>$215.65</td>
</tr>
</tbody>
</table>

Note. RVU = Relative value unit; OT = occupational therapy.

If they are able to see more patients, while therapists in their sections maintain their patient care service levels, the unit cost of care will decline for their sections.

Also, the system was never intended to highlight month-to-month fluctuations in unit costs, which could be affected by changing patient loads spread over inflexible semifixed costs. Rather, the system was intended to highlight trends in unit costs over 3- or 4-month periods, where unit costs should be controllable even given fluctuations in patient census. This longer term view is also intended to encourage cost reduction by attrition instead of layoffs by providing managers several months to adjust to decreasing patient volume.

We found the RVU system remedied the distortions caused by the ratio of the cost-to-charge method yet avoided the complexities of a full-blown standard costing system. The RVU system does not provide as much information as a detailed standard cost system, but is easier to develop and maintain. The RVU system can serve as the first step in developing a standard cost system, such as the one developed by Intermountain Health Care (Burik, 1984), should the hospital eventually decide to use the more detailed standard cost approach. The hospital's managers gain experience in analyzing the cost of ancillary services through the development of RVUs, while the hospital avoids the need to purchase software for a standard cost system and retains the options of remaining with the RVU system.

Finally, management reporting systems implemented in all hospital ancillary departments should be linked to a cost-per-case (case mix) management system to be most effective in reducing costs. Only with an integrated system are all hospital costs assigned to individuals held accountable for the costs under their control. Thus, physicians are responsible for the cost implications of their patients' length of stay and frequency of therapies and tests and ancillary....
department managers are responsible for the unit cost of providing those services.

References


Here's the data you need for hard-hitting program proposals...

A Productivity Systems Guide for Occupational Therapy

Edited by Jeanette Bair & Carol H. Gwin

This book can help you compile hard hitting and effective productivity data for use in proposal development and regular reporting. It contains a thorough coverage of different ways to document from a variety of practice settings. Also included is AOTA’s Product Output Reporting System and Uniform Terminology, as well as productivity ranges excerpted from the AOTA Member Data Survey, a bibliography and glossary of terms, and more. 227 pp, 1985.

$15.00 member

$19.00 nonmember

Order #1986

To order send check, money order or official agency purchase order (U.S. only, minimum $20.00) to: AOTA Products, 1383 Piccard Drive, P.O. Box 1725, Rockville, MD 20850-4375.

MasterCard and Visa holders may now order by phone! AOTA members call free, 800-THE-AOTA (in Maryland call 800-654-5584, in Alaska call collect, 301-948-9626) Nonmembers call 301-948-9626

Publications from the American Occupational Therapy Association