University of Michigan Health System
Program and Operations Analysis

Analysis of Pharmaceutical Spending at the University of Michigan Health Systems
Emergency Department

Final Project Report

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Executive Summary

University of Michigan Health Systems Emergency Department (UMHS-ED) is over budget by $287,475 on pharmaceutical expense FY05 YTD. The purpose of this report is to determine the cause of the over budget ED pharmacy expense.

ED budget data, Omni Cell and requisition procurement data, patient charts and billing data were all analyzed. Interviews of Pharmacy business manager and ED billing manager were also conducted. From the analysis and interviews various findings were deduced.

Medications retrieved from the Omni Cells are not tracked. The medications must be documented on patient charts in order for the patient to be billed. Omni Cell medication prices in the ED are infrequently updated and have not been updated for FY05. After the Omni Cell inventory was reevaluated in October ’04, the usage of the Omni Cell vs. requisitioning medications increased by 30%.

The requisition process has many issues. The orders are handwritten and can be unclear or difficult to read. The time it takes to receive an order can be up to an hour. Requisitions are also outside the normal process when sent to the 6th floor pharmacy.

Out of 200 patient charts for January 2005, 41 were missing medications with 49 medications missing overall. These missing medications could potentially cost the ED $20,329 per year.

In conclusion, the ED activity has steadily increased from FY02 through FY05. The ED is also being charged lower prices for Omni Cell medication due to the infrequency of price updates. Nearly 1 in 5 patient charts have a pharmacy discrepancy.

Based on the findings and conclusions, we recommend reevaluating and increasing the current ED pharmacy budget. ED charges currently exceed expenses nearly 3 to 1. ED activity increases steadily each year. The ED is also faced with future price updates from the Omni Cell, which will increase expenses dramatically.
Introduction

University of Michigan Health Systems Emergency Department (UMHS-ED) is over budget by $287,475 on pharmaceutical expense and below budget in pharmaceutical gross charges FY05 YTD. ED Pharmaceutical revenue is also below what is budgeted. Therefore, the purpose of this project is to determine the cause of the over budget ED pharmacy expense. This final report presents the progress of the project from January 31st to April 20, 2005.

Goals and Objectives

The following goals are associated with this project:

- Determine if the ED expense is reasonable given patient activity and acuity or if there are possibilities to reduce pharmaceutical spending
- Flow chart requisition ordering and billing
- Compare patient charts to billing records to determine accuracy of charge capture.

Upon receipt of these findings, the ED managerial staff will have a clearer understanding of the medication procurement process in order to better provide a budget which meets the needs of the ED in an attempt to remain on budget for pharmaceutical spending in coming years.

Background

The University of Michigan Health Systems Emergency Department (UMHS-ED) averages 70,000 patients per year. The ED is a level 1 trauma center, meaning it is capable of handling all patients. It is a tertiary facility, handling a complete spectrum of patient needs. Within the ED there are four treatment areas: Main ED, Children’s Emergency Services (CES), Michigan Emergency Department Patient Assessment and Treatment Hub (MEDPATH), and Minor Emergency Care Area (MECA). The budget for pharmacy costs for the fiscal year FY05 (starting in July, 2004) is $550,000 and the ED is currently over budget by $287,475.

Many medications are stocked in an Omni Cell, which holds frequently used medications for procurement. Any additional medications are ordered from the UMHS pharmacy through a requisition process. This process is time consuming and inefficient. Patients admitted to the hospital, but not yet transferred from ED and are waiting for an available bed, remain in the ED. Necessary paperwork and any costs assessed for those waiting for a bed, including medications, are the responsibility of the ED. This “first dose” policy is new to the ED and started in November 2004. The ED billing team processes charges for medications.

As originally proposed, the ED pharmaceutical analysis is needed due to the following key issues:

- Medication procurement is optimal through Omni Cell
- Medication procurement though requisition can lead to inefficiency
  - Delays
  - Billing confusion
• Tracking difficulty
• Dispensed Medication is manually entered on patient charts

Methodology

The ED process analysis team has examined the pharmaceutical activities of the ED to determine possibly causes of excess spending in order to bring the ED’s pharmacy budget on target and maximize revenue. The primary parties involved in this project were pharmacy representatives and ED staff.

We looked at the following sources of data in order to complete our analysis:

• Analyze Omni Cell/Requisition Frequency of Medications:
  • July FY04 - October FY04 (Data Mart)
• Analyze Budget Data:
  • FY02-FY05 (Data Mart)
• Chart Review:
  • January 2005
  • 200 patient charts
  • All patient levels
  • Patient billing data: (TSI)
  • Medication costs AWP as indicated by ED Billing Supervisor

Scope

In order to investigate the budget variance, the scope of our project included pharmaceutical utilization and charge capture of the ED. Also within our scope was to analyze the frequency of medications used and to evaluate methods of medication procurement (Omni Cell and Requisition). Finally, we were to analyze the patient billing process to evaluate billing accuracy.

Out of scope for our project was to analyze ED processes not associated with pharmaceutical usage and to research new medication options.

Findings

The following describes findings relating to Omni Cell Procurement, requisition procurement, patient chart vs. billing data, and budget data.

Omni Cell Procurement

Omni Cells are stocked daily by pharmacy to maintain par levels (replenish medications used in previous day). Inventory levels vary slightly between the five Omni Cells in the ED according to established usage. An employee identification code is entered which allows access to all medications except narcotics (which are more strictly regulated by use of a key). An employee can then extract any medication quantity they need. Procured medications must be manually
entered onto patient charts. This can lead to improper documentation, thus resulting in potential billing errors. Patients are only billed for medications listed on their chart.

The pharmacy bills the ED once a month for medications stocked in the Omni Cell. Omni Cell medication prices are updated by pharmacy infrequently. They have not been updated for FY05. Therefore, pharmacy is currently charging the ED below the Merisource online catalog cost (current cost).

Omni Cell formulary (inventory) was evaluated in October 2004 (FY05). Medications of high usage were placed in the Omni Cell if they had been there prior. Note: certain medications must be stored in pharmacy due to preparation and storage requirements. The updated formulary better reflects ED medication needs.

![Figure 1. Omni and Requisition Expenses for FY05](image)

Figure 1 shows that there was a dramatic increase in Omni Cell after October 2004 due to Omni Cell inventory re-evaluation.

<table>
<thead>
<tr>
<th>Table 1. Omni and Requisition Expenses for FY05 Based on Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY04</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>% of total usage</td>
</tr>
<tr>
<td>FY05</td>
</tr>
<tr>
<td>% of total usage</td>
</tr>
</tbody>
</table>
Table 1 depicts Omni Cell usage increased by approximately 30%, while requisition usage decreased by approximately 30% from FY04 to FY05.

Table 2. Average Expense Per Patient Omni Cell vs. Requisition From FY04 – FY05

<table>
<thead>
<tr>
<th></th>
<th>FY04 July 03-Oct 03</th>
<th>FY05 July 04-Oct 04</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Omni Expense Per Patient</td>
<td>$6.52</td>
<td>$10.11</td>
</tr>
<tr>
<td>Average Req Expense Per Patient</td>
<td>$4.23</td>
<td>$7.10</td>
</tr>
</tbody>
</table>

In Table 2, Omni Cell expense per patient increased by $3.59 and requisition expense per patient increased by $2.87.

Figure 2. ED Omni Cell Medication Frequency of Usage in FY04

The above figure shows the most highly used medications based on frequency of restocking.

Requisition Process

We have interviewed the business manager of the Pharmacy to obtain a description of the medication requisition process. Appendix 1 contains flow charts of physical flow and information flow associated with ordering medications through requisitions.

The requisition process contains the following problems:

- Handwritten orders
  - Unclear/Difficult to read
• Time consuming (~1 hour to receive order)
• Outside normal process
  • Confused with strip orders
  • Inconsistent process
    • Handled by B2 pharmacy from 8am-5pm
    • Handled by 6th floor pharmacy from 5pm-8am
• Increased handling (more manpower needed)

Frequency

We received a database of FY04 information related to pharmaceutical ordering and spending of the ED requisitions. From this data we were able to determine high frequency requisitioned medications from this time period.

Table 3. Requisition Frequency in FY04

<table>
<thead>
<tr>
<th>Medication</th>
<th>Requisition Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cipro</td>
<td>50</td>
</tr>
<tr>
<td>Protonix</td>
<td>47</td>
</tr>
<tr>
<td>Synthroid</td>
<td>38</td>
</tr>
<tr>
<td>Folic Acid</td>
<td>35</td>
</tr>
<tr>
<td>Neurontin</td>
<td>33</td>
</tr>
</tbody>
</table>

Table 3 indicates the five most frequently requisitioned medications. These five medications are now available in ED Omni Cell starting in October 2004 after Omni Cell reevaluation.

![Pareto Chart of Item](image)

**Figure 3. Highest Cost Requisitioned Medications in FY04**

As depicted in Figure 3, 8 requisitioned medications made up 80% of requisition costs in FY04.
**Budget Analysis**

The following charts outline ED patient activity and the pharmacy expense budget.

**Activity**

![ED Activity July-March](image)

**Figure 4. ED Activity Trend**

Figure 4 shows that total ED activity from July to March FY02-FY05 increased each fiscal year.

**Budget**

![ED Pharmacy Charge Budget vs. Charge Actual](image)

**Figure 5. ED Pharmacy Charge Budget vs. Charge Actual (Based on July – March Data)**
Figure 5 shows the comparison between budget and actual data of charges (patient billing data). Figure 5 shows that for FY02 through FY04 actual charges to patients exceeded budgeted amount. In FY05, the budget exceeded the actual charges.

Figure 6. ED Pharmacy Expense Budget vs. Expense Actual (Based on July – March Data)

Figure 6 shows the comparison between budget and actual data of expenses. For FY02 through FY05 actual expenses exceeded the expense budget. In FY05 the margin by which actual expense exceeded budgeted expense increased from previous years.

Figure 7. ED Pharmacy Charge Actual vs. Expense Actual (Based on July – March Data)

Figure 7 shows the comparison of actual charges to actual expenses. From FY02-FY05 actual charges far exceeded actual expenses (charges indicate patient billing rather than gross revenue). Although FY05 charges were under budget, expenses still remain below total charges.
Figure 8. ED Pharmaceutical Cost/Charge Ratio (Based on July – March Data)

Figure 8 shows cost trending for FY02 though FY05. A decreased cost/charge ratio indicates a higher net revenue. The cost/charge ratio indicates percent of charges used for expenses (Cost). Although FY05 cost/charge ratio is an increase from FY04, it is still below the expected 50% return rate on patient billing charges.

Patient Charts vs. Billing Data

- 200 charts reviewed
- All patient levels
- Patient confidentiality maintained
- Compared patient billing data (TSI) to written chart orders
  - 41 charts were missing medications
  - 49 medications missing total
  - 35 of those were Tylenol and comparable low cost medications
  - 1 discrepancy with medication amount
Figure 9 shows 65% of Patient charts audited were billing level 5 and 4. This is representative of the approximate levels that the ED receives.

Table 4 shows the medications that were not billed on the 200 charts.

Table 4. Potential Charges Lost to ED

<table>
<thead>
<tr>
<th>Medication</th>
<th>Frequency</th>
<th>Unit Cost</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>tylenol</td>
<td>24</td>
<td>$0.25</td>
<td>$6</td>
</tr>
<tr>
<td>ibprofen</td>
<td>8</td>
<td>$0.19</td>
<td>$1.52</td>
</tr>
<tr>
<td>aspirin</td>
<td>2</td>
<td>$0.07</td>
<td>$0.14</td>
</tr>
<tr>
<td>levaquin</td>
<td>1</td>
<td>$11.08</td>
<td>$11.08</td>
</tr>
<tr>
<td>protonix</td>
<td>1</td>
<td>$3.95</td>
<td>$3.95</td>
</tr>
<tr>
<td>promethazine</td>
<td>1</td>
<td>$4.3</td>
<td>$4.3</td>
</tr>
<tr>
<td>flagyl</td>
<td>1</td>
<td>$0.41</td>
<td>$0.41</td>
</tr>
<tr>
<td>noroxin</td>
<td>1</td>
<td>$4</td>
<td>$4</td>
</tr>
<tr>
<td>motrin</td>
<td>1</td>
<td>$7.95</td>
<td>$7.95</td>
</tr>
<tr>
<td>ketorolac</td>
<td>1</td>
<td>$3.75</td>
<td>$3.75</td>
</tr>
<tr>
<td>requip</td>
<td>1</td>
<td>$2.44</td>
<td>$2.44</td>
</tr>
<tr>
<td>flomax</td>
<td>1</td>
<td>$2.07</td>
<td>$2.07</td>
</tr>
<tr>
<td>synthroid</td>
<td>1</td>
<td>$5.4</td>
<td>$5.4</td>
</tr>
<tr>
<td>zantac</td>
<td>2</td>
<td>$2.33</td>
<td>$4.66</td>
</tr>
<tr>
<td>TOTALS:</td>
<td>49</td>
<td></td>
<td>$57.67</td>
</tr>
</tbody>
</table>
The prices indicated reflect AWP, and would result in a total potential charge increase of $20,329 per year. This is extrapolated from the data set of 200 patients to 70,500 patients in FY04.

Conclusions

The ED’s activity has steadily increased from FY02 to FY05. The ED is being charged a lower price for Omni Cell medications. There was a discrepancy between patient charts and billing data on 41 out of 200 charts. The ED is currently spending 26% of what is billed to patients.

Recommendations

Based on the findings and conclusions, we recommend reevaluating and increasing the current ED pharmacy budget. ED charges currently exceed expenses nearly 3 to 1. ED activity increases steadily each year. The ED is also faced with future price updates from the Omni Cell, which will increase expenses dramatically.
Appendix A. Requisition Flow Chart of Medication

1. Nurse fills out requisition form in the ED
2. Nurse tubes requisition form
3. Is requisition for an IV?
   - Yes: Tube is sent to B2 Pharmacy
   - No: Tube is sent to 6th Floor Pharmacy
4. Is it between the hours of 8 AM and 5 PM?
   - Yes: Tube is sent to ED
   - No: Pharmacist staff procures pills
5. Pharmacy staff prepares IV
6. Pharmacy staff tubes medication with a copy of the requisition
7. Nurse distributes medication
Appendix A (cont). Requisition Flow Chart of Billing Paperwork

Requisition form is filled → Requisition form is tubed → Is it between the hours of 8 AM and 5 PM?

- **YES**
  - Tube is sent to B2 Pharmacy
  - Is item charge < $5 / unit?
    - **YES**
      - ED is billed $1.25 * number units
    - **NO**
      - ED is billed actual charge

- **NO**
  - Tube is sent to 6th Floor Pharmacy
  - Copy of requisition is sent to pharmacy administration on B2
  - ED is billed monthly through Service Unit Billing process