Study of current inpatient volume and quality metrics at the University of Michigan Health System: Final Report

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TABLE OF CONTENTS:

Executive Summary.................................................................................................................. 3-5
Introduction..........................................................................................................................6
   Background.......................................................................................................................6
   Purpose............................................................................................................................6
   Goals...............................................................................................................................6
Project Scope.........................................................................................................................6-7
Project Approach..................................................................................................................7
   OMP Studies Research....................................................................................................7
   Flowcharts.....................................................................................................................7
   Interviews.......................................................................................................................8
   Pilot Run.........................................................................................................................8
   Data Collection Form & Methodology............................................................................8
Data Analysis of Inpatient Orders ..........................................................................................8
   Findings..........................................................................................................................8-9
   Unit 7B...........................................................................................................................9-10
   UMHS Order Rankings.................................................................................................11
   OMP Observations.........................................................................................................11-12
   Study Impact on OMP Implementation......................................................................12
   Recommendations.........................................................................................................12
   Further Study..................................................................................................................12-13
   Other UMHS Observations..........................................................................................13
APPENDIX A: UMHS/Mott Units .........................................................................................14
APPENDIX B: Provider Departments....................................................................................15
APPENDIX C: Flowcharts .....................................................................................................16-20
APPENDIX D: Interview.........................................................................................................21
APPENDIX E: Data Collection Methodology ......................................................................22
APPENDIX F: Data Sheet Methodology...............................................................................23
APPENDIX G: Physician Form Data Requisition Methodology..........................................24-28
APPENDIX H: Other*..........................................................................................................29
APPENDIX I: UMHS and Mott Orders..................................................................................30
EXECUTIVE SUMMARY

The University of Michigan Health System (UMHS) including Mott Children’s Hospital has begun implementing a new Order’s Management Program (OMP). The purpose of the OMP is to digitize the ordering system between physician and patient. This program will replace the current handwritten system. Our main focus was to get the number of orders stratified by inpatient census on each unit for 374 patients during a 24 hour period at the UMHS and to calculate the labor savings associated with the processing of orders the OMP will generate. The UMHS will use this data to perform an analysis in which the UMHS will quantify the OMP’s potential savings.

Data Collection

Data collection took place between February 20, 2005-April 7, 2005 and consisted of collecting the number of orders generated from the following provider departments:

- Radiology
- Laboratory
- Pharmacy
- Dietetics
- Nursing

In order to start data collection, we performed a literature search, along with flowcharts and interviews, for background information. We found that the implementation of a digitized system has become the forefront in medical administration. In California, the state legislature passed a state law requiring an OMP system at every Californian hospital by 2008. According to the Leap Frog Group, an OMP at a hospital having between 300-400 beds costs $500,000 per year to maintain with annual savings of $5 - $7 million, according to a 1999 study. Furthermore, this study estimated that the amount of annual error in physician orders would decrease by 15 – 25%. Also, we used flowcharts and interviews to learn more about the processing of an order.

After this initial research, we scheduled a pilot session with the Patient Unit Services Supervisor in which we became oriented with how to decipher charts with the aid of a Float Clerk. From this pilot, we developed the methodology used for data collection. Data collection occurred between February 20, 2005-April 7, 2005.

Results

We collected a total of 374 charts, which led to the collection of 6,068 inpatient orders. To achieve the amount of 659 charts, which was based on the December 2004 census provided by the program and operations department, we multiplied by a factor of 1.93. For some of the units, we had collected the full census amount and hence we did not multiply these particular units by the extrapolation factor. The following table is a breakdown of orders by provider departments:
Table 1: Provider Services and Physician Orders

<table>
<thead>
<tr>
<th>UMHS Entity</th>
<th>Number of Orders, 24 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pharmacy</td>
<td>3,638</td>
</tr>
<tr>
<td>Nursing</td>
<td>2,887</td>
</tr>
<tr>
<td>IV</td>
<td>1,612</td>
</tr>
<tr>
<td>Laboratory</td>
<td>1,078</td>
</tr>
<tr>
<td>Dietetics</td>
<td>551</td>
</tr>
<tr>
<td>Radiology</td>
<td>517</td>
</tr>
<tr>
<td>Other*</td>
<td>366</td>
</tr>
</tbody>
</table>

IV orders are processed through Pharmacy, we combined this number with Pharmacy to achieve a total of 5,250 orders, according to table 1. Nursing came second with 2,887 orders followed by 1,078 orders produced by Laboratory. The UMHS generated a grand total of 10,649 orders during a 24 hour period. To find the number of labor hours saved, we used the time studies found by the IOE 481 OMP Clerical Analysis Time Studies Project from Fall 2004 in conjunction with the number of orders in our study and found the UMHS can save 245 labor hours daily in unit clerk order processing. We also found that the average unit produces 270 orders per day. Also, it was found that 7B had the highest amount of orders, with 642 orders, followed by 4B with 631 orders, and followed by 4WWM with 579 orders.

During our analysis of our data, we found that out of 10,649 orders generated by the UMHS, 5.27% or 561 orders were missing time and/or date. We also found the amount of illegible orders, meaning that one of our group members could not read the orders and had to ask for unit clerk assistance. The burn acute care unit had the largest amount of illegible orders with 51% of its total orders being illegible followed by 5.7% from 6B and 3.1% from 5D. The average percentage of illegibility was .26%.

**Study Impact on OMP Implementation**

As a result of our study, we:

- Calculated labor savings of OMP implementation
- Created the first database of inpatient orders at the UMHS
- Found the total orders generated during a 24 hour period
- Found information on the agenda for OMP implementation

We accomplished our goals of calculating the labor savings and finding the total amount of orders generated at the UMHS during a 24 hour period. We found that 245 labor hours associated with a unit clerk processing an order can be saved on a daily basis and we found that the UMHS made 10,649 orders during a 24 hour period.

Given the distribution of orders throughout the UMHS, we identified two approaches the UMHS could use to implement the OMP, which include the lowest volume approach and the highest volume approach. In the lowest volume approach, the UMHS could use the lowest producing units, which include Mott 5EMC and Mott psychiatric unit of 6AP. These units could be used in the initial implementation of the OMP since these units produce the lowest amounts of orders, but include orders from the major provider departments, which include Nursing and Pharmacy. Also, given the small scale, OMP problems can be found easily within the unit.
Although it might be advantageous to implement the OMP at a smaller scale, this approach would fail to represent the large scale of orders the UMHS generates on a daily basis. Therefore, the highest volume approach could be a better approach for the UMHS. Using this approach, the UMHS could use units 7B and 4B, since these two units generate the most orders. These two units are excellent choices since major and lesser provider departments are represented in these units at a higher scale, which would be an accurate portrayal of order activity at the UMHS.

**Recommendations**

As a result of our study, we support the implementation of the OMP at the UMHS, since it will reduce labor hours and increase accuracy. If implemented, the OMP can help reduce unit clerk order processing by 245 labor hours a day, which are labor hours that could be allocated in other areas of the UMHS. Furthermore, the implementation of the OMP would increase accuracy since it would eliminate the 5.27% of missing time and/or date orders and human errors associated with the processing of an order. Also, we recommend that the UMHS implement the high volume approach since this approach will allow the UMHS to pilot the OMP in a unit that accurately represents order activity at the UMHS. Overall, the implementation of the OMP can save the UMHS millions of dollars in liability suits, labor costs, provide faster and efficient interpretation of physician orders which will ultimately provide better care for the patient.
INTRODUCTION

Background
The University of Michigan Health System (UMHS) including Mott Children’s Hospital has begun implementing a new Order’s Management Program (OMP). The purpose of the OMP is to digitize the ordering system between physician and patient. This program will replace the current hand written order entry system since it is more reliable than the current system. The current system is hand written, which means that it is prone to human errors, which include misinterpretation of orders, inaccurate time and date, and long order processing times. The OMP will reduce unit clerk error in processing, implement quality control, reduce order processing time, and save labor costs. The UMHS wants to calculate the potential savings from the implementation of the OMP and to perform these calculations, the UMHS needs the number of current physician inpatient orders incurred during a 24-hour period stratified by unit as well as the labor hours the OMP will save.

Purpose
Our main focus was to find the number of orders stratified by inpatient census on each unit for 374 patients and calculate the labor savings associated with the processing of orders the OMP will generate. Please refer to Appendix A for a complete list of units studied. The UMHS will use this data, along with previously collected data, to perform an analysis in which the UMHS will quantify the OMP’s potential savings.

Goals
The primary goal of this project was to determine the standard number of daily, inpatient orders that each unit receives at the UMHS. A secondary goal of this project was to calculate the labor savings associated with OMP implementation for unit clerk order processing. This document is the final report of our findings from our study which took place between January 20, 2005 and April 13, 2005.

Expected Impact and Outcomes
The introduction of the OMP is intended to promote efficiency, increase accuracy by decreasing practice variation among practitioners/departments, and decrease the cost of maintaining the system by optimizing the utilization of resources. The assumption is that by increasing efficiency, accuracy and the overall completeness of the system, the number of errors in the system will be reduced, which will improve patient service. The project results will provide the number of inpatient orders stratified by unit and provide the OMP’s labor savings for unit clerk order processing. From our findings, the UMHS will then use the data to assess the monetary savings from implementing the $70 million OMP.

Project Scope
Our data collection consisted of collecting the number of orders generated from the following provider departments:
- Radiology
- Laboratory
- Pharmacy
- Dietetics
- Nursing
During data collection, we also interviewed unit clerks from these popular provider departments to learn about the processing of orders. In addition to these main provider departments, we also denoted less popular provider departments. To see a complete list, please refer to Appendix B. Data collection took place in all of the UMHS units, which can be found in Appendix A.

PROJECT APPROACH

The objective of this project was to find the number of inpatient orders in a given day at the UMHS. A secondary goal was to calculate labor hour savings. To meet our project goals, we divided our project into two phases:

- Project Approach
  - OMP Studies Research
  - Flowcharts
  - Interviews
  - Pilot Run
  - Data Collection Form & Data Methodology
- Data Analysis of Inpatient Orders
  - Findings
  - Unit 7B
  - UMHS Order Rankings
  - OMP Observations
  - Study Impact on OMP Implementation
  - Recommendations
  - Further Study
  - Other UMHS Observations

OMP Studies Research
To prepare for this study, we researched relevant OMP studies at the University of Michigan, reviewed relevant literature, and looked at census and occupancy values from other hospitals which have implemented an OMP. The implementation of a digitized system has become the forefront in medical administration. In California, the state legislature passed a state law requiring an OMP system at every Californian hospital by 2008. According to the Leap Frog Group, an OMP at a hospital having between 300-400 beds costs $500,000 per year to maintain with annual savings of $5 - $7 million, according to a 1999 study. Furthermore, this study estimated that the amount of annual error in physician orders would decrease by 15 – 25%.

With the introduction of an OMP, added security measures would be needed to follow HIPAA guidelines in protecting patient information. The Leapfrog Group suggested that hospitals use social security numbers so patient information can be supplied through a consistent way of numbering.

Flowcharts:
The purpose of flowchart research was to know background information on how an order is processed. This research helped in the development of the data collection form. To see flowcharts of the processing of an order by a unit clerk, please refer to Appendix C.
Interviews
Along with the flowcharts, interviews were used primarily as a means to grasp the background on how an order is processed. Informal interviews took place concurrently with data collection. To see our interview script, please refer to Appendix D.

Pilot Run
To get better acquainted with our work area, we scheduled a pilot session with the Patient Unit Services Supervisor in which we became oriented with how to decipher charts with the aid of a Float Clerk. From this pilot, we developed the methodology used for data collection.

Data Collection Form & Data Collection Methodology
After the pilot run, we developed the data collection form and methodology used for data collection. Data collection occurred between February 20, 2005-April 7, 2005. Please refer to Appendix E and F for details on the data collection methodology and data collection form. To accomplish data, we had to interpret many different types of physician order forms used at the UMHS. Please refer to Appendix G to see samples of these forms.

DATA ANALYSIS OF INPATIENT ORDERS:

Findings:
We collected a total of 374 charts, which lead to the collection of 6,068 inpatient orders. To achieve the amount of 659 charts, which was based on the December 2004 census provided by the program and operations department, we multiplied by a factor of 1.93. For some of the units, we had collected the full census amount and hence we did not multiply these particular units by the extrapolation factor. You can see the results in Table 1.

Table 1: Provider Services and Physician Orders

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Since IV orders are processed through Pharmacy, we combined this number with the pharmacy to achieve a total of 5,250 orders. Nursing came second with 2,887 orders followed by 1,078 orders produced by the Laboratory. Other* is in reference to orders found in less frequent provider departments. Please refer to Appendix H for a full list.

Table 2: UMHS Orders

| Number of orders in 24 hr period at UMHS | 10,649 |
| Number of labor hours saved             | 245    |

According to our study, the UMHS generates a grand total of 10,649 orders during a 24 hour period. To find the number of labor hours saved, we used the time studies found by the IOE 481
OMP Clerical Analysis Studies project from Fall 2004 in conjunction with the number of orders in our study and found the UMHS can save 245 labor hours daily in unit clerk order processing. We also found that the average unit produces 270 orders per day.

**Unit 7B**

It was found that 7B had the highest amount of orders, with 642 orders, followed by 4B with 631 orders, and followed by 4WWM with 579 orders. Figure 1 shows the distribution of orders among units. To see a complete list of orders generated by unit, please refer to Appendix I.

![Estimated Frequency of Orders by Unit](image)

*Figure 1: Orders by Unit for UMHS, Source= Data Collection February 20-April 7, 2005 n=659 patients, 10,649 orders*

Psychology Mott unit of 6AP and PARU had the lowest amount of orders, but did have orders of the largest provider departments of Pharmacy and Nursing. Looking at figure 2, 7B’s Pharmacy & IV orders are 48% of the orders, with Nursing having 27% of the orders and Laboratory having 11%.
Percentage of Orders by Order Type for Unit 7B

- Pharmacy: 42%
- IV: 6%
- Nursing: 27%
- Laboratory: 11%
- Radiology: 6%
- Dietetics: 4%
- Other: 4%

Figure 2: Breakdown of Unit 7B, Source= Data Collection February 20-April 7, 2005 n=659 patients, 10,649 orders
The 7B’s distribution of orders is similar to the total UMHS distribution, which is shown in figure 3.

Percentage of Orders by Order Type for UMHS

- Pharmacy: 35%
- IV: 15%
- Nursing: 27%
- Laboratory: 10%
- Radiology: 5%
- Dietetics: 5%
- Other: 3%

Figure 3: Breakdown of Inpatient Orders at the UMHS, Source= Data Collection February 20-April 7, 2005 n=659 patients, 10,649 orders
The overall distribution indicates that the UMHS has 50% Pharmacy & IV orders, 27% Nursing orders and 10% Laboratory orders. Laboratory seems to be lower than the expectation given by our client, which was between 15%-20%. An explanation for this outcome is that a Laboratory order can usually consist of multiple orders. For instance, on a single order slip, you can have multiple orders, such as an EKG, Cardiology or an EEG, and if all these orders were prescribed at the same time, it would all be counted as a single order. On the other hand, a Nursing order usually consisted of one order.

**UMHS Order Rankings:**

In table 3, you can see the rankings by unit for the three largest provider departments as well as the overall order ranking in the UMHS. Overall, the top five order producing units also had the most Pharmacy, IV, and Nursing orders. 4B had the largest number of Pharmacy and Nursing orders, which is expected since it had the second largest number of overall orders. 5D had the largest IV orders, with an appearance of NICU and TICU in the 3rd and 5th positions respectively, despite not being one of the top five order producing units. This result is logical since these units are intensive care units and therefore require more IV orders than the average unit.

**Table 3: UMHS Order Ranking**

<table>
<thead>
<tr>
<th>Pharmacy</th>
<th>4B &gt; 7B &gt; 4C &gt; 4A &gt; 5C</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV</td>
<td>5D &gt; 5C &gt; NICU &gt; 8B/6D &gt; TICU</td>
</tr>
<tr>
<td>Nursing</td>
<td>4B &gt; 4A &gt; 5D &gt; 7B &gt; 5C</td>
</tr>
<tr>
<td>Overall</td>
<td>7B &gt; 4B &gt; 4WWM &gt; 5D &gt; 5C</td>
</tr>
</tbody>
</table>

Source= Data collection February 20-April 7, 2005 n=659 patients, 10,649 orders

**OMP Observations**

During data collection, we made some observations on the current system.

We noticed:

- Order forms were not in chronological order.
- Dates and times were missing on the order forms.
- A lack of a standard time. Some physicians used military time (eg.19:15) and others used standard time (eg.7:15pm).
- Times and dates were sometimes not recorded
- Legibility of physicians’ handwriting can impair order interpretation.
- Inconsistent shorthand.

During data analysis, we found that out of 10,649 orders generated by the UMHS, 5.27% or 561 orders were missing time and/or date. We also found the amount of illegible orders, meaning that one of our group members could not read the orders and had to ask unit clerk assistance. According to table 4, we found that BAC, the burn acute care unit, had the largest amount of illegible with 51% of its total orders being illegible followed by 5.7% from 6B and 3.1% from 5D. The average percentage of illegibility was .26%.

**Table 4: Illegible Orders Generated at the UMHS**

<table>
<thead>
<tr>
<th>Unit</th>
<th>Percent Illegible</th>
<th># Illegible Orders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit BAC</td>
<td>51.0%</td>
<td>48</td>
</tr>
<tr>
<td>Unit 6B</td>
<td>5.7%</td>
<td>19</td>
</tr>
<tr>
<td>Unit 5D</td>
<td>3.1%</td>
<td>8</td>
</tr>
<tr>
<td>Other Units</td>
<td>.26%</td>
<td>44</td>
</tr>
</tbody>
</table>

Source= Data collection February 20-April 7, 2005 n=649 patients, 10,649 orders
Study Impact on OMP Implementation

As a result of our study, we:

- Calculated labor savings of OMP implementation
- Created the first data base of inpatient orders at the UMHS
- Found the total orders generated at the UMHS during a 24 hour period
- Found information on the agenda for OMP implementation

We accomplished our goals of calculating the labor savings and finding the total amount of orders generated at the UMHS during a 24 hour period. We found that 245 labor hours associated with a unit clerk processing an order can be saved on a daily basis and we found that the UMHS made 10,649 orders during a 24 hour period.

Given the distribution of orders throughout the UMHS, which was seen in figure 1, we identified two approaches the UMHS could use to implement the OMP, which include the lowest volume approach and the highest volume approach. In the lowest volume approach, the UMHS could use the lowest producing units, which include Mott 5EMC and Mott psychiatric unit of 6AP. These units could be used in the initial implementation of the OMP since these units produce the lowest amounts of orders, but include orders from the major provider departments, which include Nursing and Pharmacy. Also, given the small scale, OMP problems can be found easily within the unit.

Although it might be advantageous to implement the OMP at a smaller scale, this approach would fail to represent the large scale of orders the UMHS generates on a daily basis. Therefore, the highest volume approach could be a better approach for the UMHS. Using this approach, the UMHS could use units 7B and 4B, since these two units generate the most orders. These two units are excellent choices since major and lesser known provider departments are represented in these units at a higher scale, which would be an accurate portrayal of order activity at the UMHS.

Recommendations:

As a result of our study, we support the implementation of the OMP at the UMHS, since it will reduce labor hours and increase accuracy. If implemented, the OMP can help reduce unit clerk order processing labor hours of 245 hours a day, which are labor hours that could be allocated in other areas of the UMHS. Furthermore, the implementation of the OMP would increase accuracy since it would eliminate the 5.27% of missing time and/or date orders and human errors associated with the processing of an order. Also, we recommend that the UMHS implement the high volume approach since this approach will allow the UMHS to pilot the OMP in a unit that accurately represents order activity at the UMHS. Overall, the implementation of the OMP can save the UMHS millions of dollars in liability suits, labor costs, provide faster and efficient interpretation of physician orders which will ultimately provide better care for the patient.

Future Studies

During our study, we found that it is necessary to have further sampling of the smaller order producing units. For instance, we found that the burn acute care unit had an illegibility rate of 51%, which is large considering the hospital average was .26% and there were 12 patients with 95 orders. Also, data for this unit was taken during one visit. To get a more accurate portrayal of order activity, a study should be conducted which finds the number of orders in smaller units and the data should be taken over a longer period of time, such as over a year. This would provide a more randomized sample of orders and would most likely reduce the 51% illegibility found in the burn acute care unit toward the UMHS average of .26%.
Other UMHS Observations
Overall, we found a lack of standardization in terms of the organization of the office layout, especially in the location of charts and of patient forms. For chart location, the charts were either by the unit clerk on a shelf or on a shelf somewhere else. Also, for patient forms, the patient forms were found in a file cabinet by the unit clerk. We found effective methods for organization already in place at the UMHS.

- On Unit 4A, we noticed that the unit clerks organized the charts on a “Lazy Susan” apparatus. The charts were put on the apparatus which made the chart retrieval process more efficient since there was an interface between the physician’s office and the unit clerk office. This should be implemented in layouts where this can be utilized since this will reduce order processing time.

- On BICU, the burn intensive care unit, we found that they had all the admit order forms, insulin, and other inpatient forms all put up against a wall, each placed in a plastic pocket container with a label of its contents placed on it. This setup made order form location efficient, since first time users could easily locate forms, which simplified form retrieval.
Appendix A: University Hospital and Mott Children’s Hospital Observed Units

<table>
<thead>
<tr>
<th>UMHS Units</th>
<th>Mott/Women’s/Holden Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>4A</td>
<td>4WEB</td>
</tr>
<tr>
<td>4BC</td>
<td>4WEM</td>
</tr>
<tr>
<td>4CI</td>
<td>4WWB</td>
</tr>
<tr>
<td>4DN</td>
<td>4WWM</td>
</tr>
<tr>
<td>4DS</td>
<td>7M</td>
</tr>
<tr>
<td>7A</td>
<td>7WEB</td>
</tr>
<tr>
<td>7B</td>
<td>7WEM</td>
</tr>
<tr>
<td>7C</td>
<td>5EMC</td>
</tr>
<tr>
<td>7DN</td>
<td>5W2</td>
</tr>
<tr>
<td>5A</td>
<td>6AP</td>
</tr>
<tr>
<td>5B</td>
<td>NICU</td>
</tr>
<tr>
<td>5C</td>
<td>OR</td>
</tr>
<tr>
<td>5D</td>
<td>PCTU</td>
</tr>
<tr>
<td>5E</td>
<td>PICU</td>
</tr>
<tr>
<td>8C</td>
<td>6M</td>
</tr>
<tr>
<td>OR</td>
<td>PCTU</td>
</tr>
<tr>
<td>6A</td>
<td>NICU</td>
</tr>
<tr>
<td>PHS1</td>
<td></td>
</tr>
<tr>
<td>6B</td>
<td></td>
</tr>
<tr>
<td>6C</td>
<td></td>
</tr>
<tr>
<td>6D</td>
<td></td>
</tr>
<tr>
<td>BAC</td>
<td></td>
</tr>
<tr>
<td>BICU</td>
<td></td>
</tr>
<tr>
<td>8A1</td>
<td></td>
</tr>
<tr>
<td>8B1</td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX B: Provider Departments

Here is a complete list of the provider departments:

- Admitting
- Prosthetics
- Blood Transfusion
- O.A. Assistance
- IV
- PFT Lab
- Pharmacy
- Laboratory
- Radiology
- Nursing
- Dietetics
- O.T. R.T Therapy
- Respiratory
- Social Work
- Vascular Access
- EEG
- EMG
- Neurophysiology
- Speech Pathology
- Sleep Study
- Rehab Engineer
- EKG
Figure 1: Diet Orders

Figure 2: Respiratory Orders
Pull Chart

Note (date/time initials)

Pull lab requisitions

Stamp requisition with CPI Card

Fill out lab requisition

STAT?

Page venipuncture nurse (if STAT)

Put STAT sticker on form (if STAT)

Place requisition in box for venipuncture/nurse

Pink Copy → Pharmacy
Hard Copy → Nurse

Replace

Figure 3: Lab Orders
Pull Chart

Note (date/time initials)

Pull requisition for diagnostic test

Check for completeness

Fill out appropriate forms for specific test

Note appointment in daily referral log

Order test by phone/tube

Call transport to setup patient transport (if necessary)

Tell nurse time of appointment (verbal/page)

Replace

Figure 4: D&T Orders
Figure 5: Admission Orders
Pull Chart
(if strip order)

Note
(date/time/initials)

Research MSC stock number in online catalog
(if unknown)

Call MSC to place order by stock number

Pink Copy → Pharmacy
Hard Copy → Nurse

Replace Chart

Figure 6: MSC Orders

Pull Chart

Note
(date/time/initials)

Call Nurse (If STAT)

Put STAT Sticker on pink copy (if STAT and not available on floor)

Pink Copy → Pharmacy
Hard Copy → Nurse

Replace Chart

Figure 7: Medicine Orders

Pull Chart

Note
(date/time/initials)

Pink Copy → Pharmacy
Hard Copy → Nurse

Replace Chart

Figure 9: Nursing Orders

Pull Chart

Note
(date/time/initials)

Order equipment through computer
Supply Chain System

Pink Copy → Pharmacy
Hard Copy → Nurse

Replace Chart

Figure 8: Patient Equipment Orders
APPENDIX D: Interview Script

This script is the document we use to conduct our interviews with the unit staff.

Hi, I’m ___________. I’m one of several students working with Dr. Richard Coffey in the Program & Operations Analysis department. Part of our coursework this term requires that we work on process improvement projects. Our project this term involves some work for the Orders Management Project. Are you familiar with the project?

If not, … {The Orders Management Project is an effort to improve the quality and safety of patient care in our Health System. The project, when implemented, will allow caregivers to electronically order tests, procedures and medications; maintain nursing work lists, which track such concerns as when medications were given, when procedures are taking place, and other issues related to care; receive laboratory results, and receive decision support - informing ordering clinicians on drug interactions, allergies and safe dose ranges.}

What we have been asked to do is to perform an inventory and catalogue any data that are currently available in departments throughout the organization which reflect processes that may be affected by the implementation of the Orders Management Project (OMP). Specifically, we are looking for whether or not you have data to document the accuracy, completeness, timeliness of orders you receive or the cost of doing business as it relates to orders that might be affected by the OMP. If you have such data, we would like understand the report and get a copy of the report {provide a time you will return to get it or an address to have the information sent to}. If you do not have these data, are there specific areas you feel can be studied which might provide useful data? If so, we may be able to provide some assistance in future terms to collect this information.
APPENDIX E: Data Collection Methodology

After the pilot run, we developed the following methodology for data collection. We:

- Went to the UMHS hospital Monday through Sunday, usually in after 3pm.
- Worked in pairs, in which one person would decipher the order, while the other student entered the data. For instance, if the order happens to be a “Radiology” order, the deciphering student would tell the other student it is a “Radiology” order. He would then record this information in his laptop in the data collection form. We choose to go in pairs because we found that the data collection is more accurate. In case there was a discrepancy, we would ask the unit clerk on duty to assist us in interpreting the charts. Also, to record our observations, we created an “observations” document for which we document our observations.
- Pulled charts that were classified as being “black” status. This color indicates that the chart is not in use, which means we will not be interfering with operations.
- Pulled half the number of charts the census determined, it because obvious that pulling a full census worth of charts was going to extend the project beyond the deadline.
- Pulled charts of inpatients, which had been at the hospital for at least 12 hours. We decided to use a 12 hour window for the fact that if they patient had not been here exactly 24 hours we not be able to count them. This in turn would shielded our data from many of the admit orders, and misrepresent the true volume of orders.
- Collected patient information such that we followed the HIPAA guidelines. We are using a code that takes the patient number and adds to the first number of that code. We then take this number, and record it as the new patient number.
- Created extra columns when we encountered a rare order from a providing unit.
- Saved collected data on a spread sheet after each data collection session.
APPENDIX F: Data Sheet Methodology

<table>
<thead>
<tr>
<th>Start Date</th>
<th>End Date</th>
<th>Patient #</th>
<th>Missing Time and or Date</th>
<th>Illegible or Uncommon Shorthand</th>
<th>Non Standard Time (Military V. 12 hour)</th>
<th>Admitting</th>
<th>Pharm: New</th>
<th>Discontinue</th>
<th>Changed</th>
<th>Increase</th>
<th>Decrease</th>
</tr>
</thead>
</table>

**Column Headings:**

- **Start Date**, the date for which the first order was recorded in our data spreadsheet. For example if we arrived at the hospital on March 23rd and the latest order was at 6 pm, then we would look at orders starting that were at least 12 hours old, and at most 24 hours old. Our start date would be March 22nd at 6pm.

- **End Date**, the date of the latest order. In the example above our end date would be March 23rd at 6pm.

- **Patient #**, This is the modified patient number. In order to protect the patient’s privacy we devised a system in which we altered the patient number. A constant value was added was added to the 4 first digit of the patient number. This allows for only group members to ascertain the true patient number. Incase a true patient number is needed; we can decode the posted patient number, and supply the original patient number.

- **Missing Time and or Date**, this column was used to tally the total number of instances where a missing time and or date occurred. This provided substantial evidence and strength to our observations. We would increment this column if the order was missing a date, time, or date and time. This was important to document, because it could lead to possible confusions in with the support staff.

- **Illegible or Uncommon Shorthand** column was created for when a physician’s hand writing was illegible, or they used uncommon acronyms or short hand. This is a detriment to patient safety if left unchecked, and unaccounted.

- **Non-standardization of Time (Military V. 12 hour system)**, commonly we would run across different time stamps. At times it became unclear what time of day they had noted, since there was no standard. This column was checked if such issued had arisen. It is our recommendation to use a military time, it is very easy to scan the orders and figure out what time of day orders had been processed.

- **Admitting** was used when we came across an admitting order.

- **Providing Department, Increase, Decrease, Change, and Discontinued**: This was the format that we used for most orders. We label the providing department if the order was a new order. For example is an IV was ordered, and then the IV column would be incremented. If an order was increase, then the Increase column would be selected (e.g. increase IV) and then same with decrease. If the order was to change another order, then the Change column would be selected, and the discontinued column would be selected if an order was discontinued.
APPENDIX G: Physician Form Data Requisition Methodology

Admit Orders

The Red Circle above indicates what our group classified as an admit order. The Blue Square was classified as a nursing order, and the green square was classified as a dietetic order.

Physician’s Orders:
The Red Square is the where we would locate the date of the order. The Green Circle was where the order is written, and the blue square would be used to identify the patient number.

**Diagnostic Orders:**

When interpreting this order form we would record the order from the red circled area above. The different providing departments from this order form are: Radiology, Cardiology, Nucl. Med. Scans, Dx. Vascular Unit, Pulm. Function, EEG, EMG, EKG.
Sliding Scale Insulin

Check boxes for all desired orders.

Sliding Scale is not recommended for more than 2 days as the only method of glycemic control. Consider adding scheduled, intermediate or long acting insulin if hyperglycemia persists.

1. Perform finger stick glucose checks and administer regular insulin per sliding scale at the following intervals: (May check more than one box)
   - AC & HS (4 times per day)
   - Before breakfast and before dinner
   - AC
   - HS
   - Every 6 hours (if NPO or on continuous tube feeding)
   - Physician specified times:
   - When patient begins eating, change chemstick frequency to AC & HS (4 times per day)

2. Blood glucose may be checked PRN if signs and symptoms of hypo or hyperglycemia are present.

3. All units below refer to insulin given subcutaneously
   - Short Acting Insulin (Humalog®, Novolog®)
   - Regular Insulin
   (note - Mealtime short acting insulin should be given not more than 15 minutes before patient eats)

<table>
<thead>
<tr>
<th>Blood Glucose mg/dL</th>
<th>Low</th>
<th>Moderate</th>
<th>High</th>
<th>Custom*</th>
<th>Custom*</th>
<th>Custom*</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 70</td>
<td>units</td>
<td>units</td>
<td>units</td>
<td>Custom*</td>
<td>Custom*</td>
<td>Custom*</td>
</tr>
<tr>
<td>70 - 150</td>
<td>0 units</td>
<td>0 units</td>
<td>0 units</td>
<td>units</td>
<td>units</td>
<td>units</td>
</tr>
<tr>
<td>151 - 200</td>
<td>0 units</td>
<td>2 units</td>
<td>4 units</td>
<td>units</td>
<td>units</td>
<td>units</td>
</tr>
<tr>
<td>201 - 250</td>
<td>2 units</td>
<td>4 units</td>
<td>6 units</td>
<td>units</td>
<td>units</td>
<td>units</td>
</tr>
<tr>
<td>251 - 300</td>
<td>4 units</td>
<td>6 units</td>
<td>10 units</td>
<td>units</td>
<td>units</td>
<td>units</td>
</tr>
<tr>
<td>301 - 350</td>
<td>6 units</td>
<td>8 units</td>
<td>12 units</td>
<td>units</td>
<td>units</td>
<td>units</td>
</tr>
<tr>
<td>351 - 400</td>
<td>8 units</td>
<td>10 units</td>
<td>14 units</td>
<td>units</td>
<td>units</td>
<td>units</td>
</tr>
<tr>
<td>&gt; 400</td>
<td>10 units</td>
<td>12 units</td>
<td>16 units</td>
<td>units</td>
<td>units</td>
<td>units</td>
</tr>
</tbody>
</table>

4. Call House Officer treating blood glucose for any of the following:
   - patient becomes NPO, or when oral feeding, tube feeding, or TPN is initiated or stopped
   - patient has any significant change in status (example: fever > 38.3°C, persistent nausea, vomiting, or diarrhea unresponsive to treatment, change in level of consciousness)
   - glucose is <70 or >300 mg/dL on 2 consecutive measurements

Physician’s Signature: ___________________________  Date: ____________  Time: ____________  Processed by: ___________________________  Doctor #: ____________

Each box in the Blue Square if checked was considered a nursing order. Each Box in the Red Square or Circle was considerer a pharmacy order.
Diet:

- **Breastfeeding.** No supplements in the 1st 12 hours of life (except as noted in the supplementation guideline) unless parent(s) request it. Initiate ineffective breastfeeding careplan as needed and document indication for supplementation on newborn caremap.
- **Formula.** 20cal/oz with iron, parent's choice of brand

Medication:

- Erythromycin ophthalmic ointment, one strip in each eye within one hour of birth
- Aquamephyton (vitamin K) 1 mg IM within 2 hours of birth
- Triple dye to umbilical cord x 1 after initial bath
- Recombivax HB 5 mcg (0.5mL) or Engerix-B 10mcg (0.5mL) IM before discharge with parental consent (Give vaccine within 12 hours of birth if mother’s hep B status is unknown or positive). Notify the physician if parent declines the vaccine.
The boxes checked in the Blue Square are lab orders, the boxes checked in the green square are nursing orders, and the orders in the red square are pharmacy orders.

Throughout our study, we encountered other types of admit forms throughout the units. When encountering such forms, we interpreted them similar to the way used the same methodology we used in the above forms to interpret the type of order.
APPENDIX H: Other*

Throughout the report, Other* is in reference to the following provider departments:

- Admitting
- Prosthetics
- Blood Transfusion
- O.A. Assistance
- PFT Lab
- O.T. R.T Therapy
- Respiratory
- Social Work
- Vascular Access
- Neurophysiology
- Speech Pathology
- Sleep Study
- Rehab Engineer
## APPENDIX I: UMHS and Mott Orders

<table>
<thead>
<tr>
<th>Unit</th>
<th>Total Inpatient Orders per Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>7B</td>
<td>642</td>
</tr>
<tr>
<td>4B</td>
<td>631</td>
</tr>
<tr>
<td>4WWM</td>
<td>579</td>
</tr>
<tr>
<td>5D</td>
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<td>6D</td>
<td>459</td>
</tr>
<tr>
<td>7C</td>
<td>457</td>
</tr>
<tr>
<td>6C</td>
<td>408</td>
</tr>
<tr>
<td>6M</td>
<td>361</td>
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<tr>
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</tr>
<tr>
<td>8B</td>
<td>343</td>
</tr>
<tr>
<td>6B</td>
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<tr>
<td>8A</td>
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</tr>
<tr>
<td>NICU</td>
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</tr>
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