ADMISSION DAY PROCEDURE PROJECT
IOE 481 HOSPITAL SYSTEMS
INTERIM REPORT

November 7, 1992
By, Bonnie Allen
Anna Ferland
Patrice Magreta
PURPOSE:
To analyze the process for patients who are undergoing Admission Day Surgery and investigate problems associated with backup delays in the operating room.

GOALS AND OBJECTIVES:
Collect and quantify data to evaluate the impact of holding times in the operating room and define the key issues that contribute to the lack of bed availability. Statistical analysis, flowcharting, and cause and effect diagrams will be utilized in investigating the Admission Day Procedure (ADP) process. Recommendations will be made as to possible solutions to the problem of backup delays.

CURRENT STATUS:
Through our weekly meetings with Kathy Orbits and Scott Lovelace we have gathered data spanning a total of three months. The data includes operating room delays, both before and after surgery. Specifically, we are analyzing the average delay per ADP patient per room, day, and time period. The data also includes delays in the Post Anesthesia Care Unit (PACU). Reasons for backups in the PACU were broken down by code with some narrative descriptions. This data has been categorized in terms of patient destinations, time frames, and causes for delays. In-patient floor units involved in this study include: 4a, 4b, 4c, 5a, 5b, 5c, 5d, 6, 7b, 7c, 8a, 8b, and 8c. Time frames were broken down into two hour segments beginning at 7:00am. Reasons given for delays include: bed unavailable, patient not discharged, room not cleaned, orders not written, physician not available for signature, nurse not available to receive report, and no transporter available.

To assist in our understanding of the surgical process, we followed the flow of an Admission Day Procedure Patient. Our tour was guided by a head nurse in PACU who narrated the steps of the patient and the role of each department in every step of the process. The information obtained from this tour was then used to draft a detailed flow chart. The flowchart is currently being reviewed by members of the involved
departments to assess its accuracy and make recommendations for improvements.

We are keeping up-to-date with the progress of the Quality Improvement Team. They are currently collecting data on reasons for discharge delays. Hopefully our completed data will assist them in analyzing where the greatest percentage of problems occur and what areas need to be focused on to improve the ADP process.

Presently, we are waiting for census data to determine possible trends in unit occupancy rates. As we continue to analyze the data, we will be able to site problem areas, draw conclusions, and to make recommendations. We will be obtaining copies of blank patient logs, operating room record sheets, PACU and anesthesia logs. This will help us to verify how information is transferred between various units and determine the source documents our data was obtained from. Operational definitions used on these documents will be confirmed with department personnel to establish precise meanings which will be used to interpret our results.
**SCHEDULE:**

11/9/92  Log sheets will be supplied by Kathy Orbits  
Census data will be collected from Chris Rourke  
Operational Definitions will be verified  
Schedule a date with Sheri Dufek to review status and set a date for our final presentation

11/16/92  Revise flow chart based on department recommendations  
Complete analyzing data  
Generate charts and graphs  
Identify the problem areas

11/23/92  Begin writing the final report

11/30/92  Meet with Sheri to critique our rough draft  
Complete our report

12/7/92  Present our final report in class
ADPflow

START

Patient verification (night prior to surgery)

Patient checks in at admitting surgical desk

Admitting calls Family Waiting Room to notify arrival of patient.

Family Waiting Room personnel escorts patient & their family to FWR

Patient & each family member check in at FWR

FWR calls ASU

Begin patient IV's

Take patients' vital signs

Are there more cases for this case period?

Patient undresses and gowns

Each nurse escorts 2 patients (w/ 1 family member each) TOASU
Does patient need extra procedure? (spinal, arterial line etc.)

- yes: Patient goes to Holding Room → Pre-surgical procedures performed
- no: Is O.R. available?
  - no: Patient waits until O.R. is available.
  - yes: Anesthesiologist escorts patient to O.R.

Anesthesiologist escorts patient to O.R. → Surgical procedure performed → O.R. calls PACU

- Is a slot available in PACU?
  - no: Patient waits in O.R.
  - yes: Anesthesiologist escorts patient to PACU
Patient goes to inpatient floor unit

Is transporter available?

Is patient's bed ready?

Are PACU discharge papers signed?

Is patient ready to go to inpatient unit?

Patient monitored in PACU
ADMISSION DAY PROCEDURE PROJECT
UNIVERSITY OF MICHIGAN HOSPITAL
IOE 481 HOSPITAL SYSTEMS
FINAL REPORT

December 7, 1992
By, Bonnie Allen
   Anna Ferland
   Patrice Magreta
# TABLE OF CONTENTS

**EXECUTIVE SUMMARY**

1

**PURPOSE**

4

**GOALS AND OBJECTIVES**

4

**BACKGROUND**

4

**APPROACH AND METHODOLOGY**

5

- Figure 1. Source Document for Pre-Op delays
- Figure 2. Source Document for OR delays
- Figure 3. Source Document for PACU delays

**CURRENT SITUATION**

9

- Graph 1. Time distribution of scheduled ADP surgeries

**FINDINGS AND CONCLUSIONS**

11

- Table 1. Estimated Annual Cost of ADP Delays
- Graph 2. PACU Delays given by time periods (1991)
- Graph 3. PACU Delays given by time periods (1992)
- Graph 4. Causes for PACU Delays by Units (1991)
- Graph 5. Causes for PACU Delays by Units (1992)
- Graph 6. PACU Delays given by cause (1991)
- Graph 7. PACU Delays given by cause (1992)

**RECOMMENDATIONS**

22

**APPENDICES**

25

A. Proposal
B. Flowchart
C. Source Document
D. Survey Forms
E. University Hospital Forms
   1. Surgery Schedule
   2. Operating Rooms Operation Record
3. Phase I Recovery Room Log
4. BUAR
F. Pre-OP Tables and Graphs
G. Operating Room Tables and Graphs
H. PACU Tables and Graphs
I. PACU Cause / Effect Diagram
The purpose of this study was to analyze the Admission Day Procedure (ADP) and quantify data relating to delays entering the operating room, exiting the operating room, and exiting the Post Anesthesia Care Unit. In this study, a pre-operative delay was calculated as the time the patient was recorded as present in the operating room (OR) minus the time the surgery was scheduled. Any negative values, indicating that the surgery began ahead of schedule, were disregarded in this report. A delay exiting the operating room (OR delay) was defined as the time a patient left the operating room minus the time dressing end was reported on the OR record minus an additional 15 minutes which was used as a lag time. Once again negative values were disregarded as no delay. Data for PACU delays were taken from two studies which had been collected within the last year. One spanned the time period of October 14 to December 6, 1991 and the other more recently covered August 1992. Both of these studies included delay times for patients leaving PACU and reasons for these delays. We determined that these data are still valid since there have been no major changes in the ADP process within the last year. Therefore, no further data were collected.

The results of our study revealed that although pre-op delays occurred quite regularly, there was no statistical correlation between these delays and the backups occurring in the operating room and PACU. We also found that the majority of post-op delays were under 15 minutes which is small in comparison to the length of those occurring in PACU. However due to the average billing rate per minute being substantially greater in the operating rooms we included this information in a cost analysis. The estimated cost that patients would be charged if they were paying for the OR
and PACU on a per minute basis came to a total of $3475,212 per year using the data from 1992. (NOTE: This does not represent a cost to the hospital) This figure includes a charge of $175,006 from OR delays and $300,206 occurring from PACU delays. These charges correspond to average delay times per day of 53 minutes and 408 minutes for the OR and PACU respectively.

The most frequent time for PACU delays was determined to be between 11 a.m. and 1 p.m. According to the 1991 data, 47% of ADP delays occurred between this time period. The 1992 data shows that the situation has not changed much within the last year as 41% of ADP delays occurred during 11 a.m. and 1 p.m. Factors contributing to the congestion during this time include inpatients being discharged, floor nurses, housekeeping, and other hospital staff taking lunch breaks, and a high volume of ADP patients being scheduled for early morning surgeries.

Generally, patient care units on the 4th, 5th, and 8th floors appeared to have the most problems when admitting ADP patients from PACU due to the fact that these are the most common floors to receive ADPs. The 1992 data had a greater total of delay hours per day, yet the length of the delays were much shorter compared to those occurring in the 1991 study. Approximately 90% of the delays recorded in 1991 were above 30 minutes with a mean value of 101 minutes. The mean value for the delays occurring during the 1992 study was 84 minutes. The average delay time per day in PACU was found to be 5 hours 57 minutes and 6 hours 48 minutes during the 1991 and 1992 data collections respectively. The variation between these sets of data may be the result of the procedure used for collecting the data or it may suggest that the frequency of delays is increasing.
We determined that the primary cause for the PACU delays from both the 1991 and 1992 data was listed as bed unavailable. This reason was listed 90% and 77% of the time for the 1991 and 1992 data respectively. A room being unavailable included a room not being cleaned and a pending inpatient discharge.

Simple improvements can be made to help decrease the number of ADP delays that occur on a daily basis. 1) Most importantly, interdepartmental communication needs to be increased among hospital staff members. Staff members need to have an understanding of how each department depends on others to keep the hospital running effectively. 2) Proper procedures for notifying admitting once a room has been cleaned need to be reviewed with housekeepers and floor nurses. 3) If possible, the procedure for reporting an empty room should be simplified so that it is not an inconvenience for the hospital staff. A computer program could be written so that the user is prompted for the floor and bed unit that is finished and ready for a new admit. 4) Floor nurses and housekeepers should be requested to stagger their breaks in order to keep the hospital properly staffed at all times. 5) The number of ADPs that are scheduled for early morning surgeries should be reduced. This would help elevate some of the backups in PACU that occur between 11 a.m. and 1 p.m.

Additional improvements which may be more costly also should be looked into if backups continue to be a problem in the future. These include the possibility of connecting the admitting and OR schedules and adding staff members to cover lunch breaks and shift changes.
PURPOSE:

To analyze the process for patients who are undergoing Admission Day Procedures (ADPs) and investigate problems associated with backup delays incurred by these patients.

GOALS AND OBJECTIVES:

Collect and quantify data to evaluate the impact of holding times on ADP patient flow, and define the key issues that contribute to the lack of bed availability when patients are ready to leave the Post Anesthesia Care Unit (PACU). Recommendations will be made as to possible solutions to the problem of backup delays.

BACKGROUND:

Due to improved surgical techniques, the lack of medical reimbursement, and the rising cost of health care, the demand for Admission Day Procedure (ADP), has steadily increased. In the past few years the number of ADPs has doubled to a current rate of approximately 30% of all surgeries.

Furthermore, a hospital is organized to run productively at 85% occupancy. However, recently the average daily census for the general care units has been closer to 93%, resulting in many days when the floor units are at full capacity.

The Admission Day Procedure allows the patient to arrive the morning of his/her scheduled surgery. Upon arrival, the hospital staff verifies that he/she has followed the appropriate pre-surgical procedures. A typical patient then enters the Ambulatory Surgical Unit (ASU) or Phase II where he/she is prepared for surgery. After surgery the patient is moved
to the PACU or first stage recovery where he/she is monitored until stabilized. At this point the patient proceeds to an assigned inpatient room. However, when no room is available a backup occurs in the recovery room, which may eventually lead to delays in the operating room (OR) and the entire surgical process.

**APPROACH AND METHODOLOGY:**

We began our research by conducting an interview with Sheri Dufek the Director of Operating Rooms (our project client) to discuss and determine the problem on hand. Follow up interviews were conducted weekly with Kathy Orbits, Nurse Manager in the University Hospital Post Anesthesia Care Unit, and Scott Lovelace, OR Business Manager, who facilitated data collection, project inquires, and communication links with hospital personnel.

With the aid of Scott Lovelace we gathered information regarding both pre-operative (pre-op) and OR delays from the operating room database Surgi-Server. The pre-op delay was calculated as the time a patient was recorded as present in the OR minus the time a surgery was scheduled. Any negative values, indicating that a surgeries took place ahead of schedule, were excluded from this study. The scheduled time of surgery was originally taken off the operating room surgery schedule. The time a patient was present in the operating room was initially documented by the circulating nurse under 'patient present' on the OR record. A graphical representation of source documents and their usage in defining pre-op delays is shown in Figure 1.
The data for delays exiting the OR included the time a surgery was completed and the time a patient left the operating room, both taken off the OR record. The time a surgery is completed is recorded under the heading 'dressing end' and the time the patient leaves the operating room is recorded as 'patient out'. These times are then sent to the scheduling clerk who types them into the Surgi-Server under the same headings. In order to define a delay for exiting the OR, we needed to determine an estimated time that was used to prepare the patient to leave the operating room. Although we were told that this time may vary with such things as the type of surgery and the experience of the physician, a core manager informed Kathy Orbits that 5 to 15 minutes should be appropriate to use as an estimated 'completion time'. Using 15 minutes as an acceptable upper range for lag time, we calculated an OR delay as patient out minus dressing end minus 15 minutes. As stated before, any negative values were disregarded. The graphical representation is shown in Figure 2.
Kathy informed us of two studies that had been performed within the last year relating to PACU holding times. One spanned the time period of October 14 to December 6, 1991, and the other covered August 1992. The first batch of data were collected to document holding times and reasons for discharge delays in PACU. The second study was performed to determine if different types of anesthesia have an effect on the length of stay in PACU but also included holding times occurring in PACU and reasons for those delays. Both forms to record these data were prepared by PACU staff who subjectively evaluated each delay to determine the appropriate reason and duration of the delay. We determined that these data are still valid since there have been no major changes in the ADP process within the last year. Although the existing data were collected for all patients, we decided to extract the necessary information for ADP's from the originally recorded data. A PACU delay was defined as the time a patient left PACU minus the time the patient met the appropriate discharge criteria, as depicted in Figure 3.
The last set of data we used for our analysis was collected from Chris Rourke, Manager Admission/Registration Services. Chris provided us with copies of the Bed Utilization and Availability Reports (BUARs) which list the census of the hospital per unit per day, taken at midnight each day. These data were analyzed to determine if delays mainly occurred only when the hospital was close to full occupancy and if certain units were less utilized on a daily basis then others.

To assist in our understanding of the surgical process, we scheduled a time when we were able to walk through the surgical process and observe the flow of an ADP patient. The tour was given by Kim LeMasters, a head nurse, and from this information we were able to complete a flow chart of the entire surgical process. An illustration of this flow chart is located in Appendix B.
CURRENT SITUATION:

According to census reports for August 1992, the University Hospital general care units are operating at 92.5% occupancy. Due to this high rate of occupancy, hospital staff must work together in order to increase efficiency and keep the hospital running effectively. Presently, anywhere from 10 to 35 ADP patients are scheduled for surgery on a daily basis. ADP's are scheduled throughout the day although a majority of these surgeries are scheduled at 7:30 a.m. A breakdown of the scheduled times for ADP surgeries can be seen in Graph 1 on the following page. Out of a total of 384 surgeries, 125 were scheduled at 7:30 a.m. which represents 33 percent of the patients. Approximately two thirds of the ADP patients were scheduled prior to 11:00 a.m.

A typical ADP patient may encounter delays prior to surgery, immediately following surgery, and exiting PACU. The current data indicate that the number of ADPs who encounter delays exiting PACU is much greater than those occurring before surgery or in the operating room. Therefore holding times were investigated for each step of the surgical process with an emphasis on delays occurring in PACU.
Graph 1. Time Distribution of Scheduled ADP Surgeries
University of Michigan Hospital - August 1992

Number of ADP's scheduled
FINDINGS AND CONCLUSIONS:

In analyzing the data we discovered that although pre-operative delays occurred quite regularly, there was no statistical correlation between these delays and the backups occurring in the operating room and PACU. Most of the pre-op delays seemed to be caused by outside factors such as patients arriving late or complications prior to surgery (i.e. unstable vital signs). We also found that the majority of operating room delays were under 15 minutes which is small in comparison to the length of those occurring in PACU. However, the average billing rate per minute is substantially greater in the operating rooms.

Reasons for operating room delays occurring could be the result of medical complications or PACU being completely occupied although no data has been collected to verify these claims. PACU has the capacity to hold 18 patients however it is usually only staffed for 14 patients. Therefore the remaining four slots are available to accept patients that have met the discharge criteria but have no bed assignment. If PACU gets backed up beyond these 18 slots additional slots may even be used in the holding room. Although the ability of PACU to expand their patient capacity in this manner is not an ideal way of operating, it allows for much of the delay problems to be absorbed by PACU thus reducing the effects on OR and other departments.

According to our 1991 data, approximately 17% of all patients were delayed in PACU. This percentage was calculated by taking the total number of patients that were recorded as having delays divided by the number of ADP patients scheduled for surgery. The number of scheduled ADPs was taken from the Surgi-Server database and was given to us by Scott Lovelace. The 1992 data showed that 64% of all ADPs were delayed in
In contrast to the 1991 data, this percentage was calculated by taking the number of patients delayed divided by the total number of patients for which a delay form was recorded. (A form was supposed to be filled out for every patient regardless of whether or not they were delayed.) In addition to using different calculation formulas, the variation between the two sets of data can be contributed to the subjectivity of the PACU nurses who determined which patients incurred delays.

The average delay time per day in PACU was found to be 5 hours 57 minutes and 6 hours 48 minutes in the 1991 and 1992 data collections, respectively. Using these average delay times and the one for the operating room, we were able to calculate the annual dollar value equivalent to these holding times. This cost is equal to the dollar value a patient would be charged if he/she was to pay for his/her hospital stay on a per minute basis. This value does not represent the actual cost to the hospital. The following table documents the above calculated delays in terms of an estimated dollar value. Please note that these charges can be calculated in a number of ways and this only represents one analysis of the delay times.

Table 1. 1992 Estimated Annual Cost of ADP Delays

<table>
<thead>
<tr>
<th></th>
<th>Average Delay per Day (in minutes)</th>
<th>Average Charges per Patient per Minute</th>
<th>Total Cost per Patient per Day</th>
<th>Estimated Total Annual Cost *</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRE-OP</td>
<td>815</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>POST-OP</td>
<td>53</td>
<td>$12.70/min.</td>
<td>$673</td>
<td>$175,006</td>
</tr>
<tr>
<td>PACU 1992</td>
<td>408</td>
<td>$2.83/min.</td>
<td>$1155</td>
<td>$300,206</td>
</tr>
</tbody>
</table>

NOTE: For 1991 the average delay per day was 357 minutes resulting in a total cost per day of $1012 and an annual cost of $263,034.

* Annual cost is based on a 260 day year. Weekends were excluded.
The dollar amount for delays occurring in the operating rooms was calculated by taking the delay in minutes and multiplying by the average charge per minute of $12.70. Dollars amounts for PACU were calculated by multiplying the delay minutes by the average charge per minute in PACU of $2.83. These figures were obtained from Scott Lovelace and are the assumed average cost per minute in the operating room and PACU respectively.

The most frequent time period for a delay to occur in PACU was between the times of 11:00 a.m. and 1:00 p.m. Almost half of all the delays occurred within this time period in both the 1991 and the more recent August 1992 data. Graphs 2 and 3 below show the frequency of delays in PACU vs. time periods for each set of data.
UNIVERSITY OF MICHIGAN — ADP PATIENTS
PACU DELAYS GIVEN BY TIME PERIODS
(10/14/91 — 12/6/91)

TIME PERIODS

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Percentage of Delays</th>
</tr>
</thead>
<tbody>
<tr>
<td>7-8:59 a.m.</td>
<td>1%</td>
</tr>
<tr>
<td>9-10:59 a.m.</td>
<td>21%</td>
</tr>
<tr>
<td>11-12:59 p.m.</td>
<td>47%</td>
</tr>
<tr>
<td>1-2:59 p.m.</td>
<td>21%</td>
</tr>
<tr>
<td>3-4:59 p.m.</td>
<td>7%</td>
</tr>
<tr>
<td>5-6:59 p.m.</td>
<td>2%</td>
</tr>
<tr>
<td>7-8:59 p.m.</td>
<td>1%</td>
</tr>
</tbody>
</table>

SOURCE: University of Michigan Hospitals, University Hospital
SAMPLE PERIOD: October-December 1991
UNIVERSITY OF MICHIGAN - ADP PATIENTS
PACU DELAYS GIVEN BY TIME PERIODS
(8/4/92 - 8/31/92)

TIME PERIODS

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Percentage of Delays</th>
</tr>
</thead>
<tbody>
<tr>
<td>9–10:59 a.m.</td>
<td>17%</td>
</tr>
<tr>
<td>11–12:59 p.m.</td>
<td>41%</td>
</tr>
<tr>
<td>1–2:59 p.m.</td>
<td>19%</td>
</tr>
<tr>
<td>3–4:59 p.m.</td>
<td>14%</td>
</tr>
<tr>
<td>5–6:59 p.m.</td>
<td>6%</td>
</tr>
<tr>
<td>7–8:59 p.m.</td>
<td>3%</td>
</tr>
<tr>
<td>9–10:59 p.m.</td>
<td>1%</td>
</tr>
</tbody>
</table>

PERCENTAGE OF DELAYS
UNIVERSITY OF MICHIGAN HOSPITAL — ADP PATIENTS

PACU DELAY HOURS BY UNITS
(10/14/91 - 12/6/91)

HOURS

TOTAL DELAY HOURS = 221

FLOOR UNITS

5A  8A  4A  5C  4C  OTHER  5B  8C  4B  8B
UNIVERSITY OF MICHIGAN HOSPITAL - ADP PATIENTS

PACU DELAY HOURS BY UNITS

(8/4/92 — 8/31/92)

TOTAL DELAY HOURS = 161

FLOOR UNITS

HOURS

29
26
22
19
18
12
9
9
6
5
3
3

5C
8A
4B
5A
4A
5B
8C
4C
8B
7B
5D
UNIVERSITY OF MICHIGAN — ADP PATIENTS
PACU DELAYS GIVEN BY CAUSE
(DATA TAKEN FROM 10/14/91 — 12/6/91)

SIGNOUT DELAY —— 1%
INSUFFICIENT ORDERS —— 3%
UNABLE TO FIND NURSE —— 3%
TRANSPORT. PROBLEM —— 2%

BED UNAVAILABLE —— 91%

B — PENDING DISCHARGE —— 46%
BOTH A & B LISTED —— 35%
A — ROOM NOT CLEANED —— 12%
1 — BED NOT READY —— 6%
UNIVERSITY OF MICHIGAN HOSPITAL — ADP PATIENTS

PACU DELAYS GIVEN BY CAUSE

(DATA TAKEN FROM 8/4/92 — 8/31/92)

TRANSPORT. PROBLEMS ——2%
UNABLE TO FIND NURSE ——8%
MEDICAL COMPLICATION ——5%
OTHER ——8%

BED UNAVAILABLE ——77%

PENDING DISCHARGE ——58%
ROOM NOT CLEANED ——21%
BED NOT READY ——17%
NO BED ASSIGNMENT ——4%

11/16/92 P.M.
B: AUGUST
There is some discrepancy in results of the 1991 and 1992 data due to systematic differences in the survey attributes. One area of variation is that the total delay hours for each survey period varied greatly. The main reason for this is that the number of days that the 1991 data covers is 37, whereas the 1992 data only covers 20 days. Another discrepancy occurred in the recordings of the reasons for delays. The 1991 data consisted of primary and secondary reasons for delays. Only primary reasons were used in the analysis. When quantifying the 1992 data, if multiple reasons were given, the delay time was divided equally among them. This may help explain the greater percentage of reasons outside of 'bed unavailable' found in 1992. The data also varied in the procedure for recording delay times. In 1991, survey forms were filled out only in the case where there was a delay. Approximately 90% of the delays recorded were at least above 30 minutes with a mean delay time of 101 minutes. The 1992 survey forms were supposed to be filled out for all patients regardless of whether they encountered a delay. Therefore, even delays that were only a few minutes were recorded, contributing to a greater number of total delays but a smaller mean value for a delay of 84 minutes. The mean delay value for all patients, including those not delayed, was 57 minutes for August 1992. Examination of the average total delay hours per day reveals that this value has increased over the past year. However this may be influenced by the differences in recording methods as previously stated. A final difference between the 1991 and 1992 data relates to the floor units with the greatest concentration of ADP delays. The specific ranking of units with the highest percentage of total delay times differs. However, four of the top five units with respect to highest delay times are the same from one study to the next.
RECOMMENDATIONS:

It has been previously suggested that ADPs are scheduled throughout the day particularly after 11 a.m. The data we gathered, however, indicated that a majority of ADP patient surgeries are still being scheduled at 7:30 a.m. The implications of this are that many ADP patients will be ready to be admitted to a floor unit before the discharge time for patients leaving the hospital the same day. Scheduling surgeries later in the morning would allow the floor units more time to discharge patients and prepare beds after patients are discharged.

Another approach in decreasing the delays occurring between 11 a.m. and 1 p.m., due to the magnitude of bed unavailability, includes investigation of the discharge process. Specifically, data collection corresponding to delays in the discharge process and the reasoning behind those delays is necessary to determine possible alternatives to discharge patients in a timely manner.

The scheduling of floor nurses and housekeeping should be examined, especially during breaks and shift changes. Compare the decreases in staff at these times to the patient flow. We found that a large percentage of delays occurred during 11 a.m. and 1 p.m., when a majority of the staff has lunch breaks. Try to insure that employees stagger their lunch periods so that each floor unit is able to operate effectively even during these busier time periods. In addition, the ratio of beds to housekeepers should be evaluated to see if certain units need to be increased in staff.
This report was focused around the Operating Room (OR) and Post Anesthesia Care Unit (PACU) data in order to find the impact of delays upon the efficiency of the Admission Day Procedure. Several observations were made in regards to the methods employed among the affected departments outside of OR and PACU. However, specific data has not been collected in these areas. Collaboration with other departments would be required to develop specific implementation plans to rectify the situation.

INCREASE COMMUNICATION

- *Keep interdepartmental communication open.* Having the Quality Improvement Team (QIT) draft a detailed flowchart of each department is an excellent idea. The completed flowchart should be posted and discussed in each department to visually remind staff of the impact their actions have on other departments. For example, the importance of notifying admitting of empty rooms and of properly coordinating admitting and OR schedules. If problems arise they should be brought to the attention of the parties involved. This flowchart would show how each department relies on one another to keep the hospital running efficiently. Open lines of communication are critical for implementing change and to constructively criticize.

REDUCE THE NUMBER OF PATIENTS WITHOUT BED ASSIGNMENTS

- *Ask floor nurses to forecast the number of patients that will be discharged* the following day in order for admitting to better allocate bed assignments. This would allow admitting more time to allocate available beds in order to insure that the maximum number of patients are given bed assignments.
• Look into the possibility of connecting the operating room and admitting room schedules. This would alleviate the problem of admitting finding out about surgeries at the last minute. The operating room schedule should be on the same database as admitting so that admitting can automatically check on scheduled surgeries as soon as they are entered into the computer. Alternatively, OR could provide a report to admitting which lists the ADPs scheduled for the following day. This would also help admitting to assign beds to as many ADP patients as possible.
UNIVERSITY HOSPITAL OPERATING ROOMS

ANALYSIS OF DELAYS ON ADMISSION DAY SURGERY PATIENTS

OCTOBER 12, 1992
MANAGEMENT SYSTEMS DEPARTMENT
BONNIE ALLEN
ANNA FERLAND
PATRICE MAGRETA
PURPOSE:
To analyze the process for patients who are undergoing Admission Day Surgery and investigate problems associated with backup delays in the operating room.

GOALS AND OBJECTIVES:
Collect and quantify data to evaluate the impact of holding times in the operating room and define the key issues that contribute to the lack of bed availability. Recommendations will be made as to possible solutions to the problem of backup delays.

BACKGROUND:
Due to improved surgical techniques, the lack of medical reimbursement, and the rising cost of health care, a demand for Admission Day Procedure has steadily increased. In the past two years the number of ADP's has doubled to a current rate of approximately 30% of all surgeries. A hospital is organized to run productively at 85% occupancy. However, recently the average weekly census has been closer to 93%, resulting in many days when the hospital is near full capacity.

The Admission Day Procedure allows the patient to arrive the morning of his scheduled surgery. Upon arrival, the hospital staff verifies that he has followed the appropriate pre-surgical procedures. The patient then enters the Ambulatory Surgical Unit (ASU) or Phase II where he is prepared for surgery. After surgery the patient is moved to the Post Anesthesia Care Unit (PACU) or first stage recovery where he is monitored until stabilized. At this point the patient proceeds to his assigned room. However, when no room is available a backup occurs in the recovery room causing delays in the operating room and the entire surgical process.

In the past year a Quality Improvement Team (QIT) has been formed to help address the problem of ADP delays. Due to the large scope of the problem and conflicting schedules, progress has been slow. While still at the beginning stages of their project, the QI team could use additional input to help solve the ongoing problem of operating room delays. Specifically, they need data to be collected and analyzed in order to focus on the main causes and implications of these delays.
PROJECT PLAN:

The Admission Day Procedure includes the following:
- University Hospital operating rooms 1-21, 25, ASU, and PACU
- Housekeeping
- All individual inpatient floor units
- Admitting office

The key issues affecting the project are:
- Increase in ADP's
- Increase in hospital capacity
- Improved surgical techniques
- Increase in the cost of health care
- Discharge times
- Interdepartmental communication
- Emergency circumstances
- Fluctuation of incoming patients

Included: University Hospital Operating Room (OR) analyzing existing data on OR and PACU delays

Excluded: Changing the admissions process limiting number of admissions Motts and Kellogg Hospitals forecasting census collecting new data

PROPOSED APPROACH:

We began by gathering information about the entire surgical procedure which will eventually result in the development of a flow chart for use throughout the various departments. To assist in our understanding of the surgical process, we have asked Kathy Orbits to schedule a time when we can observe the flow of an ADP through the surgical system.

Kathy Orbits and Scott Lovelace are providing us with data on operating room delays, both before and after surgery and PACU backups. Additional data will not be collected since the existing data appears to be sufficient for our analysis. We have already received data on PACU delays that was previously collected during October-December, 1991 and during August of 1992. After this data was entered into a spreadsheet, it was discovered that much of the data was incomplete. Patient logs were
searched through in order to recover missing statistics. Our next step will be to categorize delays in terms of patient destinations, time frames, and causes for delays. A histogram will be constructed to show the frequency of delays in various hospital units. Pie charts will be created to visually demonstrate significant factors contributing to operating room backups. The average duration of delays will be calculated to estimate monetary losses that the hospital absorbs. Our final step will be to recommend suggested improvements to minimize delays based on the results of the data.

Although we had hoped to attend many of the QIT meetings, our schedules conflict with the meeting time and we will only be able to attend a few of them. We have asked Kathy Orbits to supply us with copies of the meeting minutes so that we will be kept updated as to the progress of the Quality Improvement Team. In our weekly meetings with Kathy and Scott we will discuss our current status and interchange pertinent information and data that may assist the QIT in their process.

EXPECTED IMPACT/OUTCOMES:

* Quantify the impact of operating room delays
* Provide hard data that leads to recommended system changes in departments interacting with the surgical procedure

PROJECT TEAM:

The following individuals will be involved in the project:
Richard J. Coffey - director of management systems and project coordinator
Sheri Dufek - director of operating rooms and project client
Kathy Orbits - nurse manager in recovery room
Scott Lovelace - business manager
QIT members representing all departments associated with the Admission Day Procedure.
<table>
<thead>
<tr>
<th>DATE</th>
<th>ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>9/16/92</td>
<td>Introductory meeting with Dr. Coffey</td>
</tr>
<tr>
<td>9/17/92</td>
<td>Introductory meeting with Scott Lovelace</td>
</tr>
<tr>
<td>9/22/92</td>
<td>Group meeting to prepare for meeting with Sheri Dufek</td>
</tr>
<tr>
<td>9/23/92</td>
<td>Introductory meeting with Sheri Dufek to define project scope</td>
</tr>
<tr>
<td>9/25/92</td>
<td>Group meeting to organize an outline for proposal</td>
</tr>
<tr>
<td>9/28/92</td>
<td>Meeting with Scott Lovelace and Kathy Orbitst to discuss data availability and collection</td>
</tr>
<tr>
<td>9/30/92</td>
<td>Attended Quality Improvement Team meeting. Received first batch of data (PACU delays). Group meeting to compose first draft of proposal and entered data into spreadsheet</td>
</tr>
<tr>
<td>10/5/92</td>
<td>Weekly meeting with Scott Lovelace and Kathy Orbitst. Scheduled time to go through patient logs Meeting with Dr. Coffey Group meeting to make rough draft of proposal</td>
</tr>
<tr>
<td>10/7/92</td>
<td>Attended Quality Improvement Team meeting Looked through patient logs to locate unknown patient destinations Received admitting delay data from Scott Lovelace Presented rough draft of proposal to Sheri Dufek</td>
</tr>
<tr>
<td>10/9/92</td>
<td>Group meeting to finish proposal</td>
</tr>
<tr>
<td>10/12/92</td>
<td>Have proposal signed by Sheri Dufek and Dr. Coffey Weekly meeting with Scott Lovelace and Kathy Orbitst. Discuss our current status on the tracking of a patient through surgery and hopefully set up an appointment to follow the surgical procedure. Present proposal to class.</td>
</tr>
</tbody>
</table>

Week of 10-12-92  Tour ADP flow
<table>
<thead>
<tr>
<th>DATE</th>
<th>ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week of 10-19-92</td>
<td>Finish entering data into worksheets including PACU delays, and OR delays both before and immediately following surgery.</td>
</tr>
<tr>
<td>11/9/92</td>
<td>Present interim report to class</td>
</tr>
<tr>
<td>Week of 11-9-92</td>
<td>Begin analysis of data in order to draw conclusions and propose recommendations</td>
</tr>
<tr>
<td>Week of 11-16-92</td>
<td>Prepare final report</td>
</tr>
<tr>
<td>Week of 11-23-92</td>
<td>Prepare final report</td>
</tr>
<tr>
<td>12/7/92</td>
<td>Project reports due</td>
</tr>
</tbody>
</table>

**CLIENT PRESENTATION**
I have read the preceding proposal and acknowledge that the stated objectives and methods being used are in agreement with my requirements for the Admission Day Procedure analysis.

Sheri Dufek
Client

Richard J. Coffey
Coordinator

Patrice Mageta
Control Allan

Anna Finland
Do patient need exam procedure? (spinal, arterial line etc.)

Yes

Patient goes to Holding Room

Surgical procedures performed

No

Is O.R. available?

Yes

Anesthesiologist escorts patient to O.R. from ASU

Surgical procedure performed

O.R. calls PACU for slot assignment

No

Patient waits until O.R. is available.

Yes

Is a slot available in PACU?

No

Patient waits in O.R.

Yes

Anest. escorts patient from O.R. to Post Anesthesia Care Unit (PACU)

GOTO 2
Patient verification (night prior to surgery)

Patient checks in at admitting surgical desk

Admitting calls Surgical Family Waiting Room (SFWR) to notify arrival of patient. (First cases only.)

After 1st cases, patients stay in admitting until given directions to Ambulatory Surgical Unit (ASU)

Patient & each family member check in at SFWR

Begin patient IV's

Take patients' vital signs, draw labs

Are there more cases for this case period?

Patient undresses and gowns

Nurses go to SFWR to escort 1st cases to ASU (cases other than 1st are given directions and find their own way)

SFWR calls ASU or vice versa.
Pre-OP Delay times
= \text{Max}(0, \text{Patient Present} - \text{Scheduled Time})

Surgery Schedule

Scheduled time

OR Delay Times
= \text{Max}(0, \text{Patient out} - \text{Dressing End} - 15 \text{ min})

U of M Hospitals O.R. Record

Patient present

Dressing End
Patient Out

Estimated Completion time

*For actual source document forms see Appendix E.*
Patient Type: ___ LP ___ OP ___ ADP

Patient Admission Time: ___:___ a.m. ___:___ p.m.

Time Patient Ready for Discharge: ___:___ a.m. ___:___ p.m.

Sign Out Time: ___:___ a.m. ___:___ p.m.

Actual Departure Time: ___:___ a.m. ___:___ p.m.

Patient Destination: ________

Reason for Delay in Patient Departure from PACU:

___ delay due to bed not being ready
___ delay due to room not cleaned
___ delay due to Phase II unable to accept patient
___ delay in obtaining signout
___ delay due to insufficient orders
___ delay due to pending surgical evaluation
___ delay due to inability to access nurse who will receive report

other comments:

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

Please return to the bin designated PACU Discharge Delay Log at the nurses station

BAC/KO
Survey Form
August 1992
PACU
Discharge Delay Log Sheet
Departure time
Time discharge criteria reached

Delay Times exiting PACU 1992
(departure time - time discharge criteria reached)

Survey Form
PACU
Discharge Delay Log Sheet
Actual departure time
Time patient ready for discharge

Delay Times exiting PACU 1991
(actual departure time - time patient ready for discharge)

BUAR's report generated by hospital census system

Daily Census by unit

Hospital database statistics → Total ADP's per day
<table>
<thead>
<tr>
<th>PATIENT NAME</th>
<th>REGISTRATION #</th>
<th>TYPE</th>
<th>AGE</th>
<th>ANESTH. TYPE</th>
<th>CASE DESCRIPTION</th>
<th>BLOOD</th>
</tr>
</thead>
<tbody>
<tr>
<td>X. Ottinger, Harri B.*</td>
<td>21292853</td>
<td>AP</td>
<td>15 GEWL</td>
<td>Bronchoscopy, Thoracic Esophagectomy</td>
<td>18 Choro Hernia Repair</td>
<td>Is</td>
</tr>
<tr>
<td>X. Ottinger, Harri B.*</td>
<td>11293524</td>
<td>AP</td>
<td>51 GEWL</td>
<td>Bronchoscopy, Thoracic Esophagectomy</td>
<td>18 Choro Hernia Repair</td>
<td>Is</td>
</tr>
<tr>
<td>X. Blakemore, Robert H.*</td>
<td>2140267/</td>
<td>AP</td>
<td>20 CHOICE</td>
<td>Panendoscopy, Selective Neck Dissection</td>
<td>1 Scapular Free Flap</td>
<td>(C.H., high)</td>
</tr>
<tr>
<td>X. Blakemore, Robert H.*</td>
<td>11405169</td>
<td>AP</td>
<td>53 CHOICE</td>
<td>Neck Dissection, Tongue Dissection</td>
<td>1 Thyroplasty</td>
<td>(C.H., high)</td>
</tr>
<tr>
<td>X. Blakemore, Robert H.*</td>
<td>14158376</td>
<td>OP</td>
<td>60 CHOICE</td>
<td>Neck Dissection, Tongue Dissection</td>
<td>1 Thyroplasty</td>
<td>(C.H., high)</td>
</tr>
<tr>
<td>X. Blakemore, Robert H.*</td>
<td>23446911</td>
<td>AP</td>
<td>72 HAPS</td>
<td>Neck Dissection, Tongue Dissection</td>
<td>1 Thyroplasty</td>
<td>(C.H., high)</td>
</tr>
<tr>
<td>X. Blakemore, Robert H.*</td>
<td>23247291</td>
<td>AP</td>
<td>67 CHOICE</td>
<td>Neck Dissection, Tongue Dissection</td>
<td>1 Thyroplasty</td>
<td>(C.H., high)</td>
</tr>
<tr>
<td>X. Blakemore, Robert H.*</td>
<td>22102023</td>
<td>OP</td>
<td>49 CHOICE</td>
<td>Oral Genioplasty</td>
<td>1 Thyroplasty</td>
<td>(C.H., high)</td>
</tr>
<tr>
<td>X. Blakemore, Robert H.*</td>
<td>11470205</td>
<td>AP</td>
<td>58 CHOICE</td>
<td>Oral Genioplasty</td>
<td>1 Thyroplasty</td>
<td>(C.H., high)</td>
</tr>
<tr>
<td>X. Blakemore, Robert H.*</td>
<td>11470205</td>
<td>AP</td>
<td>28 CHOICE</td>
<td>Oral Genioplasty</td>
<td>1 Thyroplasty</td>
<td>(C.H., high)</td>
</tr>
</tbody>
</table>
PACU DISCHARGE DELAY LOG SHEET

Date:                      Patient Type: □ CP □ ADP □ IP
Direct ASU Admit? □ Yes □ No

PACU:
Patient Admission Time: _____ AM/PM
Time Discharge Criteria Reached: _____ AM/PM
Departure Time: _____ AM/PM
Patient Destination (UNIT): _____ Unexpected Admission? □ Yes □ No

Anesthesia Technique: □ General □ Regional □ MAPS □ Local

ASU: Reason for Delay Due to:
□ Bed not ready □ Room not cleaned □ Pending patient discharge
□ ASU unable to accept patient
□ Nurse inaccessible for report: _____ minutes waiting for nurse
□ Complication: __________________________________________

ASU:
Patient Admission Time: _____ AM/PM
Time Discharge Criteria Met: _____ AM/PM
Departure Time: _____ AM/PM

ASU: Reason for Delay Due to:
□ Inability to void
□ Sensation deficit
□ Nausea & vomiting
□ Drowsiness
□ Pain relief
□ Other: __________________________________________
| O.R. | PATIENT NAME / ROOM # | REGISTRATION # | SERVICE | PROCEDURE / NOTES | P A C H T I M E | CHARGE | FR CALL | IN / OUT | BED NUMBER | READ / WRITE | W I T / R O O M |
|------|----------------------|----------------|---------|-------------------|----------------|---------|---------|----------|------------|-------------|-------------|---------------|
|      |                      |                |         |                   |                |         |         |          |            |             |             |               |
|      |                      |                |         |                   |                |         |         |          |            |             |             |               |
|      |                      |                |         |                   |                |         |         |          |            |             |             |               |
|      |                      |                |         |                   |                |         |         |          |            |             |             |               |
|      |                      |                |         |                   |                |         |         |          |            |             |             |               |
|      |                      |                |         |                   |                |         |         |          |            |             |             |               |
|      |                      |                |         |                   |                |         |         |          |            |             |             |               |
|      |                      |                |         |                   |                |         |         |          |            |             |             |               |
|      |                      |                |         |                   |                |         |         |          |            |             |             |               |
|      |                      |                |         |                   |                |         |         |          |            |             |             |               |
|      |                      |                |         |                   |                |         |         |          |            |             |             |               |
### UNIVERSITY OF MICHIGAN HOSPITALS
#### OPERATING ROOMS
#### OPERATION RECORD

**UNIVERSITY HOSPITAL**
- MOIT HOSPITAL
- KELLOGG EYE CENTER

<table>
<thead>
<tr>
<th>PRIMARY SERVICE</th>
<th>ATTENDING STAFF</th>
<th>CIRCULATING PERIOD</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO.</td>
<td>NO.</td>
<td>DATE</td>
</tr>
<tr>
<td>NO.</td>
<td>SURGEON</td>
<td></td>
</tr>
<tr>
<td>NO.</td>
<td>ASST.</td>
<td></td>
</tr>
<tr>
<td>NO.</td>
<td>STAFF ANESTHESIOLOGIST</td>
<td></td>
</tr>
</tbody>
</table>

**ANESTHESIA TYPE**
- LOCAL
- RAPID SEPTAL
- SPINAL
- EPIDURAL
- BLOCK
- GENERAL

**PRE-OPERATIVE DIAGNOSIS**

**CIRCULATING NURSES IN AND OUT**

<table>
<thead>
<tr>
<th>NURSES</th>
<th>IN</th>
<th>OUT</th>
</tr>
</thead>
</table>

**ANES PRESENT**

**LOCAL ANES AGENT**
- INJECTION
- BLOOD
- ICE

**SPECIMENS**
- BIOSPECIMEN
- MICROBIOLOGY
- BLOOD BANK
- PATHOLOGY
- FROZEN SECTION

**REMARKS**

---

**SIGNATURE**

**DATE**

---

**COUNTS**

**POST-OPERATIVE DIAGNOSIS**

---

**INTRAOPERATIVE COMPLICATIONS**

---

**AGREE WITH THE ABOVE INFORMATION AND HAVE COMPLETED THE SURGEONS SECTION**
- YES
- NO

---

**SIGNATURE**

---

**DATE**
### Pre-op Delays by Day and OR#

<table>
<thead>
<tr>
<th>Pre-op Delay</th>
<th>Total Minutes of Delay</th>
<th>OR#</th>
<th>Total Minutes of Delay</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-Aug</td>
<td>466</td>
<td>1</td>
<td>1638</td>
</tr>
<tr>
<td>5-Aug</td>
<td>2122</td>
<td>2</td>
<td>1090</td>
</tr>
<tr>
<td>6-Aug</td>
<td>542</td>
<td>3</td>
<td>1373</td>
</tr>
<tr>
<td>7-Aug</td>
<td>1438</td>
<td>4</td>
<td>522</td>
</tr>
<tr>
<td>9-Aug</td>
<td>0</td>
<td>5</td>
<td>1022</td>
</tr>
<tr>
<td>10-Aug</td>
<td>1230</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>11-Aug</td>
<td>826</td>
<td>7</td>
<td>959</td>
</tr>
<tr>
<td>12-Aug</td>
<td>1459</td>
<td>8</td>
<td>1646</td>
</tr>
<tr>
<td>13-Aug</td>
<td>984</td>
<td>9</td>
<td>1857</td>
</tr>
<tr>
<td>14-Aug</td>
<td>711</td>
<td>10</td>
<td>762</td>
</tr>
<tr>
<td>16-Aug</td>
<td>637</td>
<td>11</td>
<td>356</td>
</tr>
<tr>
<td>17-Aug</td>
<td>775</td>
<td>12</td>
<td>1160</td>
</tr>
<tr>
<td>18-Aug</td>
<td>1410</td>
<td>13</td>
<td>1259</td>
</tr>
<tr>
<td>19-Aug</td>
<td>1212</td>
<td>14</td>
<td>1151</td>
</tr>
<tr>
<td>20-Aug</td>
<td>475</td>
<td>15</td>
<td>1331</td>
</tr>
<tr>
<td>21-Aug</td>
<td>0</td>
<td>16</td>
<td>514</td>
</tr>
<tr>
<td>22-Aug</td>
<td>0</td>
<td>17</td>
<td>821</td>
</tr>
<tr>
<td>23-Aug</td>
<td>1043</td>
<td>18</td>
<td>414</td>
</tr>
<tr>
<td>24-Aug</td>
<td>964</td>
<td>19</td>
<td>389</td>
</tr>
<tr>
<td>25-Aug</td>
<td>1064</td>
<td>20</td>
<td>349</td>
</tr>
<tr>
<td>26-Aug</td>
<td>706</td>
<td>25</td>
<td>942</td>
</tr>
<tr>
<td>27-Aug</td>
<td>913</td>
<td></td>
<td></td>
</tr>
<tr>
<td>28-Aug</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>29-Aug</td>
<td>543</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Minutes</strong></td>
<td><strong>19570</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Page 1**
<table>
<thead>
<tr>
<th>LOCATION</th>
<th>LIC BEDS</th>
<th>BED COMP</th>
<th>CENSUS</th>
<th>%COMP</th>
<th>V.T.O</th>
<th>V.T.O</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNIVERSITY HOSPITAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GENERAL CARE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BAC</td>
<td>54</td>
<td>11</td>
<td>26</td>
<td>100</td>
<td>96.0%</td>
<td>97.5%</td>
</tr>
<tr>
<td>4A</td>
<td>54</td>
<td>11</td>
<td>26</td>
<td>100</td>
<td>96.0%</td>
<td>97.5%</td>
</tr>
<tr>
<td>4B</td>
<td>54</td>
<td>11</td>
<td>26</td>
<td>100</td>
<td>96.0%</td>
<td>97.5%</td>
</tr>
<tr>
<td>4C</td>
<td>54</td>
<td>11</td>
<td>26</td>
<td>100</td>
<td>96.0%</td>
<td>97.5%</td>
</tr>
<tr>
<td>5A</td>
<td>54</td>
<td>11</td>
<td>26</td>
<td>100</td>
<td>96.0%</td>
<td>97.5%</td>
</tr>
<tr>
<td>5B</td>
<td>54</td>
<td>11</td>
<td>26</td>
<td>100</td>
<td>96.0%</td>
<td>97.5%</td>
</tr>
<tr>
<td>5C</td>
<td>54</td>
<td>11</td>
<td>26</td>
<td>100</td>
<td>96.0%</td>
<td>97.5%</td>
</tr>
<tr>
<td>6A</td>
<td>84</td>
<td>13</td>
<td>20</td>
<td>94.3%</td>
<td>98.9%</td>
<td>85.1%</td>
</tr>
<tr>
<td>6B</td>
<td>84</td>
<td>13</td>
<td>20</td>
<td>94.3%</td>
<td>98.9%</td>
<td>85.1%</td>
</tr>
<tr>
<td>6C</td>
<td>84</td>
<td>13</td>
<td>20</td>
<td>94.3%</td>
<td>98.9%</td>
<td>85.1%</td>
</tr>
<tr>
<td>7A</td>
<td>84</td>
<td>13</td>
<td>20</td>
<td>94.3%</td>
<td>98.9%</td>
<td>85.1%</td>
</tr>
<tr>
<td>7B</td>
<td>84</td>
<td>13</td>
<td>20</td>
<td>94.3%</td>
<td>98.9%</td>
<td>85.1%</td>
</tr>
<tr>
<td>8A</td>
<td>84</td>
<td>13</td>
<td>20</td>
<td>94.3%</td>
<td>98.9%</td>
<td>85.1%</td>
</tr>
<tr>
<td>8B</td>
<td>84</td>
<td>13</td>
<td>20</td>
<td>94.3%</td>
<td>98.9%</td>
<td>85.1%</td>
</tr>
<tr>
<td>8C</td>
<td>84</td>
<td>13</td>
<td>20</td>
<td>94.3%</td>
<td>98.9%</td>
<td>85.1%</td>
</tr>
<tr>
<td>GENERAL SUBTOTAL</td>
<td>434</td>
<td>65</td>
<td>130</td>
<td>95.3%</td>
<td>91.4%</td>
<td>92.4%</td>
</tr>
<tr>
<td>I.C.U.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BICU</td>
<td>13</td>
<td>1</td>
<td>9</td>
<td>90.3%</td>
<td>75.3%</td>
<td>71.1%</td>
</tr>
<tr>
<td>4CN</td>
<td>13</td>
<td>1</td>
<td>9</td>
<td>90.3%</td>
<td>75.3%</td>
<td>71.1%</td>
</tr>
<tr>
<td>4CG</td>
<td>13</td>
<td>1</td>
<td>9</td>
<td>90.3%</td>
<td>75.3%</td>
<td>71.1%</td>
</tr>
<tr>
<td>5D</td>
<td>20</td>
<td>1</td>
<td>17</td>
<td>85.0%</td>
<td>95.0%</td>
<td>93.2%</td>
</tr>
<tr>
<td>5E</td>
<td>20</td>
<td>1</td>
<td>17</td>
<td>85.0%</td>
<td>95.0%</td>
<td>93.2%</td>
</tr>
<tr>
<td>5F</td>
<td>20</td>
<td>1</td>
<td>17</td>
<td>85.0%</td>
<td>95.0%</td>
<td>93.2%</td>
</tr>
<tr>
<td>5G</td>
<td>20</td>
<td>1</td>
<td>17</td>
<td>85.0%</td>
<td>95.0%</td>
<td>93.2%</td>
</tr>
<tr>
<td>6DN</td>
<td>43</td>
<td>1</td>
<td>11</td>
<td>82.7%</td>
<td>78.0%</td>
<td>70.0%</td>
</tr>
<tr>
<td>6DE</td>
<td>43</td>
<td>1</td>
<td>11</td>
<td>82.7%</td>
<td>78.0%</td>
<td>70.0%</td>
</tr>
<tr>
<td>6DF</td>
<td>43</td>
<td>1</td>
<td>11</td>
<td>82.7%</td>
<td>78.0%</td>
<td>70.0%</td>
</tr>
<tr>
<td>MICU SUBTOTAL</td>
<td>86</td>
<td>6</td>
<td>56</td>
<td>70.0%</td>
<td>84.3%</td>
<td>87.2%</td>
</tr>
<tr>
<td>MHH SUBTOTAL</td>
<td>504</td>
<td>84</td>
<td>420</td>
<td>91.6%</td>
<td>93.0%</td>
<td>91.1%</td>
</tr>
<tr>
<td>KEO</td>
<td>12</td>
<td>1</td>
<td>8</td>
<td>66.7%</td>
<td>33.0%</td>
<td>22.2%</td>
</tr>
<tr>
<td>MHH, KEO</td>
<td>516</td>
<td>84</td>
<td>432</td>
<td>91.1%</td>
<td>93.0%</td>
<td>91.1%</td>
</tr>
<tr>
<td>7A CRC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PATIENT FAY</td>
<td>15</td>
<td>5</td>
<td>10</td>
<td>66.7%</td>
<td>35.3%</td>
<td>28.4%</td>
</tr>
<tr>
<td>RESEARCH FAY</td>
<td>15</td>
<td>5</td>
<td>10</td>
<td>66.7%</td>
<td>35.3%</td>
<td>28.4%</td>
</tr>
<tr>
<td>7A CRC TOTAL</td>
<td>30</td>
<td>10</td>
<td>20</td>
<td>66.7%</td>
<td>35.3%</td>
<td>28.4%</td>
</tr>
<tr>
<td>MHH TOTAL</td>
<td>534</td>
<td>84</td>
<td>450</td>
<td>91.1%</td>
<td>93.0%</td>
<td>91.1%</td>
</tr>
<tr>
<td>TOTAL OF ALL HOSPITALS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>872</td>
<td>* 877</td>
<td>* 728</td>
<td>83.0%</td>
<td>82.5%</td>
<td>84.1%</td>
<td></td>
</tr>
</tbody>
</table>

CUM PATIENT DAYS
FOR MONTH: 22433
FOR YEAR: 45773

Beds out of service -- short term
Medical: Renovation:
Maintain: Other:
TON: 6 beds 7H: 1 bed
SH: 3 beds
Other:
Total Delay Minutes By Day
Pre-OP

Operating Room Number

Total Minutes of Delay

1800
1600
1400
1200
1000
800
600
400
200
0

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21

SOURCE:  University of Michigan Hospitals, University Hospital.
PREPARED:  August 1991
APPROVED:  July 1991

[Handwritten notes and signatures]
## EXITING OR DELAYS BY DAY AND OR#

<table>
<thead>
<tr>
<th>POST-OP DELAY DATE</th>
<th>TOTAL MINUTES OF DELAY</th>
<th>OR#</th>
<th>TOTAL MINUTES OF DELAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>8/4/92</td>
<td>13</td>
<td>1</td>
<td>145</td>
</tr>
<tr>
<td>5-Aug</td>
<td>55</td>
<td>2</td>
<td>39</td>
</tr>
<tr>
<td>6-Aug</td>
<td>20</td>
<td>3</td>
<td>48</td>
</tr>
<tr>
<td>7-Aug</td>
<td>0</td>
<td>4</td>
<td>153</td>
</tr>
<tr>
<td>9-Aug</td>
<td>0</td>
<td>5</td>
<td>71</td>
</tr>
<tr>
<td>10-Aug</td>
<td>60</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>11-Aug</td>
<td>111</td>
<td>7</td>
<td>194</td>
</tr>
<tr>
<td>12-Aug</td>
<td>55</td>
<td>8</td>
<td>40</td>
</tr>
<tr>
<td>13-Aug</td>
<td>36</td>
<td>9</td>
<td>37</td>
</tr>
<tr>
<td>14-Aug</td>
<td>20</td>
<td>10</td>
<td>25</td>
</tr>
<tr>
<td>16-Aug</td>
<td>5</td>
<td>11</td>
<td>27</td>
</tr>
<tr>
<td>17-Aug</td>
<td>44</td>
<td>12</td>
<td>50</td>
</tr>
<tr>
<td>18-Aug</td>
<td>190</td>
<td>13</td>
<td>180</td>
</tr>
<tr>
<td>19-Aug</td>
<td>92</td>
<td>14</td>
<td>76</td>
</tr>
<tr>
<td>20-Aug</td>
<td>61</td>
<td>15</td>
<td>25</td>
</tr>
<tr>
<td>21-Aug</td>
<td>8</td>
<td>16</td>
<td>23</td>
</tr>
<tr>
<td>22-Aug</td>
<td>0</td>
<td>17</td>
<td>71</td>
</tr>
<tr>
<td>24-Aug</td>
<td>143</td>
<td>18</td>
<td>45</td>
</tr>
<tr>
<td>25-Aug</td>
<td>47</td>
<td>19</td>
<td>0</td>
</tr>
<tr>
<td>26-Aug</td>
<td>258</td>
<td>20</td>
<td>24</td>
</tr>
<tr>
<td>27-Aug</td>
<td>7</td>
<td>21</td>
<td>0</td>
</tr>
<tr>
<td>28-Aug</td>
<td>21</td>
<td>22</td>
<td>0</td>
</tr>
<tr>
<td>30-Aug</td>
<td>10</td>
<td>23</td>
<td>0</td>
</tr>
<tr>
<td>31-Aug</td>
<td>17</td>
<td>24</td>
<td>0</td>
</tr>
</tbody>
</table>

**TOTAL MINUTES** 1273  **TOTAL MINUTES** 1273
<table>
<thead>
<tr>
<th>TIME</th>
<th>TOTAL DELAY (MIN.)</th>
<th>AVERAGE DELAY PER ADP (MIN.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:00 to 8:59</td>
<td>3755</td>
<td>13</td>
</tr>
<tr>
<td>9:00 to 10:59</td>
<td>6034</td>
<td>12</td>
</tr>
<tr>
<td>11:00 to 12:59</td>
<td>5543</td>
<td>14</td>
</tr>
<tr>
<td>13:00 to 14:59</td>
<td>2973</td>
<td>13</td>
</tr>
<tr>
<td>15:00 to 16:59</td>
<td>568</td>
<td>13</td>
</tr>
<tr>
<td>17:00 to 18:59</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>19:00 to 20:59</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21:00 to 22:59</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23:00 to 24:00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TIME</th>
<th>TOTAL DELAY (MIN.)</th>
<th>AVERAGE DELAY PER ADP (MIN.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0:00 to 1:59</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>2:00 to 3:59</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4:00 to 5:59</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>6:00 to 7:59</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>8:00 to 9:59</td>
<td>128</td>
<td>32</td>
</tr>
<tr>
<td>10:00 to 11:59</td>
<td>424</td>
<td>25</td>
</tr>
<tr>
<td>12:00 to 13:59</td>
<td>1122</td>
<td>34</td>
</tr>
<tr>
<td>14:00 to 15:59</td>
<td>555</td>
<td>28</td>
</tr>
<tr>
<td>16:00 to 17:59</td>
<td>364</td>
<td>23</td>
</tr>
<tr>
<td>18:00 to 19:59</td>
<td>40</td>
<td>20</td>
</tr>
<tr>
<td>20:00 to 21:59</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22:00 to 24:00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Total Delay Minutes By Day
Exiting OR

Operating Room Number

Total Minutes of Delay

SOURCE: University of Michigan Hospitals, University Hospitals
SAMPLE PERIOD: August 1992
PREPARED BY: Linda Pinion
1992
AVERAGE DELAY PER ADP PATIENT IN MINUTES

Two Hour Time Block Range

Ave Minutes of Delay

0:00 to 1:59
2:00 to 3:59
4:00 to 5:59
6:00 to 7:59
8:00 to 9:59
10:00 to 11:59
12:00 to 13:59
14:00 to 15:59
16:00 to 17:59
18:00 to 19:59
20:00 to 21:59
22:00 to 24:00

SOURCE: University of Michigan Hospitals, University Hospital
SAMPLE PERIOD: August 1992
PREPARED BY: Anna Perland
November 15, 1992
ADP DELAYS EXITING PACU
PERCENTAGE OF TOTAL DELAY TIME
PER TWO HOUR TIME PERIODS

PERCENTAGE OF TOTAL DELAYS

TIME FRAME (24 hr clock)

SOURCE: University of Michigan Hospitals, University Hospital
SAMPLE PERIOD: August 1982
PREPARED BY: Bonnie Allen
MAY 1982
PERCENTAGE OF PACU DELAYS BY TIME PERIODS *
FOR THE PERIOD 10/14/91 - 12/6/91

% OF DELAYS BY TIME

0.0% 5.0% 10.0% 15.0% 20.0% 25.0% 30.0%

7-7:59 A.M  1.3%
9-9:59 A.M  5.0%
10-10:59 A.M  15.8%
11-11:59 A.M  21.5%
12-12:59 P.M.  25.7%
1-1:59 P.M  16.1%
2-2:59 P.M  5.0%
3-3:59 P.M  1.7%
4-4:59 P.M  5.2%
5-5:59 P.M  2.1%
7-7:59 P.M  0.6%

* PERCENTAGE OF DELAYS IS FOUND IN TERMS OF TOTAL DELAY TIME

SOURCE: University of Michigan Hospitals, University Hospital
SAMPLE PERIOD: October-December 1991
PREPARED BY: Patrice Magrota