Medical Procedures Unit Scheduling and Anesthesia Process Flow
University of Michigan Program & Operations Analysis
Final Project Report

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Executive Summary

Introduction
The Medical Procedures Unit (MPU) performs internal medicine cases involving anesthesia. The Department of Anesthesiology provides the MPU with one anesthesia team every day, and depending on the demand of other departments in the hospital, can sometimes provide the MPU with a second team. Recently, the demand for anesthesia has increased to the point where scheduling these cases has become a burden on the call center staff.

Goals & Objectives
The primary goal of this project was to reduce the burden of scheduling anesthesia cases on the call center staff. In order to complete this, the team outlined four objectives. The first objective was to maximize utilization of the anesthesia resource in the MPU. Second, the team wished to increase the throughput for GI anesthesia cases in the MPU. Third, the team wanted to document the call center procedures for scheduling anesthesia appointments. The team’s final objective was to decrease patient lead time.

Methods
The team conducted observations of the call centers where appointments are scheduled, as well as the MPU, and also conducted interviews with representatives from the MPU and Department of Anesthesiology. Data was gathered from the University Hospital’s IT systems (ORMIS and EWS), procedure room logs, and prep patient logs. A literature search revealed a previous project that had studied scheduling in the MPU but did not address anesthesia scheduling constraints. To better understand the system, a flowchart of the MPU was created.

Findings & Recommendations
In order to ease the task of scheduling these cases, the team investigated ways to reduce the turnaround time between cases. A significant amount of time is spent by the CRNA transporting patients to the Post Anesthesia Care Unit (PACU). The team proposes that all cases involving anesthesia should be recovered in the MPU in order to eliminate time spent transporting patients. This would increase the amount of time the anesthesia team is available by 13 hours per month which equates to 1.3 additional work days.

Through data analysis the team discovered that anesthesia utilization in the MPU was highest on Tuesdays and Fridays. The Team recommends that the Department of Anesthesiology provides two teams to the MPU every Tuesday and Friday. This addition would allow one team to perform a procedure while the second team prepares and recovers patients.
Throughout this project the team found that there were gaps in communication between the MPU and the Department of Anesthesiology. The team’s third recommendation is to increase the level of communication between the two departments through monthly meetings. These meetings would also serve to reevaluate anesthesia staffing levels based on current demand, and discuss process issues and improvements.

Also, the team recommends implementing an electronic patient tracking system. This would allow the MPU to accurately record the amount of time patients spend in each area of the appointment process, would provide readily available data which could be used for monthly improvement meetings. The team also created a document of guidelines to aid the scheduling of cases.
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MPU Scheduling Final Project Report – April 27, 2009
Introduction

The Medical Procedures Unit (MPU) at the University of Michigan Hospital is an inpatient and outpatient facility that performs a large array of services including medical and surgery gastroenterology, pulmonary, rheumatology, pediatric, and neurology. The MPU accommodates complex cases that require daily involvement from the Department of Anesthesiology. These cases take more time on average than non-anesthesia cases, and thus require more resources, specifically time, from the MPU. Over the year 2008, the number of anesthesia cases has increased from an average of 21.3 cases per month for the first three months, to an average of 61.3 cases per month for the last three months. This increase has led to difficulties with the scheduling of anesthesia cases within the MPU. Therefore, the MPU administrators asked the IOE 481 Senior Design program for assistance in reducing the time it takes the call center staff to schedule appointments involving anesthesia. Senior Design Team 7, a group of four Industrial and Operations Engineering Seniors from the University of Michigan has investigated this request. This report presents analysis of the MPU scheduling process as well as the process flow of MPU cases involving the Department of Anesthesiology, which has led the team to develop recommendations to improve patient throughput and streamline the MPU’s daily operations. This purpose of this report is to present the team’s approach and methodology, findings and conclusions, recommendations, and expected impact of the project.

Background

The MPU performs internal medicine procedures for inpatients and outpatients. A portion of these procedures are more complex than others and require anesthesia. Complex anesthesia cases have reportedly taken longer than other cases and require a large portion of scheduling and physical resources of the Unit. The MPU is currently allocated one anesthesia team [anesthesiologist, Certified Registered Nurse Anesthetist (CRNA)] per day, limiting the Unit to four cases per day, on average. During a procedure involving anesthesia, the anesthesiologist or CRNA must be in the procedure room throughout the entire procedure, which means anesthesia appointments cannot be scheduled with overlapping times. The MPU has a total of nine rooms available for all procedures; some of these rooms contain specialized equipment and are only available for certain procedures. The MPU has taken steps to reduce these constraints by hiring an additional full time staff member to schedule anesthesia cases for the MPU. These room constraints, as well as the restrictions of the anesthesia resource, are reducing the overall capacity of the MPU and thus decreasing patient throughput.

Departments Involved

The team analyzed the scheduling operations in the MPU, which required involvement from the following departments:
• The MPU is the physical department located in the University of Michigan Hospital, where procedures are conducted. Also affiliated with this department is the Endoscopy Call Center, located off-site, which schedules patients based on a number of constraints, including the availability of the patient, physician, procedure room, length, type and need for anesthesia.

• The Department of Anesthesiology provides the anesthesia team to the MPU, which includes both an anesthesiologist and a CRNA who work together on one case.

• The Division of Gastroenterology includes the physicians performing the procedures and is a part of the Department of Internal Medicine.

• The Gastroenterology Specialty Procedures Office, located in the hospital, schedules patients with more complex procedures.

Key Issues

The following key issues are affecting the MPU:

• Scheduling constraints are strict and difficult to apply
• Anesthesia cases can decrease patient throughput in the MPU
• Long patient lead times lead to delays in the process flow
• Procedure rooms and the equipment within them are underutilized
• Physicians are in high demand on certain days
• Preparing the patient is more extensive and therefore takes longer for anesthesia cases
• Cases requiring anesthesia generally take more time than other cases
• Overbooking of cases can lead to long patient wait times and overtime for nursing staff
• The cases scheduled must fit within the anesthesia hours of operation

Goals and Objectives

The purpose of this project was to reduce the time spent scheduling anesthesia cases by streamlining medical and specialty gastrointestinal (GI) cases in the MPU that require involvement from the Department of Anesthesiology. The streamlining will be done by improving scheduling, patient flow, room utilization, and policies and processes between the Anesthesiology and MPU departments, with a focus specifically on the Medical Procedures Unit.
Goals:

- Reduce the time the call center staff spends on scheduling anesthesia cases

Objectives:

- Maximize utilization of the Department of Anesthesiology team (MD, CRNA)
- Increase throughput for GI anesthesia cases in the MPU
- Document scheduling guidelines
- Decrease patient lead time (on day of procedure, and the number of days before seen by physician)

Project Scope

This project focused on both the process improvement of the anesthesia procedure appointments as well as the scheduling of anesthesia patients in the MPU. The improvements apply to both inpatient and outpatient GI procedures in the MPU. Specific procedures include: Upper Endoscopy, Balloon-Assisted Enteroscopy, Sigmoidoscopy, Colonoscopy, EMR, ERCP, and Endoscopic Ultrasound.

This project excluded modification to the software scheduling tools including the Enterprise Wide Scheduling (EWS) system, the Operating Room Management Information System (ORMIS), and the method of scheduling appointments from physicians to the call centers (through emails, faxes, or telephone calls).

Approach and Methodology

Through interviews and meetings, observations, literature research, data collection, and data analysis, the team has gathered sufficient information to provide recommendations.

Interviews and Meetings
The team interviewed the Patient Services Associate and the Patient Services Assistant from the Endoscopy Call Center, the Patient Services Assistant from the GI Specialty Procedures Office, the Physician Medical Director of the Medical Procedures Unit, and the Associate Professor of Anesthesia/Associate Chair and Chief Nurse Anesthetist from the Department of Anesthesiology. The team also met regularly with the project client, the Nurse Manager of the MPU, to gain additional information. During these interviews and meetings, the team gained information regarding the constraints of the scheduling system.
Observations
The team spent a total of 15 hours observing the MPU and both call centers. These observations of the processes that the patients, staff, and schedulers follow provided the information that the team used to develop the procedure flowchart.

Literature Search
The team reviewed a previous student project report, titled Evaluation of Medical Procedures Unit Scheduling, from December 2004, that evaluated the scheduling procedures in the MPU. It provided guidelines for scheduling within the MPU and suggested some of the past issues surrounding scheduling within the unit. This report stated sources of delay including scheduled length versus actual length of procedure, prep bay allocation, overlapping appointments, appointment time distribution, and room changeover time. This report also acknowledged that patient arrival time and procedure preparation time were not causes of delay. This project focused on all procedures being scheduled within the MPU, not specifically procedures involving anesthesia.

Scheduling Software Data
The team has also received data measuring the number of procedures performed each month by type, from 2008, and was able to access data about individual cases from the beginning of 2009 that were collected from the MPU’s software.

Patient Log Data
Two log sheets were used to collect data: the MPU Prep Patient Log and the MPU Procedures Room Log (see Appendices A and B). These log sheets were filled out daily by the nurses in the MPU.

The Prep Patient Log sheet provided the arrival time and scheduled appointment time of the patient, which prep bay is used, the procedure, the physician, and the procedure room number. The team collected one week of Prep Patient Log sheets from January 2009. In order to gain additional information, the team also added one column to a revised Prep Patient Log sheet, and collected the sheets from one week in March. The extra column was titled, Time Taken to the Procedure Room, and was used in data analysis to determine the total amount of time patients are spending in the prep bays.

The Procedures Room Log sheet provided information on the date, procedure being performed, procedure room being used, physician, and total time the patient spends in the procedure room. The team has collected the Procedures Room Log sheets from January 2009.

Flowchart Formation
The team developed a procedure flowchart beginning with the patient entering the MPU and ending when the patient is discharged from the recovery room. The procedure flowchart helped the team better understand the process of patient flow within the MPU, it can be found in Appendix C.
**Scheduling Guidelines Formation**
The team worked with the staff at the Endoscopy Call Center to develop a set of guidelines for the scheduling of all GI patients in the MPU. This task supports the project objective to streamline the scheduling process. These guidelines were created with the assistance of the current scheduler, and have been approved by the scheduling supervisor. The scheduling guidelines can be found in Appendix D.

**Data Analysis**
The team analyzed the time information gathered via the MPU data collection logs to compare the patient arrival time with the scheduled appointment time to determine if this area of the process is a source of delay. The sheets were used to determine the amount of time procedures are taking, which was compared with the amount of time blocked off for the procedure in the scheduling system. This information has helped identify which processes could use improvement and increase the overall patient throughput in the MPU. The data taken from the EWS, which measures the number of procedures performed each month, was used to develop a forecast of the expected number of anesthesia cases for future months. This helped determine if additional anesthesiology teams will be necessary in the future. The team used the data which measures number of procedures per day to determine which day of the week an additional anesthesiology resource would be most beneficial.

**Project Findings and Conclusions**
This section discusses the project findings from the data that was collected, and the conclusions made from these findings.

**Number of GI Procedures Performed in 2008**
The team examined data on the number of anesthesia procedures performed by type and month and determined that this amount increased during 2008. Next, linear regression was used to determine the rate at which the number of cases were increasing. The data showed that the number of cases increased by 4.44 cases each month for 2008. A graph of this information is shown in the following figure, *Figure 1*, with the forcasted line being dashed. The data used for this analysis had a sample size of 429 anesthesia cases out of a total of 9,906 cases overall and was collected in EWS for the calender year of 2008. With this information along with a base point the team next forecasted the increase for 2009. It was found that by December of 2009 the number of cases will be almost twice that of December 2008.
The team also compared the increase in anesthesia cases with the MPU overall case load. The data showed that while the number of anesthesia cases was increasing dramatically, the overall number of MPU cases remained relatively constant. Using three month moving averages, the team found that the percent of cases involving anesthesia had increased from 2.2% for the first three months of 2008 to 6.2% over the last three months of 2008. This statistic signifies a large increase in the number of anesthesia cases within the MPU. The Team found out that this increase in caseload was due to an increased effort by the department of anesthesia to provide the MPU with more resources.

**Number of Anesthesia Cases Performed by Day of the Week**

The team also analyzed the number of anesthesia cases by day of the week. The data used for this analysis had a sample size of 429 anesthesia cases out of a total of 9,906 cases overall. The team used data of all cases performed in the MPU during the calender year of 2008, aggrigated the number of anesthesia cases by the day of the week, and found that some days were busier than others. A graph of this is shown in Figure 2 for all of 2008. The team then compared each quarter and found that the busiest weekdays were consistent throughout the year.

The busiest days were found to be Tuesdays and Friday. The case load was much higher on these particular days than other days of the week. This analysis also does not account for the shortend workdays on Tuesdays and Thursdays. To further investigate this, anesthesia utilization was calculated.
Utilization of Anesthesia Resource
To determine a utilization percent, the case data was counted by the number of procedures per day and then multiplied by the length of the procedure that was done. On some days longer procedures are performed and other days shorter procedures are done. This takes into account for the differences in procedure time. The information about the length of the procedure was provided by the Endoscopy Call Center and was verified by the GI Specialty Procedures Office, it can be seen in Appendix G. Once the total scheduled procedure time was computed it was divided by the total time available that day. This takes into account the shortened workdays on Tuesdays and Thursdays. The data used for this analysis had a sample size of 429 anesthesia cases out of a total of 9,906 cases overall and was collected in EWS for the calendar year of 2008. Data was then split into quarters for 2008 and charted in Figure 3.
Figure 3: Anesthesia Utilization by Quarter and Day

This is the utilization of a single anesthesia team present in the MPU during normal working hours. It confirms what was previously stated, that Tuesdays and Fridays are the busiest days. It also shows that Thursdays are quite busy due to a combination of longer procedures and a shorter workday. The overall trend illustrates that the utilization of the resource has increased, but this could be attributed to the effort by the Department of Anesthesia to provide more teams to the MPU.

Scheduled Patient Appointment Times Versus Patient Arrival Times
A possible source of delay in the patient’s procedure process is caused by arriving to the prep area later than the scheduled appointment time. This delay could be caused by the patient being late to their appointment, or the MPU not being prepared to bring the patient back to the unit as scheduled. Data was collected from the Prep Patient Log sheets, filled out by the MPU nurses for one week in January 2009. A total of 40 appointments were analyzed. Figure 4 shows the delay in minutes, based on the time of day the appointment was scheduled. The chart shows the maximum amount of time delayed is 1 minute and 35 seconds, occuring with appointments scheduled at 11:30 AM. The team believes this is not a significant source of delay for the system.
**Figure 4: Patient Delay by Appointment Time**

**Miscommunication of Anesthesia Team Arrival Time**

The team discovered a misunderstanding between the MPU and the Department of Anesthesiology regarding the time the anesthesia team arrives to prep the patient. In ORMIS, the anesthesia team is scheduled to arrive to the MPU a half an hour before the procedure begins in order to prep the patient, which is also the understanding of the MPU. However, the Department of Anesthesiology understood the time scheduled in ORMIS to be the time at which the procedure begins, meaning the patient should be prepped by then. Figure 5 shows how an appointment is scheduled in the EWS and ORMIS. For example, if a patient is scheduled for a 10:00 AM appointment, the anesthesia team is scheduled to arrive at 9:30. However, in the current system, the anesthesia team believes they are supposed to have the patient prepped and ready to enter the procedure room by 9:30. This is causing the team to arrive earlier than necessary to the MPU, prepare the patient ahead of time, and wait for nearly 30 minutes for the physician to begin the procedure. See the following table, *Table 1*, for a detailed example of these times.

**Figure 5: Scheduling Systems**
Recommendations

The following recommendations are based on the team’s observations and analysis of the MPU.

Eliminate Transport of Patient to the Post Anesthesia Care Unit (PACU) by the CRNA

Patients that have received anesthesia during their procedure require special monitoring during their recovery. These patients are transported to the PACU where a PACU nurse monitors them through Phase 1 and Phase 2 recovery, and a CRNA or anesthesiologist is available in the unit in case of an emergent situation. The team has been informed that if PACU recovery is necessary the CRNA transports the patient to the PACU, has to check the patient in with the PACU staff upon arrival, and then return to the MPU for the next procedure. Knowing that the CRNA is in high demand in the MPU, the team would like to eliminate the travel time required per patient.

Through reports created by the Department of Anesthesia’s Chief Department Administrator, the team has learned that on average the MPU performs 65 cases per month requiring anesthesia. Of these cases, 60%, or 40 cases, require transport to the PACU for Phase 1 recovery. The team has noted that it takes a CRNA approximately 20 minutes (conservative estimate) to transport a patient to the PACU and return back to the MPU. On average, the PACU has two patients per day coming from the MPU which require the Phase 1 recovery. If the transportation time can be eliminated, that would save nearly 13.3 per month (20 minutes x 2 cases x 30 days), resulting in approximately 1.3 additional work days.

The team’s recommendation is to have the patient recover through Phase 1 and Phase 2 in the MPU, and eliminate the trip to the PACU. There are two alternatives to make this a feasible option. First, the MPU could train their current staff for Phase 1 recovery. Second, PACU nurses could work full time in the MPU. The team has been informed that the PACU staff already performs recovery in the Trauma/Burn ICU, the team recommends duplicating this practice in the MPU. The extent of recovery that the PACU nurse performs, Phase 1 and Phase 2 recovery versus only Phase 1 recovery, could be determined by availability. Having Phase 2 recovery

<table>
<thead>
<tr>
<th>Current State</th>
<th>Future State</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient Arrival 9:00</td>
<td>Patient Arrival 9:00</td>
</tr>
<tr>
<td>MPU Prep Starts 9:00</td>
<td>MPU Prep Starts 9:00</td>
</tr>
<tr>
<td>Anes. Prep Starts 9:00</td>
<td>MPU Prep Ends 9:20</td>
</tr>
<tr>
<td>MPU Prep Ends 9:30</td>
<td>Anes. Prep Begins 9:20</td>
</tr>
<tr>
<td>Anes. Prep Ends** 9:30</td>
<td>Anes. Prep Ends 9:45</td>
</tr>
<tr>
<td>Procedure Starts 10:00</td>
<td>Procedure Starts 9:45</td>
</tr>
<tr>
<td>**CRNA Waiting 30 Minutes</td>
<td>*Shortened Prep, No Waiting</td>
</tr>
<tr>
<td>Anes. ORMIS time 9:30</td>
<td>Anes. ORMIS time 9:45</td>
</tr>
</tbody>
</table>

Table 1: Departmental Understandings of Schedule
occur in the MPU will allow the CRNA to move more directly onto their next case, reducing the room and procedure turnover time.

The team is unsure of the financial and medicinal implications of this recommendation, but recognizes the time savings and potential capacity increase by allowing the CRNA to be more focused on procedures, as opposed to transporting patients.

Provide an Additional Anesthesiology Team
As stated earlier in the report, the busiest days of the week for procedures involving anesthesia are consistently Tuesdays and Fridays. After interviewing faculty members from both the MPU, Department of Anesthesiology, and scheduling offices, the team believes providing the MPU with an additional team for both of these days would substantially benefit the unit. Adding an anesthesia team would create openings in the schedule software, allowing the schedulers to reduce the amount of time they spend looking for an available appointment time. An additional team would also increase the throughput of anesthesia cases for the week, which would decrease the patient lead time in two ways: first, the number of days the patient waits between scheduling their appointment and proceeding with their appointment at the MPU, second, the time the patient spends in the prep bay waiting to get into the procedure room. The second team would also increase the availability of anesthesia for use by physicians. The costs of adding an additional team include adjusting the current Department of Anesthesiology staffing schedule, or hiring additional staff members.

Improve Communication
The team recommends that the MPU and Department of Anesthesiology improve their communication by holding scheduled monthly meetings. These meetings should include the heads of each department as well as a rotation of other staff members to ensure a good sampling of viewpoints of issues affecting the unit. During the meetings, the two departments would discuss the utilization of the anesthesia team based on the current demand. This would lead to discussion addressing staffing adjustments regarding the number of anesthesia teams and which days of the week they would be most beneficial to the MPU. The staff would also discuss process issues and improvements seen on the unit. A standing monthly meeting will encourage communication and help resolve any misunderstandings or troubles that have become evident.

Monthly meetings would also be beneficial because of the observed slight disconnect in expectations between the MPU and Department of Anesthesiology. The team has uncovered a slight misunderstanding in the expectations of staff arrival times. This example was discussed in detail in the findings section Miscommunication of Anesthesia Team Arrival Time.

Implement Patient Tracking System – Digital Recording
Another recommendation would be to digitize the patient tracking data around the MPU. A problem the project has faced was the lack of readily available digital information. Instead of having each nurse record on paper when patients move between rooms, or how long different preparation periods take, the team believes a digital tracking system would be beneficial to the
unit. This system would record the time the patient enters a different area of the procedure process (prep, procedure, recovery). This would allow staff to easily access how much time a patient spends in each area and how long it takes them to move through the entire process. In reviewing the MPU from an administrative perspective, seeing these times will allow a quick and efficient focus of attention that will maximize the problem solving time, instead of the data collection time. Recently, there was talk of new systems in the MPU, the team would like to note that any improvement to make these records readily available as well as digital will help in the resolution of future problems.

*Improve Room Layout*

A point of emphasis for a future senior design project should be the space utilization within the procedure rooms in the MPU. A late emerging focus of the team’s recommendations was to station the anesthesia machines in procedure rooms for a day at a time. The team observed that the moving of carts out of the room during changeovers becomes a burden for the staff, whereas if the carts could be in the rooms for an entire day it would save the CRNA’s time in the changeover period. The team noted large, stationary machines that are reasonably immovable, but the numerous small carts and cabinets that are in the rooms that did not appear to be utilized as efficiently as possible. At a glance, it appeared the room layout needed improvement, but due to the time constraints of the project, this recommendation could not be fully developed. The team recommends the layout of the procedure rooms as a focus of a future IOE 481 Senior Design project.

**Action Plan**

The team has decided that the first two recommendations must be implemented together to provide the most beneficial solution to the MPU’s scheduling difficulties. These recommendations will improve the efficiency and patient throughput of the unit. First, the team proposes adding an extra anesthesia team. Initially, the team would like to see this addition to the days which see the greatest utilization of the current anesthesia team, Tuesdays and Fridays, with the possibility of expanding this to every day of the work week depending on the availability of the Department of Anesthesiology staff, the budgetary constraints of the MPU, and the demand for more anesthesia services.

For the second anesthesia team to truly be effective in the proposed way there would need to be a change in the current recovery process of patients. The Team has have been informed by the Chief Nurse Anesthetist that members of the PACU nursing staff already perform recovery in the Burn/Trauma ICU. Therefore, if the MPU could have their own PACU nurse in MPU recovery this would cut out delays in the current process by eliminating the travel time of walking patients down to the PACU from the MPU, allowing the CRNA to move on more quickly to their next case. The PACU nurse’s main responsibility would be to provide for their skill set of Phase 1 recovery; however they could perform any of the other nursing duties (such as Phase 2
recovery) in the unit during down times. An alternative to the PACU staff working in the MPU would be to have the MPU staff be trained and able to perform Phase 1 recovery.

With the PACU (or MPU Phase 1) nurse freeing up the non value added time that the CRNA would spend on patient transportation, our team believes that only one more anesthesia team would be needed to improve the efficiency and patient throughput of the MPU. The first CRNA would do their prep then move their patient into the procedure room. While the first CRNA is in procedure the second CRNA would begin their prep. When the first CRNA has moved their patient into recovery, the PACU nurse would attend to that patient while the CRNA could start their next patient’s prep while still being close by to attend to their recovering patient if the PACU nurse needs assistance. While this is going on, the second CRNA would be in the procedure room (hopefully the same room the first procedure was being done so that anesthesia equipment and carts would not have to be moved). The two CRNAs would continue to “leap frog” each other throughout the day so that essentially there would always be one CRNA in procedure while the other attends to prep and recovery. This strategy would also be optimal for the scheduling of anesthesia appointments procedures. It would allow the procedures to be scheduled one after another, not having to incorporate preparation and recovery times except for the first and last procedures of the day.

If the demand for anesthesia appointments is still increasing, even after a second team has been added to the unit, the team has proposed a possible three team breakdown. This breakdown would again have Phase 1 recovery in the MPU, would have two teams in procedure rooms, and a third team would be assigned to patient preparation and recovery throughout the day.

These scenarios are displayed graphically below in Figure 6: Possible Work Breakdown Scenarios.

Example current work breakdown with 1 anesthesia team

Proposed 2 team solution with phase 1 recovery in MPU

Possible 3 team breakdown with phase 1 recovery in MPU

Figure 6: Possible Work Breakdown Scenarios
Expected Impact

The implementation of the team’s recommendations will result in:

- Decreased room turnover time
- Optimization of the Anesthesiology resource
- Documented procedure for scheduling patients through the Endoscopy Call Center
- Decreased patient lead time (days before appointment & time spent in preparation)
- Improved communication between MPU and Department of Anesthesia
- Improved access to patient tracking data

Additional outcomes as a result of direct improvements will include:

- Reduced number of overtime hours for the hospital staff within the MPU
- Improved patient satisfaction through increased throughput and shorter lead time

Support Received From Operating Entities

The Nurse Manager of the MPU, Fran Schultz, worked as the main contact of with the project team and hospital staff to maintain cooperation and provide the team with background information, requested data, contact information, and advice for expectations of the project.

The Project Coordinator, Tammy Ellies, provided guidance for the project. She advised the team on many aspects involved in the project, including meetings with the client, data collection and analyses, and writing the report. She has helped the team develop relationships with the hospital staff involved in the project.

The team also received insight and valuable information from additional hospital departments including the Department of Anesthesiology, the Medical Procedures Unit, Division of Gastroenterology, and the GI Specialty Procedures Office.
APPENDIX A: MPU Prep Patient Log

MEDICAL PROCEDURES UNIT
PREP PATIENT LOG

<table>
<thead>
<tr>
<th>Date</th>
<th>Prep Time</th>
<th>Appr Time</th>
<th>Patient Last Name</th>
<th>IP/OP</th>
<th>Prep Bay#</th>
<th>Procedure</th>
<th>MD or Service</th>
<th>Ready</th>
<th>Notes</th>
<th>Proc Room</th>
<th>Time Taken to Proc RM</th>
<th>Prep by</th>
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Recovery Patients in PREP

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<th>Patient Last Name</th>
<th>Prep Bay #</th>
<th>Procedure</th>
<th>Times for VS/Notes</th>
<th>D/C Time</th>
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Revised: 3/27/2009
APPENDIX B: MPU Patient Procedure Log

<table>
<thead>
<tr>
<th>Date</th>
<th>Patient's Last Name</th>
<th>Procedure</th>
<th>MD</th>
<th>Patient In Room</th>
<th>Scope In</th>
<th>Scope Out</th>
<th>Patient Out of Room</th>
<th>Botulinum Units</th>
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**INITIAL KEY:**

Nurse Signature

Nurse Signature

Nurse Signature

Nurse Signature
APPENDIX C: MPU Patient Flow for Cases Involving Department of Anesthesiology

MPU Patient Flow for Cases Involving Department of Anesthesiology

Patient
- Arrives at MPU Waiting Room
- Move to Prep Bay
- Waits for Lab Work
- Moved to Procedure Room by CRNA
- Undergo procedure
- Moves to MPU Recovery
- Patient Leaves

Office Staff
- Verify Appt., Print & Print Amtel Ticket
- Prep Area, Verify Appt., Place Amtel Ticket on Board
- Match Amtel Ticket to Patient, Physician & Prep Bay
- Wait For Available Prep Bay
- Move Patient To Prep Bay, Page CRNA, Start Patient Prep
- Gets Labs
- No
- Look Up Labs & Place on Chart
- Yes
- Perform Procedure
- No
- Attend to Patient Recovery in MPU
- Yes
- CRNA Performs Patient Assessment and Physical
- Ready to undergo procedure?
- No
- Labs OK?
- Yes
- Move Patient to Procedure Room
- Cancel Procedure
- Patient PACU Recovery Needed?
- Yes
- Move Patient to PACU
- Return To MPU
- No
- Perform Procedure
- Start Next Procedure
- Perform Procedure
- Moves to PACU Recovery
Guidelines for Scheduling Appointments

Involving Anesthesia

I. Scheduling of Appointments
   a. Step 1 – Print off the requests. Requests for scheduling of an appointment can come through the following ways:
      i. MPU-Schedule in GroupWise
      ii. CareWeb under MPU-Schedule and MPU-ECC
      iii. Occasionally via phone request
         1. Note: When requests come through by phone, normally by the physician, ask them to please e-mail the request through MPU-Schedule in GroupWise. This way you will not only have documentation of the request but you will also be able to verify that you have all the required information to add it to the schedule.

   b. Step 2 – Review requests for appointments and prioritize them by how soon they need to be added to the schedule.
      i. Work on scheduling the most urgent cases first.
      ii. Check GroupWise and CareWeb occasionally throughout the day for any other urgent scheduling requests.

   c. Step 3 – Complete the “Anesthesia Scheduling Form.”

   d. Step 4 – Check EWS & ORMIS for availability of physicians and anesthesia on the current schedule.
      i. If any questions arise about the request, helpful contact phone numbers for the department of anesthesia are as follows:
         1. Tina Burse-Houston 6-8521
         2. Peggy 7-7447
         3. Cindy 6-8508
         4. Anesthesia Front Desk 6-8470
         5. Pre-Anesthesia Clinic @ Domino Farms 6-3604 (RN’s to schedule if needed)

   e. Step 5 – Schedule accordingly.
APPENDIX D: Anesthesia Scheduling Guidelines

i. In EWS:
   1. Schedule the ANES appointment for the procedure first, one hour before the actual MPU appointment.

ii. In ORMIS:
   1. Schedule the appointment for anesthesia 30 minutes after the ANES appointment that was scheduled in EWS and 30 minutes before the MPU appointment.

iii. Exception: If you are scheduling the first case of the day, then schedule the ANES appointment at 7:00 a.m. with the ORMIS anesthesia appointment at 7:30 a.m. as well.

iv. Try to keep procedures which require anesthesia scheduled back-to-back and in the same procedure room if at all possible.

v. The cases scheduled must fit within the anesthesia hours of operation: M, W, F, 7:30 am - 5:30 pm, and T, Th 8:00 am - 5:30 pm.

vi. The last anesthesia case should be scheduled to start prior to 3:30 pm and guarantee completion by 5:00 p.m.

f. **Step 6** – Call patient to notify them of their appointment date and time.

g. **Step 7** – Notify the physician who requested the scheduling of the appointment either by GroupWise or CareWeb.
   i. If you use GroupWise make sure that you select “reply to all with comments”

h. **Step 8** – Print and compile all documentation of the appointment, staple this all together and then place it in the binder of scheduled appointments for reference.

II. Canceling Appointments

a. A cancel can come through either GroupWise or a phone call.

b. Go into EWS, find the appointment and cancel it.

c. If the cancellation is for the next day and it came through *before* 11 a.m., then go into ORMIS and cancel the appointment.

d. If the cancellation is for the next day and it came through *after* 11 a.m., then call Anesthesia Scheduling to cancel the appointment.

e. Make sure to note why the patient is canceling in both EWS and ORMIS for tracking purposes.
III. Rescheduling of Appointments
   a. Reschedules usually come through GroupWise.
   b. Find the existing appointment in EWS and note who the appointment is with.
   c. Do not remove the appointment from the schedule; look for the next available opening in both EWS and ORMIS.
   d. Once you find an opening in the schedule contact the patient and let them know of the new possible date and time.
   e. If the time you found works for the patient then schedule the new appointment time in EWS and ORMIS; also remove the old appointment time off the current schedule. Make any notes that you can in EWS and ORMIS for tracking purposes.
   f. Update the “Anesthesia Scheduling Form” for the appointment located in the scheduled appointments binder. If the appointment was originally scheduled elsewhere complete an “Anesthesia Scheduling Form,” attach the patient’s reschedule request, and place these all in the binder.
ANESTHESIA SCHEDULING FORM

GA CASE #: ___________

SURGERY DATE: ___________

REG #: _______________ VISIT #: _______________

PATIENT’S NAME: ____________________________________________________________

SURGICAL PROCEDURE: ______________________________________________________

DIAGNOSIS: _______________________________________________________________

ARRIVAL TIME: __________ ORMIS TIME: __________ SURGERY TIME: __________

LENGTH STAY: ____________________________________________________________

ANESTHESIA: CHOICE

SPECIAL COMMENTS (MED HX, LATEX ALLERGIES, SPEC REQ/CONCERNS):

________________________________________________________________________

________________________________________________________________________

Completed by: ___________________ Completed date: ___________________

Attending & Pager #: _________________

PATIENT NOTIFIED BY PHONE: ___

APPT NOTICE SENT VIA MAIL: ___

RESPONSE TO REQUESTER:

Updated 1/13/09 - S.S.
APPENDIX F: Case Breakdown by Type of Procedure

Case Breakdown by Types of Procedures
CY 2008

![Case Breakdown by Types of Procedures CY 2008](chart.png)
## APPENDIX G: GA Procedure Times

### GA Procedures.xls

#### Special MPU Procedures

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<th>Procedure</th>
<th>Elta</th>
<th>Warmsteker</th>
<th>Scheiman</th>
<th>Piraka</th>
<th>Kwon</th>
<th>Anderson</th>
<th>Fisher</th>
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#### Special MPU Procedures w/ General Anesthesia

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MGI-DBECOL: Double Balloon Endoscopy - Colon  
MGI-DBEEDG: Double Balloon Endoscopy - EGD  
EUS-EGD: EGD with EUS  
EUS-FNA: EUS with Fine Needle Aspiration  
EUS-EMR: EUS with Endoscopic Mucosal Resection  
EUS-FNAEMR: EUS with Fine Needle Aspiration & Endoscopic Mucosal Resection  
EUS-ERCP: EUS with ERCP  
MGI-EMR: Endoscopic Mucosal Resection  
MGI-ERCP: ERCP  

GA-DBECOL: Double Balloon Endoscopy - Colon with General Anesthesia  
GA-DBEEDG: Double Balloon Endoscopy - EGD with General Anesthesia  
GA-EUS-EGD: EGD with EUS with General Anesthesia  
GA-EUS-FNA: EUS with Fine Needle Aspiration with General Anesthesia  
GA-EUS-EMR: EUS with Endoscopic Mucosal Resection w/ General Anesthesia  
GA-EUS-F&E: EUS w/ FNA & EMR w/ General Anesthesia  
GA-EUS-ERCP: EUS with ERCP with General Anesthesia  
GA-MGI/EMR: Endoscopic Mucosal Resection with General Anesthesia  
GA-ERCP: ERCP with General Anesthesia