University of Michigan Health System Nursing Department
Programs and Operations Analysis Department

Outpatient Infusion Services Authorization Analysis
And Process Improvement
Final Report

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Executive Summary

The Nursing Department at the University of Michigan Hospitals and Health Centers holds budget for some of the outpatient infusion units which include the Transplant Ambulatory Care Unit (TACU), 7 Mott, and 8 A. Currently, TACU and 7 Mott do not have a pre-authorization process for outpatient infusions and are experiencing write-offs due to this.

The purpose of this project was to identify monetary losses because a pre-authorization process does not exist; provide recommendations to implement a new pre-authorization process to reduce write-offs; identify the bottlenecks, potential efficiencies, and safety issues with the infusion process at TACU; and provide recommendations to fix these problems.

Pre-authorization write-off data for TACU was estimated by comparing January to July 2003 scheduling with the TSI billing data. Patients who were treated as an outpatient at TACU, but not shown on the TSI billing data were assumed to be not billed for their treatment. The write-offs for 7 Mott were computed by comparing separate patient visits recorded by Gretel Quitmeyer (nurse manager at 7 Mott) from January through June of FY03 to TSI billing data during the same period. By comparing aggregate values of patients treated at 7 Mott and those on the TSI billing data, patients who were not pre-authorized were identified.

Recommendations to implement a new pre-authorization system were based on the current pre-authorization process at the UMHS Cancer Center, volumes of the three infusion units, and available FTEs. Timings for each step of the process (performed by one staff member) were used to estimate the cost and workload projected for a new process at TACU and 7 Mott.

TACU bottlenecks, potential efficiencies, and safety issues were found during a period of 40 hours of observation at TACU and interviews with two nurses and one medical assistant.

The data collected showed the following:
- TACU wrote off an estimated $100,233 and 7 Mott wrote off $1,135.80 of revenue from January to July 2003 because there was no pre-authorization process in place.
- Based on the analysis of TSI data, 25.41% (TACU) and 25% (7 Mott) of the patient population’s insurance companies require pre-authorization to receive treatment.
- Bottlenecks in the infusion process are caused by patients waiting for lab results, the IV team, and medications.
- Other problems such as: nurse and medical assistant downtime, parking issues, IV pumps problems, safety issues, and patient turndown; all contribute to patient dissatisfaction or infusion process potential efficiencies.
After analyzing several possible solutions we recommend the following solutions for problems with the lack of a pre-authorization procedure and infusion process potential efficiencies:

- As a temporary solution, train the medical assistant at TACU to perform pre-authorizations for TACU and 7 Mott using the same pre-authorization procedure from the Cancer Center. As a permanent solution, consolidate all the outpatient infusion units and perform pre-authorizations for these units by an individual(s) in that consolidated unit.

- Eliminate the IV team and further train nurses to insert IVs for patients; create an online system where signatures for lab results can be acquired; confirm patient arrival by calling him or her the day before the appointment so medications can be ordered in advance.

- Consolidate all outpatient infusion units into one unit which has the resources to handle demand for the three units, TACU, 7 Mott, and 8 A (as a long term solution).
Introduction

The University of Michigan Health System’s Nursing Department currently has no hospital wide process for pre-authorizing UMHS outpatient infusions for insurance payments. Patients are being billed for services that should have been covered by their insurance companies but were not because of a lack of a pre-authorization procedure. Therefore, when neither the patient nor the insurance company pays for the procedure, the hospital incurs the loss. The Nursing Department is looking to solve this problem by implementing a pre-authorization procedure.

In addition, the Nursing Department is trying to improve the efficiency of the outpatient infusion procedure at TACU. Currently, an average of 4-5 patients are seen each day at the facility which is open 7 am-7 pm on weekdays and 7am-2 pm on weekends. TACU (Transplant Ambulatory Care Unit) is budgeted for 2.4 full-time-equivalent (FTE) registered nurses (RN) and a 1.4 FTE medical assistant (MA). TACU currently staffs one nurse and one medical assistant.

The purpose of this project was to provide recommendations to management to increase insurance reimbursements for outpatient infusions by conducting a series of studies on the tasks required for pre-authorization. This report also presents a plan to analyze the infusion process at TACU. After observing the current infusion process at TACU and identifying bottlenecks, safety issues, and other potential efficiencies, we are providing recommendations for these problems.

Goals and Objectives

Through our analysis, we plan to recommended system and process improvement that will achieve the following goals:

- Decrease the number of outpatient insurance authorization write-offs through recommending plans on implementing pre-authorization procedures
- Estimate the number of outpatient infusions that are not pre-authorized
- Estimate financial implications because of the lack of a pre-authorization procedure
- Analyze several pre-authorization procedures that could be implemented at TACU and 7 Mott
- Suggest new ways to implement a pre-authorization process at TACU and 7 Mott
- Provide recommendations for staff scheduling for pre-authorization and the actual infusion process to accommodate the forecasted demand at TACU
- Determine costs associated, if any, with hiring additional qualified staff for pre-authorization at the Cancer Center or at TACU and 7 Mott
- Increase patient satisfaction by reducing financial obligations and wait times for infusions
- Study the current procedure for infusions at TACU
- Reduce bottlenecks and potential efficiencies in the infusion process at TACU
- Eliminate safety issues in the infusion procedure at TACU
• Consider possible consolidation of the three infusion units: TACU, 8 A, and 7 Mott

Background

The Nursing Department performs about 2,000 infusions per year within the three areas and each infusion generates an average charge of about $2,500 according to TSI billing data from January through June 2003. Several insurance companies require hospitals to call for pre-authorization for infusions. If the hospital neglects to contact the insurance company, the patient is obligated to cover the payment because he or she signs a Consent for Treatment Form. By signing the consent form, the patient agrees to be financially responsible for all treatments not covered by the insurance company. If the patient fails to pay for the infusion services, the charges are taken out of the Nursing Department’s budget.

We found that a pre-authorization process does not exist for outpatient infusions in two units analyzed, TACU and 7 Mott. Hence, the Nursing Department was not being reimbursed by insurance providers from January 1, 2003 through June 30, 2003 (the period we studied) and therefore recognizes the urgency for implementing a pre-authorization procedure. However, the current staff members are not fully trained to complete the pre-authorization process.

TACU does not have a standard infusion process but there are general steps which occur during the infusion process. Before the infusion process begins, the nurse or medical assistant checks vitals, evaluates lab results, obtains medications, and calls for the IV insertion team. The IV team attempts to respond within one hour of TACU’s requests. In addition, some medications cannot be ordered prior to the patient’s arrival because they can be very expensive and must be used within a few hours once mixed. During this process, patients may experience significant wait times before their infusion begins.

Key Issues:

A need for implementing a pre-authorization process and analyzing the current infusion process concerns the following issues:

• Desire to appropriately receive reimbursement from insurance companies and patients
• Patient demand for infusions vs. available staffing
• Losses incurred by the nursing department due to lack of pre-authorization
• Efficiency of infusion process at TACU
• Waiting times for an infusion to begin at TACU

This project focused on the actual infusion processes occurring in TACU, the flow of patients through the infusion process, and the staffing required for pre-authorization processes. We did not study the infusion processes at other locations in the health...
system. However, we did look into the Cancer Center’s pre-authorization processes hoping that our findings will benefit TACU and 7 Mott.

**Approach and Methodology**

This project was conducted in three stages: data collection, data analysis, and recommendations. During data collection we interviewed individuals involved in the pre-authorization, billing, and outpatient infusion process at three locations.

We collected information regarding the following:

- Patient Appointment Information from the Enterprise Wide Scheduling System (January through June 2003)
- TSI billing data for TACU (January through June 2003) and 7 Mott (July 2002 to July 2003); data includes dates of treatment, procedure, amount charged, estimated net revenue, and insurance company
- Gretel Quitmeyer’s separate patient visits for 7 Mott
- Training required for pre-authorization staff
- Timings for each step of the Cancer Center’s pre-authorization process performed by their primary pre-authorization staff member
- Registration and billing forms used by each unit
- Timings for each step of the infusion at TACU for patients
- Staffing schedules and available Full Time Equivalents (FTEs) per unit

We collected and computed the following data from the interviews and information explained above:

- Estimated loss incurred by the Nursing Department due to a lack of pre-authorization
- Estimated percent of patient population receiving pre-authorizations
- Estimated percent of patient population in need of pre-authorizations
- Average time to perform a pre-authorization at the Cancer Center
- Flowchart the pre-authorization process at the Cancer Center
- Flowchart of infusion process at TACU
- Observed staff downtimes at TACU
- The average wait times during major infusion process steps at TACU
- Safety issues at TACU

Using the computed data, the following questions were answered:

- Can current staffing and scheduling handle the demand for pre-authorizations?
- Can current staff be trained to handle pre-authorizations or is additional staff needed?
- Where should pre-authorizations be handled?
• If a pre-authorization procedure is necessary, should the same procedure at the Cancer Center be implemented at the outpatient infusion centers? What changes should be made?
• What can be done to improve the infusion process given the observed potential efficiencies or bottlenecks in the current infusion process?

Findings and Conclusions

The infusion process at TACU was flowcharted for a period of forty hours of observation. Separate flowcharts from the perspective of the patient, nurse, and medical assistant were developed to detect downtimes (see appendices A, B, and C). The flowchart from the viewpoint of the patient shows significant delays when waiting for lab results, the IV team, and medications to arrive (see appendix A). In addition, there is a questionable delay in waiting for pump setup. These issues have been studied and discussed with the infusion center staff in order to determine the cause of the delays and to suggest solutions.

Wait Times Caused by Delays in IV Team Arrival, Medication Arrival, and Lab Result Arrival at TACU

Patients spend an average time of 38.7 minutes with a standard deviation of 10 minutes waiting for their infusion to begin (total wait times collected for 12 patients collected over 40 hours). This includes all prior set up which is required before the infusion can begin: IV team arrival, IV insertion, medication arrival, lab result arrival, and pump start up (see appendices D and E).

A TACU patient spends an average time of 29 minutes with a standard deviation of 6 minutes waiting for the IV team to insert an IV (IV wait time for eight patients collected over 80 hours by TACU staff). Occasionally, patients end up waiting more than an hour. In one observed case, a patient waited 1 hour and 15 minutes (7:40 am – 8:55 am) for the IV team to arrive. In another example, a patient waited for 1 hour and 18 minutes (3:20 pm – 4:38 pm) for the IV team to arrive. Because of the various health problems of transplant patients, IV insertion requires trained and experienced hospital staff. Although the IV team guarantees service within an hour and gives priority to TACU, there may be ways to speed up the wait time.

TACU patients spend an average time of 24 minutes with a standard deviation of 5 minutes waiting for medication to arrive (medication arrival wait time for eight patients collected over 80 hours by TACU staff). This is partly due to waiting for the referring physician to sign the order. Once the order is signed, it is sent to the pharmacy then brought back by TACU staff. Some medications cannot always be ordered well in advance because they are expensive, have short shelf lives, and depend on the results of the lab reports. However, some medications can be ordered in advance if they are relatively inexpensive with a long shelf life.
**Problems with IV Pumps at TACU**

On some occasions we observed that a nurse had to turn the pumps on and off multiple times before an infusion could be completed successfully. Since TACU’s staff has been using the pumps for only a few months, certain error messages take a significant amount of time to decipher and solve. The new pumps need to be used because they are more precise than the older model and hence are safer and more effective for patients.

**Patient Turn Down at TACU**

Based on our client’s observation, patients are being turned down. Observational data was taken by TACU staff for 80 hours recording patient turndowns (see appendix F), but during that time period, no patients were turned down. However, through interviews with staff, we learned that TACU and 8 A have informal patient turndown criteria. For example, 8 A has an informal rule which states that those patients who are 80 years of age and above and/or mentally handicapped are not allowed to receive treatment. In addition, 8 A staff claimed that there were times when the facility was full to capacity and patients either had to wait in order to receive their infusions or were turned down.

**Patient Volume and Charges at TACU**

According to the Enterprise Wide Scheduling (EWS) data, from January 1, 2003 through September 3, 2003, an average of 4.4 patients per day received treatment at TACU on weekdays and 2.8 patients per day on weekends.

The number of patients scheduled for weekends and weekdays were found from FY03 EWS data for TACU. All patients on the EWS system were scheduled and arrived at TACU to receive treatment. Average numbers for revenue and charges generated at TACU were calculated from available billing data. From the billing data, we used total charges instead of departmental charges to find average charges per day (from observations total charges were equal to departmental charges). Considering that the billing data only reflected those patients who were pre-authorized, the average revenue and charges for TACU will appear lower than true averages (considering many patients were not pre-authorized). Finally, total charges and revenues reflect all procedures done at TACU, not just outpatient infusions. This was done for considerations of nurse and MA workloads.

The average revenue and charges were calculated (from available billing data: March 1, 2002- June 30,2003) assuming the average salaries of the nurse and MA of $30 per hour and $12 per hour respectively, the MA working only on weekdays, and the hours of the nurse and MA (see Table 1):
Table 1: TACU Revenue & Charges by Time of Week

<table>
<thead>
<tr>
<th></th>
<th>Weekday</th>
<th>Weekend</th>
</tr>
</thead>
<tbody>
<tr>
<td>Charges/Day</td>
<td>$13754</td>
<td>$8748</td>
</tr>
<tr>
<td>Revenue/Day</td>
<td>$8052</td>
<td>$5121</td>
</tr>
<tr>
<td>Staff Cost/Day</td>
<td>$504</td>
<td>$210</td>
</tr>
</tbody>
</table>

The average charge per patient, considering all treatments done at TACU (not just outpatient infusions), was $3,118 per day.
The average revenue per patient, considering all treatments done at TACU (not just outpatient infusions), was $1,825.4 per day.
Average revenues and charges were calculated by multiplying average charge per patient by average number of patients per day.

Daily weekend revenue is only 64% of daily weekday revenue. Taking into consideration that TACU is open for 12 hours on weekdays and 7 hours on weekends, the average revenue per hour for weekdays is $671.00 and the average revenue per hour for weekends is $732.00 approximately. In addition, the average charge per hour for weekdays is $1,146.00 and the average charge per hour for weekends is $1,249.00 approximately. Because the two numbers are comparable, TACU could benefit through additional open hours on weekends. The current limited weekend hours may discourage patients from receiving treatment on weekends, so greater open hours could potentially bring in more revenue. To estimate the increased amount of revenue on weekends for longer open hours, further analysis including surveys would be needed.

Additional Observed Problems with the Infusion Process at TACU

- Patients sometimes arrive before their scheduled appointment times. Hence, pumps are not set up and medications are not yet prepared and/or ordered when patients come.
- Many patients arrive late due to difficulty in finding a parking space
- The nurse and medical assistant experience idle times when there are delays in the infusion process (see appendices B and C)
- TACU lacks adequate space to store files, so staff must often reorganize to work around this problem.

Safety Issues at TACU

The primary concern of the hospital is the safety of the patients and employees. The following are a few issues that that can be resolved:

- Facilities staff cleans TACU during operating hours which is inconvenient and dangerous for TACU staff and patients. Staff and patients have to work around the janitor while he/she mops the floor. In addition, the wet floor becomes a safety issue where staff and sick patients can slip and fall and potentially hurt themselves.
• The light switch panel on the back wall is located right above the bed. This means the staff has to reach over the bed to operate the lights, which can be a safety concern for the patient in the bed.
• The lower panel on the back wall holds medical instruments that clip on. The rolling bed is at the same level as the instruments, so it hits the instruments and can cause breakage.

Nursing Department’s Loss of Revenue

An estimate of the lost revenue due to lack of pre-authorization at TACU was found by comparing the EWS scheduling data with the TSI billing data from January through June of 2003. The EWS data contained patient CPI number, date of service, and procedure for each patient appointment. The TSI data included CPI number, date, charge, net revenue, inpatient/outpatient status, and insurance company. Although TACU performs many treatments besides infusions, only outpatient infusion data was used in this analysis.

Using Microsoft Access, the EWS data was linked to the TSI data through patient CPI number and date of service. An update query was used to find the charge and net revenue for each patient on the EWS table. The 63 patients of the total 525 patients (from January through June 2003) that did not have a corresponding charge record in the TSI billing data, were assumed to have not been charged due to lack of pre-authorization. Since the actual infusion charge for those 63 patients (not on the TSI data) was unknown, the average charge and revenue of included procedures from the TSI data were used for calculations.

To find the loss of revenue due to lack of pre-authorization at 7 Mott, the total number of separate patient visits recorded by Gretel Quitmeyer (nurse manager at 7 Mott) from January through June of FY03 were compared to the total number of patients who showed up on the TSI billing data during the same period. Because 7 Mott data did not include patient CPI numbers, the TACU write-off method could not be used. 44 separate billings appeared on the TSI billing data while 47 separate patient visits were found on 7 Mott's data. Multiplying the average charge for an outpatient infusion at 7 Mott during FY03 ($378.60) times three (number of 7 Mott patient visits not on TSI data) shows an estimated $1,135.80 in lost charges.

TACU and 7 Mott wrote off an estimated $100,233 and $1,135.80 of revenue respectively, (from January 2003 through June 2003) because there is no pre-authorization process in place. Based on EWS and billing data, these numbers were computed assuming that the charge for an infusion procedure at TACU is $2,677, revenue is $1,591, and the average charge for an infusion at 7 Mott is $378.60. This directly affects the nursing department, which holds the budget for both TACU and 7 Mott.

To implement an optimal pre-authorization process for TACU and 7 Mott, we analyzed the Cancer Center’s pre-authorization process. Their process is split into five steps (see Appendix G and H). (1) The charge forms from each unit are collected and given to staff
members at the Cancer Center. (2) The staff at the Cancer Center take out the forms that do not need pre-authorization and then sorts those forms by insurance carriers. (3) They check for referrals for those patients that do need pre-authorization. (4) If there are no referrals in place; they have to obtain referrals (usually done by contacting the referring clinic or on the computer). (5) The staff finally calls the insurance company to obtain the actual pre-authorization. The Cancer Center employs 2.4 FTEs to perform the pre-authorizations. Observation of the current pre-authorization process at the UMHS Cancer Center showed the following times for each pre-authorization step using a sample size of 363 patients:

Table 2: Average Times during Each Step to Perform Pre-Authorization

<table>
<thead>
<tr>
<th>Step</th>
<th>Total Time (min)</th>
<th># patients</th>
<th>time/patient (min/patient)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taking out forms of patients that don't need pre-authorization</td>
<td>40.00</td>
<td>363</td>
<td>0.11</td>
</tr>
<tr>
<td>Sorting through the previous stack by insurance carriers</td>
<td>60.00</td>
<td>38</td>
<td>1.58</td>
</tr>
<tr>
<td>Checking for referrals for those patients</td>
<td>85.00</td>
<td>162</td>
<td>0.52</td>
</tr>
<tr>
<td>Correcting referrals</td>
<td>223.00</td>
<td>70</td>
<td>3.19</td>
</tr>
<tr>
<td>Pre-authorizing</td>
<td>86.00</td>
<td>15</td>
<td>5.73</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>494.00</strong></td>
<td><strong>11.13</strong></td>
<td></td>
</tr>
</tbody>
</table>

As seen in Table 2, on average it takes about 11.13 minutes with a standard deviation of 2.97 minutes to pre-authorize a patient.

Figures 1 and 2 show the insurance payer mix which was obtained from TSI billing data. The figures show that 25.41% (TACU) and 25% (7 Mott) of the patient population require pre-authorizations.
**Figure 1: TACU Payer Mix**

*Note: From TSI billing data (1,267 patients)*

**Figure 2: 7 Mott Payer Mix**

*Note: From TSI billing data (44 patients)*
Based on the number of patients that arrive per day and the percentage of these patients that require pre-authorization, we calculated the number of patients for FY03 that required pre-authorizations. For example: 3.95 patients per day * 365 days per year * 25.41% = 366 patients per year.

Table 3 shows population data for TACU and 7 Mott. TACU and 7 Mott infuse 366 and 19 patients in FY03 who need pre-authorizations respectively.

Table 3: Patient Data for TACU and 7 Mott

<table>
<thead>
<tr>
<th></th>
<th>TACU</th>
<th>7 Mott</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average # of patients per day that arrive for infusions for FY03</td>
<td>3.95</td>
<td>.21</td>
</tr>
<tr>
<td>Percent of population that require pre-authorization for FY03</td>
<td>25.41%</td>
<td>25.00%</td>
</tr>
<tr>
<td>Average # of patients that require pre-authorization for FY03</td>
<td>366</td>
<td>19</td>
</tr>
</tbody>
</table>

Since we know the average the time to perform a pre-authorization (Table 2) and the number of patients that require pre-authorization for FY03 (Table 3), by multiplying these two numbers, we get the total time to perform a pre-authorization for TACU (Table 4) and 7 Mott (Table 5).
Table 4: Average Time it takes to perform Pre-Authorization at TACU

<table>
<thead>
<tr>
<th>TACU</th>
<th>Pre-Authorize Minutes/Patient</th>
<th>FY03 Patients that need pre-authorization</th>
<th>Minutes to pre-authorize FY03 Patients</th>
<th>Hours per month to pre-authorize FY03 Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taking out forms of patients that don’t need pre-authorization</td>
<td>0.110</td>
<td>366</td>
<td>40.331</td>
<td>0.056</td>
</tr>
<tr>
<td>Sorting through the previous stack by insurance carriers</td>
<td>1.579</td>
<td>366</td>
<td>577.895</td>
<td>0.803</td>
</tr>
<tr>
<td>Checking for referrals for those patients</td>
<td>0.525</td>
<td>366</td>
<td>192.037</td>
<td>0.267</td>
</tr>
<tr>
<td>Correcting referrals</td>
<td>3.186</td>
<td>366</td>
<td>1165.971</td>
<td>1.619</td>
</tr>
<tr>
<td>Pre-authorizing</td>
<td>5.733</td>
<td>366</td>
<td>2098.400</td>
<td>2.914</td>
</tr>
<tr>
<td>Total</td>
<td>11.133</td>
<td>366</td>
<td>4074.634</td>
<td>5.569</td>
</tr>
</tbody>
</table>
Table 5: Average Time it takes to perform Pre-Authorization at 7 Mott

<table>
<thead>
<tr>
<th>7 Mott</th>
<th>Pre-Authorize Minutes/Patient</th>
<th>FY03 Patients that need pre-authorization</th>
<th>Minutes to pre-authorize FY03 Patients</th>
<th>Hours per month to pre-authorize FY03 Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taking out forms of patients that don’t need pre-authorization</td>
<td>0.110</td>
<td>19</td>
<td>2.094</td>
<td>0.003</td>
</tr>
<tr>
<td>Sorting through the previous stack by insurance carriers</td>
<td>1.579</td>
<td>19</td>
<td>30.000</td>
<td>0.042</td>
</tr>
<tr>
<td>Checking for referrals for those patients</td>
<td>0.525</td>
<td>19</td>
<td>9.969</td>
<td>0.014</td>
</tr>
<tr>
<td>Correcting referrals</td>
<td>3.186</td>
<td>19</td>
<td>60.529</td>
<td>0.084</td>
</tr>
<tr>
<td>Pre-authorizing</td>
<td>5.733</td>
<td>19</td>
<td>108.933</td>
<td>0.151</td>
</tr>
<tr>
<td>Total</td>
<td>11.133</td>
<td>211.525</td>
<td></td>
<td>0.294</td>
</tr>
</tbody>
</table>

Given that an average of 385 patients need pre-authorization at TACU and 7 Mott, it would take 5.95 hrs per month to do the pre-authorization, assuming the process is the same as the Cancer Center’s.

Alternatives and Hypotheses

Recommendations were based on the analysis of the options explained below:

**Options for Pre-Authorization**

- Either fund the Cancer Center to perform pre-authorizations for TACU and 7 Mott or implement a procedure similar to the Cancer Center’s at 7 Mott and TACU by hiring additional staff
- Allow the medical assistant at TACU to perform pre-authorizations for TACU and 7 Mott after receiving adequate training
- Consolidate all the outpatient infusion units throughout the hospital and hire clerks for this consolidated unit to perform pre-authorizations

**Options to Improve the Infusion Process at TACU**

- Discontinue use of the IV team and further train the nurse at TACU to feel comfortable with inserting IVs for patients
• Provide IV team with patient schedules a day in advance so arrival times can be appropriately planned
• Call patients ahead of time (the day before their procedure) to determine whether they are coming so medications can be ordered prior to their arrival

Options to Improve Safety at TACU

• Allow the janitor to mop the floors either early in the morning (before TACU opens) or after TACU closes and not during uptimes
• Change around the setup of the room where the rolling bed is not located under the light switch panel and the lower panel on the back wall which has medical instruments clipped onto it

Recommendations

After identifying the opportunities for improvement and analyzing the possible options we recommend the following:

Improving IV Team Delays at TACU

TACU can improve IV team delays by giving the IV team the patient schedule a day in advance so arrival times can be appropriately planned. Another possibility is to further train the nurses to insert the IVs. The nurses have had preliminary IV training, but may feel uncomfortable with inserting IVs in weak patients. Improper IV insertion and limited training may lead to increased discomfort of the patient. If all the infusion units are consolidated to one unit, the entire unit should have one FTE allocated for IV insertion or have the IV nurses insert the IV into the patient.

Improving Medication Delays at TACU

The hospital staff currently has a system to confirm the arrival of certain patients, but a standard confirmation procedure should be in place for all patients. Therefore, the medical assistant at TACU should call the patient to confirm that he or she is coming for his or her appointment the day before the appointment to order medications ahead of time. The time and cost limitations of the various medications allow for only small improvement in the medication ordering bottleneck. Delays could be shortened by implementing an online system for recording doctors’ signatures which eliminates wait time for doctors to sign orders.

Improving Lab Result Delays at TACU

The lab result system is out of the scope of this project, but a more consistent batching procedure should be developed to operate on a first come first serve basis.
Improving IV Pumps at TACU

Because the pumps cannot be physically improved, TACU staff will have to get accustomed to using the pumps with time and experience. Until then, medical staff and instruction books are available for help if problems arise.

Reducing Patient Turndown at TACU

Standardization criteria for patient refusals should be required and hence patient turndown would decrease. Patient turndown can also be reduced by consolidating the entire outpatient unit. Consolidation would decrease patient turndown for several reasons. For example, sufficient staff could appropriately handle the elderly and mentally handicapped patients, which are currently turned down by TACU and 8 A.

Improving Safety at TACU

We recommend that staffing services clean TACU after closing or before opening times of operation. Our observations indicated fewer patients were present at TACU during opening and closing times. This will reduce the number of potential accidents of patients slipping on wet floors, etc. In addition, we recommend moving the patient bed, so the light switch panel is easily accessible and moving the instrument panel higher on the wall would avoid collisions with the bed.

Consolidation of Outpatient Infusion Units

Consolidation of outpatient infusion centers should be considered for three primary reasons. Consolidation will increase patient satisfaction, increase available staff and space optimization, and provide a greater return on investment based on fewer allocated resources. Having a localized area will further increase comfort and reliability on a single treatment location. Furthermore, to reduce high amounts of variability in downtimes and uptimes at outpatient infusion centers, consolidation will provide opportunities for finding optimal space and staff necessary to facilitate forecasted patient demands for TACU, 8 A, and 7 Mott. This will greatly reduce patient turndowns and increase patient satisfaction.

Based on FY03 data the volume for the three outpatient infusion units, TACU, 8 A, and 7 Mott, was 1,050, 1,512, and 76 patients respectively. Therefore, we predict that the volume for the new consolidated unit will be 2,638 patients per year. Assuming that 25% of patients require pre-authorization (from TACU and 7 Mott payer mix), the new consolidated unit will need to pre-authorize 660 patients per year (2,638 patients * 25% = 660 patients per year). This would require approximately 0.06 FTEs (122 hours/year) of staff time to pre-authorize the combined volume of patients (assuming it takes an estimated 11.13 minutes per patient to pre-authorize a patient at the Cancer Center).
Based on our observations and analysis, we recommend the medical assistant at TACU to perform the pre-authorization process for TACU and 7 Mott patients as a short term, cheaper solution in contrast to other alternatives to reduce write-offs. The critical costs that will be incurred from this alternative are supply cost, extra telephone charges, and training cost. From FY03 data, 385 patients who came into TACU and 7 Mott for infusions needed pre-authorizations. This would require an estimated 5.66 hours per month for pre-authorization. Through observational data and flow charting (see appendix C) of the medical assistant, we observed downtimes where the MA could perform these pre-authorizations. Through training from the Cancer Department and/or taking classes that are offered for pre-authorization, the medical assistant can learn to perform pre-authorizations. Since the medical assistant does not have experience in performing pre-authorizations, it will take one month to fully train him or her with a learning curve of three months (according to the Auditor of Cancer Center).

However, if patient flow per year increases at TACU and 7 Mott, and if the medical assistant cannot handle the demand for the pre-authorizations; we recommend having the Cancer Center’s pre-authorization unit perform them. Currently, they perform pre-authorizations for 8 A and with additional resources, they can perform pre-authorizations for TACU and 7 Mott as well. Another alternative would be to hire additional staff to do pre-authorizations for TACU and 7 Mott at a consolidated unit, similar to the Cancer Center if there is a large increase in patient flow.
Appendix A

Patient Arrives to TACU

Gives Blue Card to MA

Check vitals (MA/Nurse)

Are lab results ready?

Do meds need to be ordered?

Order meds

Is IV needed?

Get lab results

Post-treatment instructions are given

Page for IV team

Get IV

Start infusion pump

Infusion finished

Start infusion

Discharge & billing sheets are filled out

IV is taken out

Patient leaves TACU

Patient

TACU Patient Flowchart
Appendix B

When patient arrives, nurse takes patients blue card and looks up patient

Nurse arrives for the day around 7:15 AM

After IV team arrives, nurse attaches meds to pump and pump to patient's IV

Nurse checks patient vitals every 10-15 minutes throughout infusion

Does nurse advise patient on what post-infusion care?

Does nurse help patient fill out discharge paperwork?

Nurse gives patient discharge paperwork to fill out

Nurse discharges patient and patient is free to leave

Nurse gives patient advice on post-infusion care

Nurse leaves for the day at 7:00 PM

Nurse returns to desk to finish paperwork/work on computer till the next patient comes in

Flowchart for Nurse through the Outpatient Infusion Process

Appendix B
MA arrives for the day at 8:30 AM

MA schedules patients throughout the day for infusions

When patient arrives, takes blue card and looks up patient information

After the lab results, meds, and IV team has come, infusion begins

Does the nurse check the patient’s vitals?

YES

MA continues to work on computer until the next patient comes in

MA leaves for the day at 4:30 PM

NO

MA will check patient’s vitals every 10-15 minutes

TACU Flowchart of Medical Assistant through the Outpatient Infusion Process
### Infusion Wait Times

Staff: Please fill in the clock times (not intervals) of each of these infusion activities.

If you have any questions, please contact 3sv@umich.edu

<table>
<thead>
<tr>
<th>Patient CPI</th>
<th>Patient Arrival</th>
<th><strong>Type of Infusion</strong></th>
<th>Call to IV Team</th>
<th>IV Team Arrives</th>
<th>Meds Order</th>
<th>Meds Arrive</th>
<th>Lab Reports Arrive</th>
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Note: ** For type of infusion, also record the avg time it takes for that infusion process.
**3SV Consultants Infusion Process Data Collection Sheet**

*Process times at TACU*

<table>
<thead>
<tr>
<th>Date</th>
<th>In</th>
<th>Finished PPW</th>
<th>Infusion Starts</th>
<th>Infusion Stops</th>
<th>Out</th>
<th>Paperwork</th>
<th>CPI #</th>
<th>Infusion Type/CPT</th>
<th>Insurance Co.</th>
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</tbody>
</table>
Patients Turned Down For Infusions

Please complete the corresponding section for all the patients that were turned down for an infusion

<table>
<thead>
<tr>
<th>Date</th>
<th>Time they called for an infusion</th>
<th>Reason for turning that patient down</th>
<th>All other appointments scheduled for that day (include time and quantity)</th>
</tr>
</thead>
<tbody>
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</table>
# Pre-Authorization Process Data Form

*Please complete the corresponding section for the tasks you are performing today*

<table>
<thead>
<tr>
<th>Appendix G</th>
</tr>
</thead>
</table>

| Date: ____________________ |
| Name: ____________________ |

<table>
<thead>
<tr>
<th>Yellow Paper Sorting (taking out patients who don't need pre-auths and sorting by carrier)</th>
<th>Checking For Referrals</th>
<th>Pre-Auth/Imaging (Calling insurance companies for pre-auth, faxing to imaging)</th>
</tr>
</thead>
<tbody>
<tr>
<td># forms in initial stack: _______</td>
<td># Patients: _______</td>
<td># Patients: _______</td>
</tr>
<tr>
<td>Begin Time: ____________ (take out patients who don't need pre-auths)</td>
<td>Begin Time: ____________</td>
<td># Calls Made: _______</td>
</tr>
<tr>
<td>End Time: ____________</td>
<td>End Time: ____________</td>
<td>Begin Calling Time: ____________</td>
</tr>
<tr>
<td># forms in smaller stack: _______</td>
<td># Referrals not found: _______</td>
<td>End Calling Time: ____________</td>
</tr>
<tr>
<td>Begin Time: ____________ (sort by carrier)</td>
<td>Correction Time Begin: _______</td>
<td># Faxes Done: _______</td>
</tr>
<tr>
<td>End Time: ____________</td>
<td>Correction Time End: _______</td>
<td>Begin Fax Time: ____________</td>
</tr>
<tr>
<td></td>
<td>Correction Time End: _______</td>
<td>End Fax Time: ____________</td>
</tr>
</tbody>
</table>

- # forms in initial stack: _______
- # Patients: _______
- # Patients: _______
- # Calls Made: _______
- Begin Calling Time: ____________
- End Calling Time: ____________
- # forms in smaller stack: _______
- # Referrals not found: _______
- Correction Time Begin: _______
- Correction Time End: _______
- # Faxes Done: _______
- Begin Fax Time: ____________
- End Fax Time: ____________
Appendix H

Pick up stack of charge forms (yellow form) → Remove forms that don’t require pre-authorization → Sort forms by insurance carriers

Does each patient have a referral? (Yes/No)

- Yes: Call insurance company for pre-authorization → Fax pre-authorization papers to imaging → Pre-authorization Completed
- No: Contact referring doctors for referrals

Pre-Authorization Flow Chart at the Cancer Center