Executive Summary

Introduction

The University of Michigan Health System (UMHS) has a fragmented process for the transfer-in of patients. This deficiency has led to unnecessary loss of patients in need of care. Our team’s task was to improve the collection and administration of the data necessary to make critical decisions in the transfer-in process. The purpose of this document is to show our findings and recommendations to improve the transfer-in process at the University Hospital.

UMHS is concerned with the high number of declined patients in 2002-2003. Even though the number of declined patients has reduced from 138 turn downs in March 2002 to 41 in August 2003, the Coordinator of Patient Flow Improvement Initiatives, Barbara Wetula, believes further improvement can be achieved.

Description of Current System

The current process that the UMHS has to transfer-in patients from other hospitals is fragmented. There are three main departments that collect information regarding transfers: Transfer Center, Cardiology and Admitting department. The Transfer Center is the main logistical division within UMHS, which is responsible for all the transfers. However, some patients do not go through the Transfer Center and they are not registered in their records.

Findings and Conclusions

We quantified the raw data from the Transfer Center log from April to October 2003, and computed graphs that give a better representation of the data collected. A total of 1046 transfer requests were analyzed. A summary of the key findings may be seen in Appendix A.

Recommendations

Global Flowchart

There should be one flowchart for the transfer-in of patients to be used by the departments. It should be as simple as possible, taking into account the different needs between the departments, see Appendix B.

Centralized Database

A centralized database is also an important step to consolidate a unique process. This will be beneficial in several ways:
- Nurses in the Transfer Center can input data directly into the computer, speeding up the transfer-in process.
- Physicians involved in the transfer of a patient can assess the needs of the patient in need of a transfer.
- Staff in the Admitting Department can take over at 7pm without talking to the Transfer Center.
- Managers can generate graphs and statistics easily to make recommendations to improve the process.

We have designed the interface of a possible intranet to illustrate our idea of fields and style. The intranet would be accessed just like a website and the initial screen would require a login name and password, as in Figure 1 shown below. This login would address the security issues, which are very important when working with patient information.

![Figure 1: login screen for intranet](image)

Once the user enters the intranet, a general view of transfer-in patients for the current month appears. Figure 2 below shows a sample screen after a user has signed in.

![Figure 2: General view of transfer-in patients](image)

The screen shown in Figure 2 shows the status for all the transfer-in patients for the month of December 2003. In this case, three patients were transferred, two patients on hold, and three patients were not transferred. General information for each patient is displayed and a “light system” (dots below insurance, physician, and admitting) was used
to indicate the current status of acceptance depending on insurance, physician, and admitting department. Green dots mean that the patient was accepted; yellow dots mean the patient is on hold; red dots mean the patient was denied. When a patient is admitted into the hospital as a transfer, insurance must be verified, a physician must accept the patient, and beds must be available. This light system allows the user of the intranet to quickly assess the status of the patient.

The general view proposed in Figure 1 is also the main screen from which there can be access to specific data. Users of the intranet may need specific details of a patient, so links should be created from the patient’s name to a detailed report for the patient. Figure 3 shows one of these screens for a specific patient.

![Figure 3: Specific screen by patient](image)

The screen shown in Figure 3 is for a patient that has been transferred, so the adequate fields appear. Only relevant information is shown, like acceptance time and admitting physician. When dealing with a patient who has not been transferred there would be other fields, like decline date and reason for denial. This is one of the advantages of an intranet: it allows us to show the relevant information only.

**Avoid Double Work**

To make the transfer of patients more efficient, duplicate work should be eliminated. Data should be registered once and it should be recorded directly into the database from which the intranet is uploading the information. This will ensure that the data shown in the intranet is updated frequently and errors in data collection will be easier to detect (some software actually performs automated data revisions).

**Implementation**

The implementation of the intranet would also eliminate the daily emails used by some staff to determine the current transfer situation. Anybody with access may check the current transfer status of any patient, knowing that the information has been updated. Ultimately, this will make all the transfer staff more efficient and less prone to error.
Appendix A

Findings and Conclusions

Figure A1 shows that 60% of the transfer applicants actually are transferred into the hospital, while 18% are declined by UMHS staff. We also observed that 19% of the applicants cancel their transfer in process.

![Figure A1: Percentage of Total Transfers](source)

**Admitted patients**

Figure A2 shows that about 80% of the patients that were admitted to UM hospital waited less than two days to get a bed.

![Figure A2: Total Delay for Admitted Patients](source)

**Cancelled Patients**

It is also important to stratify the frequency of declined patients by their reason. Figure A3 shows that condition improved and sent elsewhere account for most of the declines. This is a good sign because only 7 persons died that we could potentially help during the study period. Although, the number of patients sent to other facilities, shows that still there are improvement opportunities.
Figure A3: Cancels by Type

Source: UMHS Transfer Center logs
n=197 (April to October 2003)

Figure A4 shows that reducing the acceptance delay will be helpful for having fewer patients going to other hospitals, making it less likely for a patient to expire while waiting for a transfer.

Figure A4: Delay of Cancelled Patients

Source: UMHS Transfer Center logs
n=197 (April to October 2003)
Appendix B

Transfer in patients Flowchart

Legend

- Action Required
- Paperwork required
- Decision Making
- Process ended

Transfer Center (TC) receives call

Emergency involved

YES → Referral to ED

NO → Create Transfer Center Record (TCR)

Medical Approval

YES → Update TCR to waiting status

NO →

Insurance Approval

YES → Contact accepting UM MD

NO → Accept patient

YES →

Call Admitting Department

Bed Available

YES → Call referring physician/hospital to send patient and determine time of arrival

NO → Update TCR to null status → Call accepting UM MD → Call referring physician/hospital → Rechedule holding

Notify accepting UM MD

Complete TCR

End
Process analysis of patients transferring into UM Hospital from other hospitals

Final Report

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Introduction

The University of Michigan Health System (UMHS) has a fragmented process for the transfer-in of patients. This deficiency has led to unnecessary loss of patients in need of care. Our team’s task was to improve the collection and administration of the data necessary to make critical decisions in the transfer-in process. The purpose of this document is to show our findings and recommendations to improve the transfer-in process at the University Hospital.

Background

UMHS is concerned with the high number of declined patients in 2002-2003. Even though the number of declined patients has reduced from 138 turn downs in March 2002 to 41 in August 2003, the Coordinator of Patient Flow Improvement Initiatives, Barbara Wetula, believes further improvement can be achieved.

Patients are accepted or denied by the UMHS based on insurance, severity of case, bed availability, and other factors. The University of Michigan currently has 470 beds distributed in the following manner: 84 for intensive care, 93 for monitored patients, and 293 for general care. The transfer center, a logistical division within UMHS, uses information supplied by doctors and physicians to efficiently allocate the use of these resources. Sometimes the transfer center is bypassed by some doctors transferring patients into the hospital, which generates gaps in the process.

Goals and Objectives

The goals and objectives of the project were the following:

- Develop a standardized patient transfer-in process
- Improve the collection and handling of the transfer-in data
- Provide recommendations for a central database

Expected impact

Based on the data collected from interviews and research, and data gathered by the Transfer Center, our team has developed recommendations for improving the UM Hospital’s transfer-in system. Specifically, we expect recommendations to result in:

- A new centralized and standardized information system
- Tools to help staff respond adequately to a transfer process
- Efficient use of hospital resources (e.g. beds) to avoid unnecessary patient loss
- Doctors and physicians adapting effectively to the transfer-in process
Summary of approach and methodology

We interviewed doctors, and staff from the transfer center and admitting department to understand their point of view regarding the transfer-in process, expecting to get different perspectives on the current state of the process observing how it differs from the ideal. With the information that was provided by our client Barbara Wetula and our coordinator Barbara Radloff (e.g. patient placement guidelines, admissions guidelines and the transfer center’s flowchart), and the data collected from the interviews, we analyzed the current state of the patient transfer-in process, identifying the possible bottlenecks and inefficiencies.

To design the centralized database we looked at the information provided by all the parties involved in the transfer-in process. We defined what data should be presented, in what manner, and who should have access to it. To achieve this, we verified that the data gathered and the data presented to those who need it, are the same.

Description of Current System

The current process that the UMHS has to transfer-in patients from other hospitals is fragmented. Three main departments that collect information regarding transfers: Transfer Center, Cardiology and Admitting. The Transfer Center is the main logistical division within UMHS; see Appendix A for process flowchart. It is supposed to be the one responsible for all the transfers; however, some patients do not go through the Transfer Center. Figure 1 shows a snapshot of the information they gather.

![Figure 1: Data Gathered by the Transfer Center](image-url)
Figure 1 represents the data collected by the Transfer Center. This data is more detailed and complete than that gathered by the other departments. Fields such as: date of first call, date physician accepted and date bed available (noted with arrows), make it possible to quantify and view data in graphs and reports.

The cardiology transfers are handled by an individual person, Michelle Donnelly. She uses a more simplified process to transfer patients than that used by the Transfer Center, see Appendix B. She also collects different data in her transfer logs; see Figure 2.

The problem with the data gathered in this department is that it is difficult for management to analyze because it lacks the fields with the dates noted in figure 1.

After the Transfer Center department closes at 7pm, the Admitting Department takes over the transfers. The information gathered after 7pm is then faxed to the Transfer Center the next morning. Figure 3 shows the data that is collected in this department.
The main issue is that they collect very little information, about half of that collected by the Transfer Center. They collect fields such as: phone number, arrived, and called for, which are not useful to the Transfer Center.

The admitting department and the Transfer Center gather information in paper logs. Then, when these logs are completed they type them in Microsoft Excel. This double work represents an opportunity for improvement. Daily e-mails are also sent to management to review the records of patients that could not get into the hospital that given day.

Fields such as “patient name” is gathered by all the departments but in different formats. Admitting and Cardiology departments gather the patient’s first and last name while the Transfer Center log gathers only the last name. This represents an opportunity to standardize not only where the data is collected, but the format as well.

Another party involved in transfers are the physicians. Sometimes they will bypass the Transfer Center and accept or decline patients directly on their own. None of this data is registered; therefore, it cannot be quantified. There is no way to know how many patients were not accepted by physicians and their reasons. Quantifying this data will help to get a better overview of the number of patients not admitted due to bed occupancy and other factors.

Findings and Conclusions

We quantified the raw data from the Transfer Center log from April to October 2003, and computed graphs that give a better representation of the data collected. A total of 1046 transfer requests were analyzed. An overall view of the findings can be seen in Figure 4.

![Figure 4: Percentage of Total Transfers](image)

Source: UMHS Transfer Center logs
n=1046 (April to October 2003)
Figure 4 shows that the hospital accepts 60% of the patients that apply for a transfer. The declined patients are those patients that did not meet the hospital’s admitting criteria and, therefore, are not seen as potential patients that were lost. Patients that cancel, on the other hand, are those patients that died while waiting for admittance, get transferred to another hospital, or patients whose condition improved.

**Admitted patients**

Figure 5 shows that about 80% of the patients that were admitted to UM hospital waited less than two days to get a bed.

![Figure 5: Total Delay for Admitted Patients](source: UMHS Transfer Center logs n=626 (April to October 2003))

To analyze the cancellations and declines with greater detail, a study by day of the week was done, see Figure 6.
In Figure 6, it can be seen that on Thursdays and Fridays UMHS has more cancellations and declines than any other day. It also remarks how the number of cancellations and declines drop on the weekends.

Figure 7 shows that, on average 43% of the time delay that a patient waits to get into the hospital is due to bed availability and 57% of the time to acceptance delay.
Cancelled Patients

It is also important to stratify the frequency of declined patients by their reason. Figure 8 shows that condition improved and sent elsewhere account for most of the declines. This is a good sign because only 7 persons died that we could potentially help during the study period. Although, the number of patients sent to other facilities, shows that still there are improvement opportunities.

![Figure 8: Cancels by Type](source: UMHS Transfer Center logs, n=197 (April to October 2003))

Figure 8: Cancels by Type

Figure 9 shows that about 75% of the patients cancel within the first two days of the initial transfer request. If the hospital does not get a patient in within the first two days, the patient will be likely to cancel.

![Figure 9: Total Delays for Cancelled Patients](source: UMHS Transfer Center logs, n=197 (April to October 2003))

Figure 9: Total Delays for Cancelled Patients
Figure 10 shows that reducing the acceptance delay will be helpful for having fewer patients going to other hospitals, making it less likely for a patient to expire while waiting for a transfer.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{delay_of_cancelled_patients}
\caption{Delay of Cancelled Patients}
\end{figure}

\textbf{Condition Improved} \hspace{1cm} \textbf{Expired} \hspace{1cm} \textbf{Sent Elsewhere}

\begin{itemize}
\item Condition Improved: 28% Bed Delay, 72% Acceptance Delay
\item Expired: 82% Bed Delay, 18% Acceptance Delay
\item Sent Elsewhere: 18% Bed Delay, 82% Acceptance Delay
\end{itemize}

Source: UMHS Transfer Center logs  
n=197 (April to October 2003)

\textit{Declined Patients}

From Figure 11 we can see that the biggest reason for declining a patient is that the patient does not require the UM level of care.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{declining_reasons}
\caption{Declining Reasons}
\end{figure}

\begin{itemize}
\item UM Level of Care not Needed: 90
\item Outpatient Appointment Made: 60
\item Criteria Not Met: 50
\end{itemize}

Source: UMHS Transfer Center logs  
n=193 (April to October 2003)
Figure 12 how that about 80% of the patients are declined within the first two days of the initial transfer request.

Recommendations

The first step towards improving the transfer-in process is creating a centralized data collection system to be used by all the parties involved. Although it is hard to completely satisfy everybody’s needs, it is essential to realize that the current process would benefit greatly from such a system. A centralized database and process would improve the communication between the departments, as well as allow management to quantify necessary data to make decisions.

To achieve this goal we have three recommendations.

1. A simplified global flowchart of the transfer-in process should be considered.
2. Consider a main database in which all the data required is portrayed.
3. The process would be more efficient by avoiding double work.

Global Flowchart

There should be one flowchart for the transfer-in of patients to be used by the departments. It should be as simple as possible, taking into account the different needs between the departments, see Appendix C.
Centralized Database

A centralized database is also an important step to consolidate a unique process. This will be beneficial in several ways:

- Nurses in the Transfer Center can input data directly into the computer, speeding up the transfer-in process.
- Physicians involved in the transfer of a patient can assess the needs of the patient in need of a transfer.
- Staff in the Admitting Department can take over at 7pm without talking to the Transfer Center.
- Managers can generate graphs and statistics easily to make recommendations to improve the process.

The problem with implementing a central database is actually setting it up and getting people to use it. To avoid this, it is crucial to invest heavily on the design of the database to make sure everybody finds it helpful. During the design phase, it should be determined who should have access to this database and what information should be portrayed to satisfy everybody’s needs. From our exposure to this process, we believe that the key parties involved are the Transfer Center, the Admitting Department, and the Cardiology Department. But we also must be careful in considering physicians and other staff members that may need input or output from this database. Therefore, it must be clearly defined who can access this data, and also, who can modify the data.

Another important feature of a database is to determine the software to be used. It is a common belief in industry that Microsoft Access is the best software for databases, but we believe that using this software may lead to compatibility problems since many users will be accessing this data. Specifically, some users may not have this software installed in their personal computers. For this reason, we believe that an intranet would prove to be user friendly and anybody with a web browser could access it. Further software issues would depend on the programmers responsible in implementing the database.

We have designed the interface of a possible intranet to illustrate our idea of fields and style. The intranet would be accessed just like a website and the initial screen would require a login name and password, as in Figure 13 shown below. This login would address the security issues, which are very important when working with patient information.
Figure 13: login screen for intranet

Once the user enters the intranet, a general view of transfer-in patients for the current month appears. Figure 14 below shows a sample screen after a user has signed in.

Figure 10: General view of transfer-in patients

The screen shown in Figure 14 shows the status for all the transfer-in patients for the month of December 2003. In this case, three patients were transferred, two patients on hold, and three patients were not transferred. General information for each patient is displayed and a “light system” (dots below insurance, physician, and admitting) was used to indicate the current status of acceptance depending on insurance, physician, and admitting department. Green dots mean that the patient was accepted; yellow dots mean
the patient is on hold; red dots mean the patient was denied. When a patient is admitted into the hospital as a transfer, insurance must be verified, a physician must accept the patient, and beds must be available. This light system allows the user of the intranet to quickly assess the status of the patient.

It may be the case that a patient who was transferred successfully will have three green lights, but there may be a few exceptions. A patient may have been denied based on insurance policy, but the transfer may still take place. Also, if a patient requires urgent care, he may enter the hospital through the emergency room. All these exceptions must be carefully analyzed by the programmers and hospital staff to make sure the intranet addresses all the possibilities.

The general view proposed in Figure 13 is also the main screen from which there can be access to specific data. Users of the intranet may need specific details of a patient, so links should be created from the patient’s name to a detailed report for the patient. Figure 15 shows one of these screens for a specific patient.

The screen shown in Figure 15 is for a patient that has been transferred, so the adequate fields appear. Only relevant information is shown, like acceptance time and admitting physician. When dealing with a patient who has not been transferred there would be other fields, like decline date and reason for denial. This is one of the advantages of an intranet: it allows us to show the relevant information only.

From the general view in had in Figure 13, management would also be able to access some reports calculated with the data in the database. Up-to-date reports may be generated by the actual software simply by using the data in record. It is important that managers define what types of records they would like to have, to allow programmers to
implement the necessary algorithms. We believe that by using a centralized system, managers should expect reports that inform them about pending transfers, acceptance rate, decline trends, major reasons for cancels, etc.

Avoid Double Work

To make the transfer of patients more efficient, duplicate work should be eliminated. Data should be registered once and it should be recorded directly into the database from which the intranet is uploading the information. This will ensure that the data shown in the intranet is updated frequently and errors in data collection will be easier to detect (some software actually performs automated data revisions).

The implementation of the intranet would also eliminate the daily emails used by some staff to determine the current transfer situation. Anybody with access may check the current transfer status of any patient, knowing that the information has been updated. Ultimately, this will make all the transfer staff more efficient and less prone to error.
CVC Bed Coordinator Outside Hospital patient transfer process

Call to UM dr from referring physician

- Accept pt?
  - Yes: Contact CVC bed coordinator
  - No: Notify referring MD

Notify referring MD

Referring MD/ hospital calls CVC bed coordinator

BC calls attending/ fellow to initiate MD to MD contact

Contact CVC bed coordinator

- Enter admit, fax face sheet to AC
  - Insurance approved: Arrange transfer
  - Insurance denied: Contact UM accepting MD

Contact UM accepting MD

- Accept pt?
  - Yes: Contact AC w/ reason i.e. UM only place that can provide care, etc.
  - No: UM doctor contacts referring MD

Contact AC w/ reason i.e. UM only place that can provide care, etc.

- Yes: Arrange transfer
  - No: Wait for AC procedure/ response