Cardiac Patient Services Improvement
Final Report

Management Systems Department
The University of Michigan Hospitals
Thursday, December 12, 1991

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Karen Webb
Anne Wilczak
TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Executive Summary</td>
<td>1</td>
</tr>
<tr>
<td>Introduction and Background</td>
<td>2</td>
</tr>
<tr>
<td>Approach and Methodology</td>
<td>4</td>
</tr>
<tr>
<td>Current Situation</td>
<td>9</td>
</tr>
<tr>
<td>Alternatives Considered</td>
<td>11</td>
</tr>
<tr>
<td>Findings and Conclusions</td>
<td>31</td>
</tr>
<tr>
<td>Recommendations</td>
<td>35</td>
</tr>
<tr>
<td>Action Plan</td>
<td>36</td>
</tr>
<tr>
<td>References</td>
<td>37</td>
</tr>
<tr>
<td>Appendix 1</td>
<td>39</td>
</tr>
<tr>
<td>Appendix 2</td>
<td>42</td>
</tr>
<tr>
<td>Appendix 3</td>
<td></td>
</tr>
</tbody>
</table>
EXECUTIVE SUMMARY

There is currently concern that cardiac inpatients are experiencing an unnecessary delay in transport between the seventh floor inpatient units and the basement level (B1) cardiac procedure areas at the University of Michigan Hospital in Ann Arbor. It is the goal of this study to attempt to identify the source of these delays and to recommend alternatives to reduce them. The departments specifically involved in this study were the Cardiac Intensive Care unit (7D), the Cardiac Step-Down unit (7C), the Electrophysiology lab, and the Catheterization lab.

There exists a cardiac transportation policy drafted by Dr. Bertram Pitt on March 9, 1989 which matches patient conditions with the type of transportation needed. A copy of the policy may be found in Appendix 3 of the full report. All cardiac care staff members are not familiar with this policy. At the present time, stable cardiac patients are transported by the centralized Patient Transportation department. Unstable patients may be transported by a nurse or a resident fellow in addition to or as a substitute for a transporter.

It was mentioned in staff interviews that a contributing source of the delays is finding stretchers for transport. This may improved by designating stretchers 'for cardiac use only'. Wait times were determined through data collection and it was found that wait times for transporters are greater than staff expectations (15 - 20 minutes). The mean time waited for transport is approximately 30 minutes.

Lack of Cardio-Pulmonary Resuscitation Certification (CPR) was stated as a problem area and CPR training was cited as a way to improve the system. This was not within the scope of our project, so it is mentioned for your consideration.

Based on data collected and observations of the cardiac transportation process and the staff, it is recommended that the current transportation system be improved through greater communication between departments. Methods of improving the existing system include:

1. Developing a step by step procedure that the affected units should follow consistently for better communication.
2. Holding a brainstorming session with representatives from 7C, 7D, the Catheter lab, the EP lab, and the Patient Transportation department.

It is also recommended that a student nurse be used to transport or accompany critical patients from the floor to the lab. This would reduce the workload for the seventh floor nursing staff, provide hands-on experience for the students, and provide patients with a qualified transporter.
INTRODUCTION AND BACKGROUND

There is currently concern that cardiac inpatients are experiencing an unnecessary delay in transport between the seventh floor inpatient units and the basement level (B1) cardiac procedure areas at the University of Michigan Hospital in Ann Arbor. It is the goal of this study to attempt to identify the source of these delays and to recommend alternatives to reduce them. The departments specifically involved in this study were the Cardiac Intensive Care unit (7D), the Cardiac Step-Down unit (7C), the Electrophysiology lab, and the Catheterization lab. Concern has also been expressed regarding the qualifications of the staff transporting these patients.

On September 12, 1991, a meeting of cardiac care staff was held to discuss these issues. The representatives attending this meeting were:

Heather Wurster  Director Associate - Seventh Floor Nursing
Joyce Sorrentino  Head Nurse - 7C Cardiac Step-Down
Laura Gorman  Manager - Invasive Cardiology
Maureen Flaherty-Thompson  Head Nurse - 7D Cardiac Intensive Care

A copy of the minutes of the meeting can be found in Appendix 1. Topics discussed included inpatient flow, professional standards and qualifications, and transportation waiting times. The Management Systems department was contracted to perform a study of the cardiac patient transportation system. The project was delegated to Dr. Richard Coffey’s Industrial and Operations Engineering 481 class - “Special Projects in Hospital Systems”. The students assigned to this project were Lee DeKay, Karen Webb, and Anne Wilczak with Elizabeth Othman acting as the Project Coordinator.
APPROACH AND METHODOLOGY

In order to gain an accurate understanding of the cardiac transport process, it was necessary to collect actual transport times. Data collection forms were given to the staffs of the Catheter and EP labs, the nurses of 7C, and the clerks of 7D. Examples of these forms can be found in Appendix 2. They were asked to record the time the Patient Transportation department was called and the time the transporter arrived at and left their respective units. Data collection forms from the seventh floor were matched with those from the B1 labs and recorded times were subtracted to give the intermediate times of the process. This study was carried out from Tuesday, October 29, 1991 to Friday, November 1, 1991 and from Monday, November 4, 1991 to Friday, November 8, 1991. A total of 47 transports were recorded during this period. Four of the transports were to or from 7D and the remaining 43 were to or from 7C.

Because this data was not sufficient for a clear understanding of the process, a second study was performed with the authors acting as data gatherers. The same collection method was used. A total of ten transports were recorded during the December 1 - 2, 1991 collection period. Two of the transports were to or from 7D and eight were to or from 7C.

In addition to the data collected specifically for this study, transport time data was also provided by the Patient Transportation department in the form of transport logs listing request times, dispatch times, and completion times.

Flowcharts of the transportation process from room to lab and from lab to room were created to determine the location of problem areas.
Interviews with cardiac staff and transporters were conducted to gauge the level of understanding of the process. Suggestions for improvement of the system were also welcomed.

Hospitals throughout the country were contacted to provide information on their cardiac transportation systems. The hospitals selected were of approximately the same size and caliber as the University of Michigan Hospital. Information was obtained from Beaumont Hospital, the Cleveland Clinic, Georgetown University Hospital, the Mayo Clinic, Sacramento Mercy General, the Ohio State University Hospital, and St. Joseph’s Hospital.

Other general information regarding cardiac transportation practices, procedures, and volumes was obtained through conversations with Joyce Sorrentino, Maureen Flaherty-Thompson, Laura Gorman, Terry Schuenemeyer, Michelle Troy, Gregory Cox, and Jeannie Collins.
CURRENT SITUATION

At the present time, stable cardiac patients are transported by the centralized Patient Transportation department. There are eight full-time transporters working during the day shift and they are responsible for transports throughout the entire hospital. The majority are not BCLS trained.

Unstable patients may be transported by a nurse or a resident fellow in addition to or as a substitute for a transporter. There exists a cardiac transportation policy drafted by Dr. Bertram Pitt on March 9, 1989 which matches patient conditions with the type of transportation needed. A copy of the policy may be found in Appendix 3. All members of the EP and Catheter staffs are not familiar with this policy. The staff is uncertain in assigning patients to proper diagnostic categories. This may cause improper staffing on transports.

The transportation process from the seventh floor to the EP and Catheter labs is handled entirely by the labs. A flowchart of the process is shown in Figure 1.
Figure 1. Transport from Room to Lab
To begin the process, the lab calls the Patient Transportation department to request that a patient be picked up from the seventh floor. The Patient Transportation department typically expects 20 to 30 minutes advance notice for patient transports. The lab then calls the seventh floor to inform them to expect a transporter and the floor puts the patient “on call”. The Patient Transportation department typically dispatches a transporter about 15 minutes before the patient’s lab appointment time. When the transporter arrives on the seventh floor, the patient should be on a stretcher ready for transport. In the case of 7D - Cardiac Intensive Care, the patient is not moved to a stretcher but is transported in his or her own bed. When the patient is not ready, the transporter uses a “Five Minute Rule” to decide whether or not to wait. If the patient will not be ready within approximately five minutes, the transporter leaves to complete other tasks and the Patient Transportation department must again be called when transport is needed. The patient is transported between floors via the West Staff Elevators. When the patient arrives at the lab, the transporter calls the dispatch center to inform them that the run has been completed. As of October 8, 1991, all transport times are recorded by the dispatch center on “Patient Transportation System, Version 3.0” software by Headlee Systems.

When a patient is to be transported from the lab to the seventh floor, the lab again makes all of the arrangements. A flowchart of this process is shown in Figure 2.
Begin

Lab Calls Transport

Transport Dispatches Transporter

Transporter Arrives on Time?

Yes

No

Transporter Leaves

Patient Ready?

Yes

No

Transporter Waits?

Transporter Leaves

Transporter Leaves With Patient

Transporter and Patient Arrive at Room

Nurse Available?

Yes

No

Transporter Leaves

Transporter Activates Call Button

Transporter Leaves

End

Figure 2. Transport from Lab to Room
The EP lab usually calls the Patient Transportation department near the end of the patient's procedure to request a transporter. When the transporter, after collecting the patient, arrives on the seventh floor, he or she notifies the nurse if the nurse is not present by activating the "Nurse Call" button in the patient's room. After leaving, the transporter notifies the dispatcher that the run has been completed.

Nurses and resident fellows transport or accompany unstable patients from the EP lab and typically all patients from the Catheter lab to the seventh floor.
The utilization of a satellite transporter for the cardiac units has been proposed by staff at a variety of levels as an alternative solution to the problem. He or she would be responsible for transporting patients to and from the cardiac procedure areas with a nurse or fellow if required.

Advantages
- Transporter more accessible
- Shorter waiting time
- BCLS trained

Disadvantages
- May still need fellow or nurse to accompany patient (Depends on amount of training)
- Conflicting requests for transport (Which lab or unit gets priority?)
- Staffing problems (Number of transporters needed)
- Idle time
- Cross-training?
- Location of satellite headquarters
- Cost

A second alternative considered was a transporter from the Patient Transportation department assigned to cardiac areas.

Advantages
- BCLS trained
- More familiar with cardiac units
Disadvantages

- Utilization
- Higher costs (Higher level of training → Higher Wages)
- Controlled by Patient Transportation department

The final alternative considered was to use student nurses in place of cardiac floor nurses to accompany and transport unstable patients to the procedure areas. These students would be on a rotating schedule and would be assigned to handle critical transports only from floor to lab. In addition, they could perform any additional floor duties.

Advantages

- Qualified to transport unstable patients
- Reduces nursing time required for transports
- Gives students hands-on experience

Disadvantages

- Scheduling
- Less experience than floor nurses
FINDINGS AND CONCLUSIONS

Hospital Survey

The hospitals in the survey were selected based on size (approximately 800 beds), and type (research/university) in order to set a benchmark. This shows where the University of Michigan stands relative to the transportation methods of other hospitals. The results are shown in Table 1.

Table 1. Results of Nationwide Hospital Survey

<table>
<thead>
<tr>
<th>Hospital</th>
<th>Type of Transportation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beaumont, Royal Oak</td>
<td>Centralized transport, if critical patient then nurse transports.</td>
</tr>
<tr>
<td>Cleveland Clinic</td>
<td>Centralized transport, nurse transports if patient has IV. One person in transport designated as Cardiac, but not BCLS.</td>
</tr>
<tr>
<td>Georgetown University</td>
<td>Has 1 designated BCLS trained transporter, if unstable nurse or fellow transports.</td>
</tr>
<tr>
<td>Mayo Clinic</td>
<td>Centralized transport, no qualifications. Nurses go with unstable patients.</td>
</tr>
<tr>
<td>Mercy General, Sacramento</td>
<td>Nurses accompany patients from Cath lab to telemetry and ICU beds.</td>
</tr>
<tr>
<td>Ohio State University Hospital</td>
<td>Has 2 designated transporters. With any monitored patient a tech, fellow, or nurse also goes with transporter and patient.</td>
</tr>
</tbody>
</table>
The survey shows a wide variety of transportation methods used. The University of Michigan Hospital uses a system no different from several other comparable institutions. Georgetown University Hospital uses a BCLS trained designated transporter yet unstable patients still require a nurse or doctor to accompany transports. The University of Michigan is the only hospital of those surveyed with a formal, written cardiac transportation policy.

Survey of Transporters

A discussion was held with several transporters to discover what the general feelings of the Patient Transportation department are concerning the problems arising in transporting between the cardiac care units and the procedure areas. Questions asked included:

What amount of time does it take you to get to your pick-up destination after you receive a call?

Is there a problem with the nurses not being there when you arrive with the patient on the floor (transporting from the lab)?

What percentage of the time do you feel that the patients aren’t ready when you arrive?

The transporters believe that they reach their destination approximately five minutes after they are notified of a transport request. The
EP and Catheter labs have priority on transport so the transporters will be sent to these destinations first.

Generally, a nurse is present when the patient is returned to the cardiac care units. On 7C, the clerk is notified and the "Nurse Call" button is activated if the nurse is not present. On 7D, because of the critical condition of the patient, a nurse waits for the patient to arrive.

When transporting from 7D, there is usually a significant wait since the patient must be disconnected from equipment by a nurse or doctor. The wait is approximately 20 to 30 minutes for this procedure. The transporters unanimously agreed that the patient is not ready for transport 100% of the time. On 7C, the patient is not ready for transport 25% of the time.

It was mentioned that a contributing source of the delays is finding stretchers for transport. Stretchers are missing about 50% of the time.

It was mentioned by the transporters surveyed that a designated transporter responsible for cardiac patients would be advantageous. This solution was suggested by a transporter who had previously worked in a department where a designated transporter was present and another transporter readily agreed that this would be a good solution.

Survey of Cardiac Staff

A discussion was also held with several cardiac staff members to determine their understanding of the cardiac transportation situation. Questions asked included:

What amount of time do you expect to wait for a transporter?

What do you think is a reasonable amount of time to wait for a transporter?
What percentage of transports are done by nurses and/or fellows?

Where are the problem areas in the transport process?

What ideas do you have as to how to improve the system?

Do you feel the transportation system adequately meets your needs?

The responses of the staff regarding the expected wait time for a transporter ranged from five minutes to one hour. Apparently, this wait time is fairly inconsistent.

All of the staff surveyed felt that a reasonable amount of time to wait for a transporter to arrive is about fifteen to twenty minutes. The actual mean wait time is about twenty minutes.

It is generally believed that 20% of the transports to and from the EP lab are accompanied by a nurse. In the Catheter lab, about 85% are done by cardiac staff. The results from the two data collection periods show that approximately 77.6% of transports are performed by transporters, 17.2% by nurses, and 5.2% by resident fellows. (See Figure 3.) This shows a sizable amount of nursing time is required for transports.
Figure 3. Percentage of Transports by Staff Type

Lack of Cardio-Pulmonary Resuscitation Certification (CPR) was pinpointed as a problem area and CPR training was cited as a way to improve the system. Also, communication between departments was noted as a problem area.

The staff was split as to whether the current transportation system meets their needs. Some felt it was adequate. Others said that they would not be satisfied until the transporters were BCLS trained. Still others complained that wait times are too long.
Analysis

From the flowcharts shown in Figures 4 and 5, several times were considered to be possible sources of delays.

Time from Request to Dispatch

A mean time of 10.6 minutes was calculated with a standard deviation of 7.8 minutes. This time usually depends on the time of day and the number of available transporters. (Please see Figure 6). The longest wait times seem to occur from 11am-12pm and from 2pm-4pm. This may be due to transporter breaks and shift changes.
Figure 4. Mean Times for Transports from Room to Lab
Figure 5. Mean Times for Transports from Lab to Room

**Mean Times**

- **Transporter Activates Transporter**
  - Mean = 10.6
  - Std dev = 7.8

- **Transporter Leaves**
  - Mean = 9.6
  - Std dev = 4.6

- **Transporter Leaves With Patient**
  - Mean = 5.8
  - Std dev = 3.73

**Flowchart Details**

1. **Lab Calls Transport**
2. **Transport Dispatches Transporter**
3. **Transporter Arrives on Time?**
   - Yes: **Transporter Leaves With Patient**
   - No: **Transporter Leaves**
4. **Patient Ready?**
   - Yes: **Transporter Leaves With Patient**
   - No: **Transporter Waits?**
5. **Transporter Waits?**
   - No: **Transporter Leaves With Patient**
   - Yes: **Transporter Leaves**
6. **Nurse Available?**
   - Yes: **Transporter Leaves**
   - No: **Transporter Activates Call Button**

**End**
Figure 6. Average Time from Request to Dispatch versus Time of Day
Amount of Time from Dispatch to Arrival

For the labs, this time was found to have a mean of 9.6 minutes and a standard deviation of 4.6 minutes. For the floors, arrival time was found to have a mean of 10.4 minutes and a standard deviation of 4.7 minutes.

A control chart, shown in Figure 7, was constructed using the total amount of time waited for transport. This includes the time from request to dispatch and from dispatch to arrival. The chart shows that the transporter arrival times are under control because they do not exceed the three standard deviation limits. The lower control limit is a negative value, which is not feasible for time measurements. Hence, it is assumed to be zero.

Figure 7. Control Chart for Request Until Arrival
Using the staff expected wait times for transport, new control charts were constructed. (See Figures 8, 9, and 10). The upper control limits were set to 20, 15, and 10 minutes reflecting the expectations of resident fellows and nurses. Given these upper control limits, it is shown that the process will not meet staff expectations.

Figure 8. Control Chart for Request Until Arrival
Figure 9. Control Chart for Request Until Arrival

Mean Time (min)

Sample Number

Mean = 16
UCL 15.00
LCL 0.0
Actual Transport Time

The Actual Transport Time from floor to lab was found to have a mean of 7.2 minutes with a standard deviation of 5.7 minutes. From lab to floor the mean was 5.8 minutes with a standard deviation of 3.7 minutes. The longer time from floor to lab may be due to elevator wait. Because of the critical condition of cardiac patients, a transport time of over 5 minutes presents a possible clinical problem.

Run Time

Run time is the total time from dispatch to the time the transporter completes the run. This is shown in Figure 11 versus the time of day. Length
of run times tended to increase throughout the day for patients incoming to the floor. For patients incoming to the lab there was not a consistent pattern.

Figure 11. Run Time versus Time of Day
The average numbers of transports performed for each lab and unit per day of the week were calculated from the data collected. The results are shown in Figures 12 and 13 respectively.

**Monday**

EP  \[\begin{array}{cccccccc}
\underline{8}
\end{array}\]

Cath \[\begin{array}{c}
\underline{4}
\end{array}\]

**Tuesday**

EP  \[\begin{array}{cccccccc}
\underline{8}
\end{array}\]

Cath \[\begin{array}{c}
\underline{2}
\end{array}\]

**Wednesday**

EP  \[\begin{array}{cccccccc}
\underline{11}
\end{array}\]

Cath \[\begin{array}{ccc}
\underline{3}
\end{array}\]

**Thursday**

EP  \[\begin{array}{cccccccc}
\underline{9}
\end{array}\]

Cath \[\begin{array}{c}
\underline{3}
\end{array}\]

**Friday**

EP  \[\begin{array}{cccccccc}
\underline{9}
\end{array}\]

Cath \[\begin{array}{c}
\underline{4}
\end{array}\]

**Figure 12. Average Number of Transports per Lab per Day**
Monday
7C  (10)
7D  (2)

Tuesday
7C  (8)
7D  (2)

Wednesday
7C  (11)
7D  (3)

Thursday
7C  (11)
7D  (1)

Friday
7C  (12)
7D  (1)

Figure 13. Average Number of Transports per Day per Unit

The average number of transports requested per hour for each lab was also calculated from the collected data. The results are shown in Figures 14 and 15. For the EP lab, the most transports are requested between 7:00 am and 10:00 am and between 3:00 pm and 5:00 pm because most of the day’s procedures are performed during these two time periods. For the Catheter lab, the most transports are requested between 7:00 am and 9:00 am, 12:00 pm and 1:00 pm, and 2:00 pm and 3:00 pm.
Figure 14. Request Time versus Average Number of Transports for EP Lab
The average number of requests for transport per hour for each unit are shown in Figures 16 and 17. For 7C the greatest amounts of transports to and from the unit are requested between the hours of 7 am and 10 am and 4pm and 5 pm. This corresponds to procedures being started and completed at these times. For 7D the greatest amounts of transports occur later in the day. This is because the patients in this study from 7D were transported to the Cath lab, which performs inpatient procedures later in the day.
Figure 16. Average Number of 7C Requests per Hour
Figure 17. Average Number of 7D Requests per Hour
RECOMMENDATIONS

Based on data collected and observations of the cardiac transportation process and the staff, the resulting recommendation is to improve the current transportation system. From this small study of the cardiac procedure areas, sufficient evidence was not found to support the need for a satellite or designated transporter. As shown in the small survey of nationwide hospitals, the University of Michigan Hospital uses a transportation system that is comparable to those of other institutions. While a satellite or designated transporter would be BCLS trained, they still would require a nurse or resident fellow to accompany critical transports. The transporter would be more accessible but conflicting requests would require the use of centralized transport as a back-up system. The volume and frequency of cardiac transports (as shown in Figures 12, 14, and 15) would cause congestion one minute and idleness the next. Furthermore, cardiac procedures are performed from 7:00 am until approximately 10:00 pm and one transporter would not be able to cover this entire time period. However two transporters would not be fully utilized because of the low volume encountered within this study. In order to be effective, they would have to be cross-trained for other duties.

"'Hurry up and wait,' frustration, long waiting times for patients...are symptoms of a poorly designed system for patient flow" (Rising, 1977, p.3). Long wait times and frustration were observed within the existing system. As was shown in Figures 8, 9, and 10, staff expectations far exceed actual performance times. This leads to undue stress on the staff. The key to improving the current system is increased communication between all parties involved in the cardiac transportation process. It is important that the
cardiac staff realize the mean time waited for transport is approximately 30 minutes. The expectations of the staff should be adjusted to this fact, as the process is under control. The only way to meet current staff expectations would be to radically change the transport system. By increasing communication between 7C, 7D, the Catheter lab, the EP lab, and the Patient Transportation department, this will lead to more realistic expectations. There are two methods recommended to improve communication between the affected groups.

1. Develop a step by step procedure that the involved units should follow consistently for better communication.

Suggestions include:

**Floor to Lab**

1. Lab calls Transport to request transport and give patient appointment time.
2. Lab calls floor and tells the floor appointment time.
3. Nurse goes to the room and gets patient ready 20 minutes before appointment time. This will attempt to reduce the amount of time the patient spends on the stretcher.
4. Transporter transports patient to lab.

**Lab to Floor**

1. Lab calls Transport and requests transport
2. Lab calls floor and gives the approximate transport time.
3. Transporter arrives and transports patient to floor.
4. Lab calls to notify the floor that the patient is on the way up to the floor, this gives the nurse approximately five minutes.
5. Transporter and Nurse arrive at the room at approximately the same time and Nurse returns the patient to bed.

Although some of these suggestions are already used, they are not used consistently. This causes breakdowns of the system to occur. The new procedure could be tested for a one or two week trial period to determine the feasibility of formal implementation.

The second recommendation is to:

I Hold a brainstorming session with representatives from 7C, 7D, the Catheter lab, the EP lab, and the Patient Transportation department. At this meeting, the suggested procedure and the results of its trial period could be discussed in more detail. An idea to discuss during this meeting might be a way to reduce the problem of unavailable stretchers. This might be accomplished by marking the stretchers ‘for cardiac use only’ or by storing several in an unused storage area in case needed. A future possibility to explore would be to put the proposed communication procedure into a computer system linked to the Patient Transportation department computer system. For example, if the lab calls the dispatcher, then the dispatcher only has to type in that the patient is being picked up at 7C. The computer would then send a message to a computer on 7C telling the unit of the patient to be transported and the appointment time.

It is suggested that student nurses be used for accompanying or transporting critical patients from floor to lab. This would reduce the workload for seventh floor nursing staff and provide the students with
valuable hands-on experience. They would also be qualified to deal with most cardiac emergencies.

If more supporting data is desired, a supplemental study is suggested. Other cardiac units and procedure areas could be included in this study to show the entire transportation process for all cardiac patients.
ACTION PLAN

February

- Brainstorming Session
- Notify Staff of Change in Wait Time Expectations
- Implement Trial Communications Procedures
- Interview Student Nurses

March

- Discuss Results of Trial Communications Period
- Develop Formal Procedure
- Student Nurse Begins Duties
- Implement Supplemental Study
REFERENCES

APPENDIX 1.
MINUTES FROM SEPTEMBER 12, 1991
CARDIOLOGY MEETING
Cardiology Meeting  
September 12, 1991

Present: Heather Wurster, Joyce Sorrentino, Laura Gorman, Maureen Flaherty-Thompson

During this initial meeting issues were discussed regarding the transportation of patients between the Cardiology inpatient units (7C & 7D) and Cardiology procedure areas (Cath lab & EPS lab). We will incorporate the Total Quality approach in dealing with the various components of this issue. The main concerns discussed include the following:

1. Evaluate the frequency and flow of Cardiology patients between inpatient units and procedure areas.
2. Determine the professional standard that needs to be adhered to. A Cardiology transportation policy does presently exist which sates that a clinical escort is required for Category II and III patients.
3. Reduce the waiting time of patients returning to 7C or 7D after completion of their procedures in the Cath lab and EPS lab.
4. Address the qualifications and cost of staff needed to accompany cardiology patients between units and to appointments.
5. Obtain information regarding the standards of practice in other institutions similar to University Hospital in transporting Cardiology patients.
APPENDIX 2.
DATA COLLECTION FORMS
CARDIAC PATIENT TRANSPORTATION DATA SHEET - B1 Labs

Date: ______________

Patient Name: ____________________  Patient Reg Number: __________

Patient Type: ADP  Inpatient  Unit: 7C  7D
(Circle One)  (Circle One)

Type of Transporter(s): Transporter  Nurse  Doctor/Fellow
(Circle All That Apply)

Lab: EPS  Cath
(Circle One)

INCOMING PATIENT

Time Patient Arrived at Lab: ______________

Comments: ________________________________

OUTGOING PATIENT

Time Transport Dept Called: ______________
(Please Note Repeated Calls) ______________

Time Scheduled for Transporter: ___________

Time Transporter Arrived at Lab: __________

Time Transporter Left Lab: ______________

Comments: _______________________________

If lost, please return this sheet to Laura Gorman.
Date: __________

Patient Name: ___________________________ Patient Reg Number: _______________

Diagnosis: ________________________________________________________________

Patient Category: (Circle One) I (1 Transporter, No Monitor) II (2 Transporters, No Monitor) III (1 Doctor or Nurse, 1 Transporter, Portable Monitor)

Patient Type: (Circle One) ADP Inpatient If Inpatient, Circle Unit: 7C 7D

Type of Transporter(s): (Circle All That Apply) Transporter Nurse Doctor/Fellow

OUTGOING PATIENT

Time Transport Dept Called: ________________ (Please Note Repeated Calls) ________________

Time of Patient Appointment: ________________

Time Transporter Arrived at Unit: ________________

Time Transporter Left Unit: ________________

Comments: _____________________________________________

_______________________________

INCOMING PATIENT

Time Transporter Arrived at Unit: ________________

Time Transporter Left Unit: ________________

Time Nurse Arrived: ________________

Comments: _____________________________________________

_______________________________

If lost, please return this sheet to Joyce Sorrentino.
APPENDIX 3.
CARDIAC TRANSPORTATION POLICY
Memorandum

TO: Larry Warren
   Associate Director and Administrator
   University Hospital and Kellogg Eye Center

FROM: Bertam Pitt, M.D.
   Professor of Internal Medicine
   Chief, Division of Cardiology

   Eric R. Bates, M.D.
   Alan H. Kadish, M.D.
   Fred Morady, M.D.
   John M. Nicklas, M.D.
   Michael J. Shea, M.D.
   Division of Cardiology

DATE: March 9, 1989

SUBJECT: TRANSPORTATION OF MONITORED CARDIOLOGY INPATIENTS

The staff and monitoring equipment required to transport cardiology inpatients to diagnostic and therapeutic procedures should be determined according to the following patient classifications:

CATEGORY I - 1 Transporter, no portable monitor

   Stable patients without: a) a history of symptomatic arrhythmias resulting in syncope or cardiac arrest, b) a recent myocardial infarction within the previous 48 hours, or c) hemodynamic/respiratory instability.

CATEGORY II - 2 Transporters (at least 1 certified in Basic Cardiac Life Support), no portable monitor

   Stable patients without hemodynamic/respiratory instability but with either: a) a history of a symptomatic arrhythmia resulting in syncope or cardiac arrest or b) a recent myocardial infarction within the previous 48 hours.

CATEGORY III - 1 or more Transporters plus Nurse and/or Physician, portable monitor

   1. Patients with hemodynamic instability producing hypotension with decreased renal, cerebral, or cardiac perfusion requiring intra-aortic balloon pump, temporary pacemaker, arterial line, and/or pharmacologic support.
   2. Patients with respiratory instability requiring mechanical ventilation or a history of respiratory instability within previous 24 hours.
   3. Obtunded or unconscious patients.

House officers should be responsible for assigning patients to the appropriate transportation category and indicating that category on the request forms and in the medical orders.

JN/lk
APPENDIX B

ADD-ON CASES
ADD-ON CASES
November 1991

# OF CASES

SERVICE

CARDIAC
GYN
NEURO
ORAL
ORTHO
OTO
PLASTICS
SEC
SGI
SON
STX
SVA
TBE
THORACIC
UROLOGY

WITHIN HOURS
OUT OF HOURS
ADD-ON CASES
November 1991

HOURS

SERVICE

CARDIAC  GYN  NEURO  ORAL  ORTHO  OTO  PLASTICS  SEC  SGI  SON  STX  SVA  TBE  THORACIC  UROLOGY

WITHIN HOURS
OUT OF HOURS
ADD-ON CASES WITHIN HOURS
November 1991

HOURS

# OF CASES

CARDIAC  GYN  NEURO  ORAL  ORTHO  OTO  PLASTICS  SEC  SGI  SON  STX  SVA  TBE  THORACIC  UROLOGY
ADD-ON CASES OUT OF HOURS November 1991

HOURS  # OF CASES

CARDIAC
GYN
NEURO
ORAL
ORTHO
OTO
PLASTICS
SEC
SGI
SON
STX
TB E
THORACIC
UROLOGY

HOURS
5 4 3 2 1 0

SERVICES
CASES OUT OF HOURS
November 1991

WEEKDAY OUT OF HOURS
SATURDAY CASES
SUNDAY CASES

HOURS

300
200
100
0

60 50 40 30 20 10 0
CASES OUT OF HOURS
November 1991

SERVICE

# OF CASES

CARDIAC
GYN
NEURO
ORTHO
OTO
PLASTICS
THORACIC
UROLOGY

WEEKDAY
SATURDAY
SUNDAY
CASSE OUT OF HOURS
November 1991
WEEKDAY CASES
OUT OF HOURS
November 1991
APPENDIX D

PROCEDURE TIMES
AVERAGE ANESTHESIOLOGY
+ POSITIONING TIME
November 1991
AVERAGE PROCEDURE END TIME
November 1991

% OF TOTAL CASE TIME

SERVICE
APPENDIX E

BLOCK TIME AND TOTAL TIME UTILIZATION
AVERAGE MONTHLY BLOCK UTILIZATION
November 1991

% UTILIZATION

SERVICES

CARDIAC  64%
GYN     73%
NEURO   72%
ORTH   77%
OTO     79%
PLASTICS 89%
SEC     96%
SGI     95%
SON     95%
STX     66%
SVA     50%
TBE     61%
THORACIC 53%
UROLOGY 62%
AVERAGE MONTHLY TOTAL UTILIZATION

6:00 AM TO 8:00 PM

November 1991

Utilization %

- Urology 69%
- Thoracic 56%
- TBE 74%
- TVA 73%
- STX 70%
- SON 63%
- SCI 63%
- SEC 85%
- Plastics 84%
- OTO 80%
- Ortho 88%
- Oral 67%
- Neuro 80%
- CVN 88%
- Cardiac 118%

SERVICE
AVERAGE MONTHLY TOTAL UTILIZATION
6:00 AM TO 5:30 PM
November 1991
AVERAGE MONTHLY TOTAL TIME UTILIZATION
6:00 AM TO 8:00 PM V. 6:00 AM TO 5:30 PM
November 1991
AVERAGE MONTHLY BLOCK V. TOTAL TIME UTILIZATION
(TOTAL FROM 6:00 AM TO 8:00 PM)
November 1991
AVERAGE MONTHLY
BLOCK V. TOTAL TIME UTILIZATION
(TOTAL FROM 6:00 AM TO 5:30 PM)
November 1991
CARDIAC SURGERY AVERAGE DAILY BLOCK V. TOTAL TIME UTILIZATION
November 1991

% UTILIZATION

DAY OF WEEK

MON  TUE  WED  THU  FRI
GYNECOLOGY SURGERY AVERAGE DAILY BLOCK V. TOTAL TIME UTILIZATION
November 1991

% UTILIZATION

DAY OF WEEK

MON  TUE  WED  THU  FRI

60%  68%  80%  82%  66%  70%  64%  68%  49%  49%

BLOCK  TOTAL
NEUROSURGERY AVERAGE DAILY BLOCK V. TOTAL TIME UTILIZATION
November 1991

% UTILIZATION

0% 20% 40% 60% 80% 100% 120%

MON 63% 86%
TUE 71% 91%
WED 75% 83%
THU 86% 105%
FRI 71% 74%

DAYS OF WEEK

BLOCK
TOTAL
ORAL SURGERY AVERAGE DAILY BLOCK V. TOTAL TIME UTILIZATION
November 1991

DAY OF WEEK

% UTILIZATION

0% 10% 20% 30% 40% 50% 60% 70% 80% 90%

MON TUE WED THU FRI

0% 74% 74% 0% 70% 0% 86% 0%
ORTHOPEDICS SURGERY AVERAGE DAILY BLOCK V. TOTAL TIME UTILIZATION
November 1991

<table>
<thead>
<tr>
<th>DAY OF WEEK</th>
<th>BLOCK</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>MON</td>
<td>81%</td>
<td>92%</td>
</tr>
<tr>
<td>TUE</td>
<td>74%</td>
<td>83%</td>
</tr>
<tr>
<td>WED</td>
<td>78%</td>
<td>82%</td>
</tr>
<tr>
<td>THU</td>
<td>76%</td>
<td>79%</td>
</tr>
<tr>
<td>FRI</td>
<td>75%</td>
<td>85%</td>
</tr>
</tbody>
</table>
OTOLARYNGOLOGY SURGERY AVERAGE DAILY BLOCK V. TOTAL TIME UTILIZATION
November 1991

Day of Week: MON, TUE, WED, THU, FRI

% Utilization:
- MON: 70% (BLOCK), 72% (TOTAL)
- TUE: 84% (BLOCK), 88% (TOTAL)
- WED: 94% (BLOCK), 102% (TOTAL)
- THU: 75% (BLOCK), 89% (TOTAL)
- FRI: 71% (BLOCK), 76% (TOTAL)

Graph shows average daily block versus total time utilization across the week.
PLASTIC SURGERY AVERAGE DAILY BLOCK V. TOTAL TIME UTILIZATION
November 1991

% UTILIZATION

MON  TUE  WED  THU  FRI

100%  98%  107%  102%  125%

123%  77%  75%  75%  68%

DAY OF WEEK

BLOCK
TOTAL
ENDOCRINE CRITICAL CARE AVERAGE
DAILY BLOCK V. TOTAL TIME UTILIZATION
November 1991
GASTROENTEROLOGY SURGERY AVERAGE DAILY BLOCK V. TOTAL TIME UTILIZATION
November 1991

% UTILIZATION

MON: 82% 127%
TUE: 81% 85%
WED: 115% 115%
THU: 0% 0%
FRI: 106% 111%

DAY OF WEEK

BLOCK
TOTAL
Onology Surgery Average Daily Block V. Total Time Utilization

November 1991
TRANSPLANT SURGERY AVERAGE DAILY BLOCK V. TOTAL TIME UTILIZATION
November 1991

% UTILIZATION

DAY OF WEEK

MON 43% 49%
TUE 0% 0%
WED 72% 111%
THU 36% 59%
FRI 0% 0%
VASCULAR SURGERY AVERAGE DAILY BLOCK V. TOTAL TIME UTILIZATION
November 1991

% UTILIZATION

- MON: 85% BLOCK, 98% TOTAL
- TUE: 124% BLOCK, 98% TOTAL
- WED: 0% BLOCK, 0% TOTAL
- THU: 78% BLOCK, 117% TOTAL
- FRI: 94% BLOCK, 96% TOTAL
THORACIC SURGERY AVERAGE DAILY BLOCK V. TOTAL TIME UTILIZATION
November 1991

DAY OF WEEK

% UTILIZATION

MON  TUE  WED  THU  FRI

56%  60%  63%  63%  55%

0%  0%  0%  0%  48%  48%