Children’s Multidisciplinary Specialty Nephrology Clinic

The University of Michigan Health System
Program and Operations Analysis
Industrial and Operations Engineering 481

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Executive Summary

Background
The state of Michigan formed Children’s Multidisciplinary Specialty (CMS) clinics for children having chronic or handicapping medical conditions. These clinics provide a coordinated interdisciplinary approach to the treatment and management of these conditions through the use of a five-member core team. The CMS Nephrology clinic has requested a study be done to quantify the amount of time in which a psychologist will be required to be present in the clinic.

The Goal
The goal of this study is to help in the scheduling of the psychologist that will be added to the CMS core team in the near future. This report will also serve as a base line to compare future time study data.

Recommendations
The following recommendations represent the best opportunity to utilize the time of the professionals associated with the Nephrology CMS core team.

- Employ the use of XX psychologist hours to complete required comprehensive visits
- Schedule comprehensive visits during predetermined clinic hours
- Staff psychologist only on days in which comprehensive visits will be preformed
- Explore the possibility of a single psychologist working for multiple CMS clinics

Report Content
The following report consists of:

- an analysis of the distribution of CMS visits by type, by day and by month,
- data regarding contact time with patient as well as patient wait time
- recommendations to improve utilization of resources
- a general operational overview of the Nephrology CMS clinic
Introduction and Background

The state of Michigan formed Children’s Multidisciplinary Specialty (CMS) clinics for recipients of Medicaid and Children’s Special Health Care Services (CSHCS). CMS clinical services are reserved for patients whose medical condition is of a severe and chronic or handicapping nature where complex coordinated assessment and management is required.

CMS clinics provide a coordinated interdisciplinary approach to assessment and management of some complex medical conditions through the use of a core staff team. The core team consists of a doctor, nurse, dietitian, social worker and psychologist. Children receiving care through the CMS clinic service begin their treatment with a comprehensive visit. During the comprehensive appointment, the child meets with all five members of the core team. After which, the core team compiles an integrated report outlining the course of action or plan for treatment for the next year. Throughout the year, patients will return for “Management” and “Support” visits. During a management visit, the child meets with the doctor or nurse, and two other members of the core team; while during a support visit, the patient meets with only one member of the team.

Currently, there are 15 different specialized Pediatric clinics at the University of Michigan Health System. These clinics occupy the same area as Pediatric clinics that are not associated with CMS. The Pediatric Nephrology clinic and the CMS Nephrology clinic see patients at the same time.

The CMS clinics have requested studies in several areas including:

- billing procedures
- how to schedule the clinics
- evaluation of patient projections
- how to identify CMS patients

Due to the short time frame available to accomplish this project, the team narrowed the objective and concentrated on quantifying the amount of time when a psychologist must be present. However, while collecting data, observations were made in an attempt to identify future projects, and findings of relevant data are noted.

The purpose of this project was to study and document the work flow and work requirements within the CMS clinic. This project analyzed the operations performed by each core staff member. The project team determined the amount of time a psychologist is needed for comprehensive visits.
Approach and Methodology

In determining the need for a psychologist in the CMS Nephrology Clinic, the team collected direct time data observations and analyzed historical clinic appointments. Direct time data collections occurred over 9 observation sessions between Thursday October 23, 1997 and Tuesday, November 18, 1997. The team observed 7 of 19 comprehensive visits (36.8%) and 8 of 33 management visits (24.2%) during this time frame. The historical data was obtained from the CMS Nephrology clinic and contained information on the date and type of CMS visits that have occurred from when the clinic opened in July 1996 through October 1997.

Data Collection

Time ladders generated during data collection, begin when the patient entered the room and indicate the times when a medical professional would enter or leave the room (Figure 1). From these, the time each patient spent in the clinic, the amount of waiting time and the amount of contact time with each professional could be quantified. The CMS Nephrology clinic estimates only five management or support visits have required the use of a psychologist since the clinic opened in July of 1996; Therefore, recommendations will focus on the comprehensive data.

Figure 1. Example Time Ladder; source: Direct Observation

Oct. 23 Thursday

Comprehensive

<table>
<thead>
<tr>
<th>Event</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient Enter</td>
<td>10:15</td>
</tr>
<tr>
<td>Nurse Enter</td>
<td>10:20</td>
</tr>
<tr>
<td>Diet Enter</td>
<td>10:25</td>
</tr>
<tr>
<td>Diet Exit</td>
<td>10:27</td>
</tr>
<tr>
<td>Diet Enter</td>
<td>10:38</td>
</tr>
<tr>
<td>Diet Exit</td>
<td>10:39</td>
</tr>
<tr>
<td>Nurse Exit</td>
<td>10:37</td>
</tr>
<tr>
<td>Dr. Enter</td>
<td>10:45</td>
</tr>
<tr>
<td>Dr. Exit</td>
<td>10:54</td>
</tr>
<tr>
<td>SW Enter</td>
<td>10:55</td>
</tr>
<tr>
<td>SW Exit</td>
<td>11:05</td>
</tr>
<tr>
<td>Patient Exit</td>
<td>11:07</td>
</tr>
</tbody>
</table>

Database Research

The Nephrology database contained information on 1103 CMS visits from July 1, 1996 through October 23, 1997. This information was used to determine any possible patterns in appointment types and to determine the distribution of CMS visits. This information is summarized in Table 1 and shown graphically in Figure 2. Tuesdays averaged the highest number of CMS visits; followed by Monday and Thursday respectively.
The number of Management and Support visits has been rising linearly throughout the 1997 calendar year (Figures 3 and 4). However, a slightly cyclical trend has developed for Comprehensive visits. This may be explained by the large influx of Comprehensive visits when the clinic first opened, and the required yearly renewal of Comprehensive visits for these patients (Figure 5).
Figure 3. Management visits by month. Source: CMS Nephrology clinic database.

![Total Management Visits Per Month](image)

Figure 4. Support visits by month. Source: CMS Nephrology clinic database.

![Total Support Visits Per Month](image)

Figure 5. Comprehensive visits by month. Source: CMS Nephrology clinic database.

![Total Comprehensive Visits Per Month](image)
Current Situation

State requirements assert that a Doctor, Nurse, Dietitian, Social Worker and Psychologist must see patients during a CMS Nephrology comprehensive visit. Currently, the state allows the CMS team to use a survey to complete a psychological evaluation. This survey is given to the parents and patients that are at least nine years of age and serves as a supplement to actually seeing the psychologist.

For the patient's convenience, current scheduling practices allow Comprehensive visits to be scheduled at any time the CMS clinic is open (Figure 6).

Figure 6. Shaded areas indicate times when CMS Nephrology clinic sees patients.

<table>
<thead>
<tr>
<th>DAY</th>
<th>Morning (8 AM -12 Noon)</th>
<th>Afternoon (1 PM - 5 PM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tuesday</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wednesday</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thursday</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Friday</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*The first Thursday morning of the month is a special clinic for Hypertension; the third Thursday of the month is a special clinic for PKD and the fourth Thursday clinic is for Nephrology/Rheumatology patients.

Findings and Conclusions

Analysis of the database yielded information on the number of CMS visits that have occurred during the last 15 months. Figure 6 shows the number of comprehensive visits that occurred each day. Figures 7 and 8 show the number of management and support visits, respectively. Monday, Tuesday, and Thursday have the highest demand for all CMS and particularly comprehensive visits. While there have been a few visits on Wednesdays and Fridays, these numbers are much lower.
Figure 6. Comprehensive Visits by day of the week. Source: CMS Nephrology database.

![Average distribution of Comprehensive visits throughout the Week](chart)

Figure 7. Management Visits by day of the week. Source: CMS Nephrology database

![Average Distribution of Management Visits Throughout the Week](chart)

Figure 8. Support Visits by day of the week. Source: CMS Nephrology database

![Average Distribution of Support Visits Throughout the Week](chart)
Figure 9. Total CMS Visits by month. Source: CMS Nephrology database

Figure 9 shows the monthly distribution of all CMS visits. The number of visits during August 1996 appears to be an outlier and the October 1997 available data ended on the 23rd and was pro-rated to the end of the month. Additionally, the number of CMS visits per month has been relatively constant since February 1997. However, the types of visits have fluctuated. Since September 1996, the number of comprehensive visits has remained below 20 per month (Figure 10). With the exception of October 1997, the average number of comprehensive visits is less than five per week.

Figure 10. Number of Comprehensive visits per month. Source: CMS Nephrology database.

The state requires a certain amount of contact time for each type of visit. Contact time has been defined here as the total time spent with each professional. Therefore, if two professionals were present in the room at the same time, then contact time may exceed the time spent in the room. A comprehensive visit must include at least one hour with medical professionals, and management and support visits must be at least 30 minutes of contact time. Figure 11 shows each visit observed as a percentage of the
required time. From this, one can see that some patients did not receive the required amount of contact time (Table 2). During comprehensive visits, the addition of a face-to-face visit with the psychologist is expected to increase the total contact time.

Figure 11. Contact time vs. State requirements. Source: Direct Observations.

![Visits Meeting State Required Amount of Time](image)

Table 2. Compliance with State Requirements. Source: Direct Observations.

<table>
<thead>
<tr>
<th>Type of Visit</th>
<th>State Required Contact Time</th>
<th>Percentage of Visits Meeting State Requirement</th>
<th>Percentage of Total Visits Observed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comprehensive</td>
<td>60 Minutes</td>
<td>57.15%</td>
<td>36.80%</td>
</tr>
<tr>
<td>Management</td>
<td>30 Minutes</td>
<td>50.00%</td>
<td>24.20%</td>
</tr>
<tr>
<td>Support</td>
<td>30 Minutes</td>
<td>50.00%</td>
<td>8.00%</td>
</tr>
</tbody>
</table>

Patient wait time refers to the time in which the patient was alone in the examination room without a professional present. The total amount of patient wait time is quantified in Table 3 and shown graphically in Figure 12 and 13.

Table 3. Patient Wait Time in Examination Room. Source: Direct Observations.

<table>
<thead>
<tr>
<th></th>
<th>Minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>20</td>
</tr>
<tr>
<td>Minimum</td>
<td>4</td>
</tr>
<tr>
<td>Maximum</td>
<td>47</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>10.566</td>
</tr>
</tbody>
</table>
Figure 12.

Patient Wait time in Examination Room

Figure 13.

Patient Wait Time Vs. Time With at Least One Professional

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