Pediatric Dietitians: Staffing Pattern Assessment

Final Report

Patient Food and Nutrition Services, University of Michigan Hospitals and Health Centers Nutrition Services

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Table of Contents

Executive Summary ..............................................................................................................4
Introduction & Background ..................................................................................................4
Approach ...........................................................................................................................4
Findings ..............................................................................................................................6
Conclusions & Recommendations .......................................................................................7
Expected Impact ..................................................................................................................8
Areas of Further Study .........................................................................................................9

I. Introduction ..................................................................................................................10

II. Background ..................................................................................................................10

III. Goals and Objectives ..................................................................................................11

IV. Project Scope ..............................................................................................................12

V. Approach .....................................................................................................................12
RD Work Process Familiarization ......................................................................................12
RD Workload Distribution Data Collection ........................................................................13
Staffing Model Volume Data Collection ..........................................................................13
Staffing Model Development ............................................................................................14
Benchmarking ....................................................................................................................14
Conclusions & Recommendations ...................................................................................14

VI. Findings .....................................................................................................................14
RD Work Process Familiarization ......................................................................................15
RD Workload Distribution Data Collection ........................................................................17
Staffing Model Findings ....................................................................................................21
Benchmarking ....................................................................................................................25

VII. Conclusions & Recommendations ............................................................................25
Inefficient and Non-Standardized Procedures ...................................................................25
Current Staffing Pattern Does Not Reflect Required Staffing Pattern ...............................27
RDs Perform Tasks That Do Not Require Their Expertise ................................................27
RDs Perform Nutrition Calculations Using Hand-Held Calculators ................................28

VIII. Expected Impact .......................................................................................................28

IX. Areas of Further Study ...............................................................................................29
Improve RD productivity measuring system (and corresponding staffing model) ..........29
Perform cost analysis of equipment purchases .................................................................29

X. Acknowledgements .....................................................................................................30

XI. Appendices ................................................................................................................31
A. Nutrition Care Process Flow Chart .............................................................. 31
B. RD/DT Interview & Shadow Observations .................................................. 32
C. Literature Search List .................................................................................. 45
D. Work Sampling Check Sheet Instructions .................................................. 46
E. Work Sampling Check Sheet ....................................................................... 47
F. Work Tally Check Sheet .............................................................................. 48
G. Online Stats Staff Model by Month/ by RD ................................................. 49
H. Tally Sheet Staff Model by Month/ by RD .................................................... 51
I. RD Tally Sheet Workload Timeliness ............................................................ 53
J. Time Study Verification Summary ............................................................... 54
K. Workload Drivers Pareto Charts (Top Five Workload Drivers) ................ 55
L. Workload Drivers Box-plot .......................................................................... 57
M. Expected Impact Table (with calculations) .................................................. 58
N. Benchmarking Survey ................................................................................. 59
List of Tables and Figures

Figures:
Figure 1. RD High Level Work Flow Chart .................................................................16
Figure 2. Overall Breakdown of RD Activities ...............................................................17
Figure 3. Direct vs. Indirect Inpatient Care Breakdown ...............................................18
Figure 4. Direct vs. Indirect Outpatient Care Breakdown .............................................18
Figure 5. Five Most Time Consuming RD Workload Drivers .......................................19
Figure 6. Percentage of Workload Driver Completed ..................................................19
Figure 7. Average Number of Workload Drivers Overdue .........................................20
Figure 8. Four Most Time Consuming RD Workload Drivers Comparison .................20
Figure 9. Online Stats Estimated Daily Total FTE Requirement for 03/08 ...................21
Figure 10. Online Stats Estimated Daily FTE Trend Averaged Over All Positions for 03/08 ....22
Figure 11. Control Chart of Mott Children’s Hospital Census Data (6/06 - 3/08) ........ 23
Figure 12. Tally Sheet Estimated Daily Total FTE Requirement ..................................24
Figure 13. Tally Sheet Estimated Daily FTE Trend Averaged Over All Positions ..........24

Tables:
Table 1. UM-CareLink and Web-DOES Comparison .....................................................17
Table 2. Benchmarking Comparison of Mott Children’s Hospital against Other Pediatric Institutions .............................................................25
Table 3. Expected Impact of Recommendations ..........................................................29
Executive Summary

I. & II. Introduction and Background

The team’s project focuses on the 11 Registered Dietitian (RD) positions in teams D, E, and float positions in the Mott Children’s Hospital. RDs currently serve both inpatients and outpatients and are assigned by floors or by specific units. There is a perception that the RDs are experiencing an increased workload due to an increase in patient care demand and unbalanced work distribution over the years. For example, RDs perceive that workload is higher during Mondays and Tuesdays because only one RD covers weekends. To mitigate these problems, the Nutritional Services Manager asked the team to streamline redundant and inefficient processes of the RD services and propose a RD staffing model that ensures quality nutritional services and is practical and implementable. This report is an account of the team’s analysis of the current workload distribution used in the University of Michigan Health System, Patient Food and Nutrition Services Department.

III. Approach

The team followed the steps described below in chronological order to accurately address the problem, collect relevant data, and logically analyze the problem to propose recommendations.

RD Work Process Familiarization

Performed Literature Search
The team performed literature searches of previous IOE 481 staffing model projects as well as existing staffing guides, and dietetic journal articles. Refer to Appendix C for the literature search list.

Interviewed and shadowed RDs, created flowcharts
The team spent over 120 hours interviewing and shadowing 11 RDs and 2 Dietetic Technicians (DT) to gain a better understanding of the work procedures of RDs and DTs as well as the key project issues. The team then created high level and detailed flow charts of the RDs’ work processes. (Appendix B).

RD Workload Distribution Data Collection

Conducted RD work study
In order to determine and analyze how an RD spends time during a typical working day of an RD the team created work sampling check sheets for the RDs to fill out at randomly selected moments throughout the day for three weeks (02/18/2008 - 03/10/2008).

Validated existing data
The team performed data validation by performing time studies on two RDs for 14 hours. The purpose of the time study was to verify the data collected in the work sampling sheets and the work tally sheets.
Stratified and analyzed work sampling data to identify streamlining opportunities
The work sampling data collected by the RDs were analyzed and stratified to identify the tasks that took the longest time to complete. The collected data were also used to build the staffing model.

Staffing Model Volume Data Collection

Reviewed existing productivity statistics
The team extracted, reviewed, and analyzed existing productivity statistics from June 2007 to March 2008, which revealed RD’s current daily work flow, particularly in direct patient care.

Constructed RD work tally sheet and collected tally data
The team felt that the existing online productivity statistics did not accurately reflect the RDs’ productivity. In order to obtain more accurate and reflective RD work volume data, the team created and distributed work tally sheets for the RDs to fill out for one work week (03/18/2008 – 03/24/2008). The data collected was used as volume input for the improved staffing model.

Staffing Model Development

Developed two staffing models
The team developed two staffing models to estimate staffing requirements based on the service unit and the day of the week. The first model’s volume data is based on the online productivity statistics while the second model is based on the work tally data. The models have been developed in Microsoft Excel and are flexible for the manager to update and change data as needed.

Analyzed staffing models
The team analyzed the two staffing models to evaluate the overall required staffing levels versus the current actual staffing levels. The model was adjusted accordingly after meetings with the Project Coordinator and with the Nutritional Services Manager. The main focus of the analysis was to exam the reliability of the patient volume, RD work time estimates, model outputs and flexibility of the model with new data inputs.

Benchmarking

Created, distributed, and analyzed benchmarking surveys
To determine the levels of staff, level of productivity, and workload allocation used at other institutions, the team created a benchmarking survey (see Appendix N). The Nutritional Services Manager then distributed the survey to a listserv of other Nutrition Services Managers. After receiving 12 responses, the team compiled, compared, and analyzed the benchmarking results.

Conclusions & Recommendations

Formulated conclusions and recommendations
After stratifying the work sampling data, the team investigated opportunities for streamlining the work categories that took the longest time to complete. The team proposed recommendations to eliminate non-value-added tasks, and shift tasks that do not require an RD’s expertise to DTs or
to other members of the team.

IV. Key Findings

RD Work Process Familiarization
- Documentation is perceived as time-consuming (RDs stated that it takes them 20% - 50% of their work days)
- UM-CareLink\textsuperscript{1} & Web-DOES\textsuperscript{2} are not compatible
- Outpatient pages, calls, and care results in interruptions and frequent travelling

RD Workload Distribution Data Collection
- Data Verification (time study and census verification):
  - No significant difference in time distributions existed between the work sampling data and time study data for the top workload drivers
  - At least 88% of the differences between the work sampling data and the time study data fall within one standard deviation
  - Census data for Mott Children’s Hospital (from June 2006 to March 2008) indicated that the census for March 2008 falls within the upper and lower control limits as shown in Figure 9.

- RD Workload Components:
  - 51% of time spent in inpatient care
  - 20% of time spent in outpatient care
  - 29% of time spent in non-patient related activities

- Inpatient Care Breakdown:
  - 38% of time spent in direct patient care
  - 62% of time spent in indirect patient care

- Outpatient Care Breakdown:
  - 46% of time spent in direct patient care
  - 53% of time spent in indirect patient care
  - 1% of time spent in care for long-term outpatients

- Top 5 workload drivers include: Documentation/Charting (16.0% of day), examining patient information (8.2% of day), performing rounds (8.0% of day), travelling (5.4% of day), and speaking with physician or other members of the team (5.3% of day)

\textsuperscript{1} UM-CareLink is a computerized provider order entry (CPOE) system that recently began rolling out across the University of Michigan Health System.

\textsuperscript{2} Web-DOES is a diet order system for UMHS inpatients. Used by unit clerks, diet clerks, dietitian assistants, and registered dietitians.
Staffing Model Findings

- **Online Statistics Staffing Model:**
  - The model is based on the empirical model formula shown below:

  \[
  \text{Total Daily Work Minutes} = \left( \sum \text{Average Primary Workload Driver} \times \text{Workload Volume} \right) + \left( \sum \text{Average Secondary Workload Driver} \right)
  \]

  - The March 2008 model output indicated that the actual staffing level did not meet the expected staffing level and that the required staffing level was higher on Mondays, Wednesdays, and Fridays.
  - 8 of the RDs that have online statistics data need to work overtime to meet patient demand.

- **Tally Sheet Staffing Model**
  - From the tally sheet data collection over 03/18/08 – 03/24/08, the team noticed that the workload drivers, reassessments and consults, had a very high number overdue each day, 1.34 and 1.08 respectively.
  - From the 03/18/08 – 03/24/08 model output, the current required staffing level does not meet the expected staffing level.
  - From the 03/18/08 – 03/24/08 model output, the required staffing level was higher on Wednesdays.

**Benchmarking**

- RD to patient ratio is much lower at Mott, 1 RD: 14.0 patients, compared to 1:38.2 for the average of twelve institutions that responded to the benchmarking survey.
- Ratio is lower due to the high patient acuity of Mott and the outpatient duties of the RDs.
- Many institutions employed DTs to cover a much wider range of duties. These tasks encompass some of the work that RDs perform at Mott.

**V. Conclusions & Recommendations**

**Inefficient and Non-Standardized Procedures:**

Documentation + Travel Time + Examining patient info = 29.6% of day

**Recommendations:**

To Reduce Documentation/Charting Time:

1. Purchase digital voice-recognition recorders to facilitate charting.
2. Implement random audits to ensure succinct nutrition documentation to the physicians and to the medical team.
3. Employ documentation training sessions to educate and standardize charting procedures.
4. Include drop down menus and other criterion selection menus in charting window to minimize free text entry.
To Minimize Unnecessary Travel Time:

5. Purchase notebook or tablet computers for RDs that have outpatient assignments to allow them to chart and look up patient information when waiting.

To Minimize Time to Examine Patient Info:

6. Implement a standard work procedure that uses UM-CareLink’s Worklist Manager Function as the main source to plan daily workload.
7. Phase out Web-DOES with systems that are compatible with UM-CareLink and CareWeb (e.g. CBORD) to reduce order system incompatibilities and human error.

Current Staffing Pattern Does Not Reflect Required Staffing Pattern:
Based on both our Online Statistics Staffing Model and Tally Sheet Model the required staffing level was higher on Mondays, Fridays, and Wednesdays.

Recommendation:

8. Increase staffing to match expected/required staffing

RDs Perform Tasks That Do Not Require Their Expertise:
Benchmarking showed that many institutions employed Dietetic Technicians (DTs) to perform some RD duties.

Recommendation:

9. Transfer more RD duties to DTs, such as screens, diet orders, and nutrition education.

RDs Perform Nutrition Calculations Using Hand-Held Calculators
Shadowing and interviewing RDs showed that many calculations are performed using hand-held calculators. RDs spend 3.3% of their day performing calculations according to the work sampling data. The numerous nutrition calculations needed by the RDs throughout the course of the day provide many opportunities for calculation error.

10. Have RDs perform nutrition calculations using computer-based programs

Computer programs developed to calculate nutrition values based on entered-in values would reduce the potential for calculation errors and reduce the time RDs spend performing calculations.

VI. Expected Impact

If all of the recommendations are implemented, the team expects each RD to save 1,123 minutes per month or (18.7 hours per month).
VII. Areas of Further Study

**Improve RD productivity measuring system (and corresponding staffing model)**
- The RDs view the productivity statistics sheet as a poor indicator of their productivity
- RDs have different understandings of the categories in the productivity statistics sheet
- The productivity statistics sheet have different fields asking for workload drivers that are “due” or “done”

Implementing a productivity measuring system that better addresses the RD workload drivers and does not require RDs to input data → better staffing decisions

**Select equipment for purchase and perform cost analysis**

Evaluate the features that are needed and determine model of equipment to be purchased. Perform a basic cost analysis to verify costs are recouped though time savings and patient care improvements.
I. Introduction

The services of the Registered Dietitians (RDs) in Mott Children’s Hospital are in greater demand as the RDs have become an integral part of many interdisciplinary teams. While the funding for RD staff has not increased, the number of clinics and clinic visits has increased. In addition, increased demand for nutrition services has led to some patients not receiving adequate nutritional care, resulting in physician dissatisfaction, RD job related stress, and to increased RD turnover.

The Nutritional Services Manager asked the team to evaluate the current RD workload distribution process, and propose methods to streamline redundant and inefficient RD work processes. In addition, the Nutritional Services Manager requested that the team evaluate the current RD staffing model and propose an improved staffing model that accurately depicts RD staffing adequacy. In response, the team collected and validated the working volume and time estimates for RD work tasks. Based on the validated data, the team developed a dynamic staffing model to reflect the current workload conditions for the RDs to help the Nutritional Services Manager improve or adjust the staffing plan of the department. Furthermore, the team also developed recommendations to streamline RD processes. The purpose of this report is to provide an account of the team’s analysis of the current workload distribution used in the University of Michigan Health System, Patient Food and Nutrition Services Department.

II. Background

Registered Dietitians (RDs) currently serve both inpatients and outpatients in Mott Children’s Hospital. Each RD has inpatient assignments by specific units and/or outpatient assignments by specific outpatient clinics. Individual RDs have nutritional expertise with particular patient populations (e.g., bone marrow transplant, thoracic intensive care, cystic fibrosis). Currently, Mott Children’s Hospital has 31 inpatients and outpatient RDs in 5 teams (Teams A through E).

There is a perception that funding for RDs has increased at a rate lower than the demand for dietetic services. Currently, RD funding is at 11.5 Full-Time Equivalents\(^3\) (FTEs). Temporary RD funding amounts to 2.7 FTEs (2.1 FTEs until September ’08). During the transition period for an improved staffing model, the Nutritional Services Manager believes that if the 2.1 FTEs temporary budget variance is allocated properly, the concerns of inadequate staffing should be temporarily alleviated. Although more funding for additional RDs has been requested, the goal of this project was to determine more efficient methods for RDs to perform required tasks.

To evenly distribute RD workload while still providing a high level of patient care, appropriate volume & time data of peak & non-peak periods are needed to be obtained to create a flexible model that predicts the future staffing plan.

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\(^3\) One Full-Time Equivalent (FTE) equals a full workweek (37.50, 40, etc. hours), regardless of the number of positions or employees that make up those hours. For example, three employees in two different positions, whose combined hours equal 40 hours, equal one FTE. For this project there are 40 hours in a work week.
To fulfill the project, the following key issues drove the need for this project:

- Some RDs do not have enough time to see all their patients. 30% Mott patients requiring RD services were not attended to on-time. This results in RDs pushing this work to the next day or build up over time, and may eventually decrease patient satisfaction. The team was asked to analyze the daily RD work procedures as well as propose streamlining recommendations.

- A staffing analysis was needed to know how many RDs were needed to evenly distribute the workload while providing a high level of patient care quality. Because of the fluctuation of data from year to year and from service to service, the Nutritional Services Manager needed a dynamic staffing model that can predict staffing needs prospectively based on expected volumes for the current year.

Other issues that drove the need for this project include:

- The staffing pattern on weekdays differs from the weekends; there is only one RD present on Saturdays and Sundays.

- The new UM-CareLink online orders management program has been live in Mott since June 2007. The new system has impacted workflow, causing some re-work in diet order entries since UM-CareLink is not compatible with the Web-based Diet Order Entry System (Web-DOES).

### III. Goals and Objectives

The primary goals of the project were to:

- Assess and streamline the work processes of RDs
- Develop a dynamic RD staffing model to be used by the Nutritional Services Manager on an ongoing basis

To effectively analyze and propose recommendations for each of the primary goals above, the project objectives were to:

- Fully understand the different RD workload drivers
- Collect workload time distribution data to analyze bottleneck tasks
- Collect appropriate volume and time data as inputs of the staffing model

The team proposed recommendations to streamline RD work processes by reducing non-value added tasks, and by reallocating those tasks that do not require RDs’ expertise to appropriate personnel. Additionally, the team developed two robust RD staffing models to accommodate RD workloads: the first model is based on the online productivity statistics and the second model is based on the tally sheet data that the team collected.
IV. Project Scope

This project scope included:

- 11 Registered Dietitians working in teams D and E, 2 Dietetic Technician (DTs)
- RD work processes in both the inpatients and outpatients areas
- RD work processes in Mott Children’s Hospital, the A. Alfred Taubman Health Care Center, and the offsite Home Ventilator Program Clinic
- The investigation and streamlining of RD workload drivers

This project scope excluded:

- Dietetic services for adult patients
- Other University of Michigan Health System sites not listed above
- Food production and delivery

V. Approach

The team followed the steps described below in chronological order to accurately address the problem, collect data, and analyze the problem to develop recommendations.

RD Work Process Familiarization

Performed Literature Search
The team completed literature searches of previous IOE 481 staffing model projects. This helped the team to understand the methodology required to create a robust staffing model. The team also examined approaches to clinical staffing in the book, *Achieving Excellence: Clinical Staffing for Today and Tomorrow*. The team gained much insight from a range of information from the work processes of an RD to data collection methods. The team also researched journal articles from the *American Dietetic Association* related to RD staffing patterns to gain a better understanding of topics including: an ADA standard staffing ratio, examining factors in the amount of dietitian staffing, and potential solutions to staffing problems. Refer to Appendix C for the literature search list.

Interviewed and shadowed RDs, created flowcharts
The team interviewed and shadowed the 11 RDs and the 2 Dietetic Technicians (DTs) over a total of 120 hours to gain a better understanding of the work procedures of RDs and DTs as well as the key project issues. Gaining the basic understanding of their workload allowed us to develop a flow chart that illustrates the high level work procedures (see Appendix A). In addition, the team created individual detailed flowcharts for each RD (Appendix B).
**RD Workload Distribution Data Collection**

*Constructed RD work sampling check sheet and collected work sampling data*

The team created work sampling check sheets for the RDs to fill out at randomly selected moments throughout the day for three weeks (02/18/2008 - 03/10/2008). The work sampling check sheets allowed the team to effectively determine the percentage of time the RDs spend on different tasks. The random moments are based on when the pager beeps at random intervals. The work sampling sheet classifies the different types of activities of an RD, and is designed to be easy to use with minimal interruption during their work. The RDs felt that the data collected in the “beeper study” more accurately depicts their work distribution than the categories in the online productivity statistics from June 2007 to March 2008.

*Validated existing data*

The team validated the work sampling data by performing time studies on two RDs for two work days (03/26/2008, 03/27/2008). The purpose of the time study was to verify the data collected in the work sampling sheets as well as the data collected in the work tally sheets. Other data validation tasks included informally interviewing RDs as well as the Nutritional Services Manager about the reliability of the data. The team obtained expert estimates for the existing and missing data to further improve the model.

*Stratified and analyzed work sampling data to identify streamlining opportunities*

The work sampling data collected by the RDs were analyzed and stratified to identify the tasks that took the longest time to complete. The collected data was also used to construct the staffing models. The team then focused on the tasks that took the longest time to complete and identified streamlining recommendations.

**Staffing Model Volume Data Collection**

*Reviewed existing productivity statistics*

The team reviewed and analyzed existing productivity statistics from June 2007 to March 2008 provided by the Nutritional Services Manager. The productivity or “online statistics” revealed the 11 RDs’ current self-reported daily work load, particularly in direct patient care. This information gave the team a better understanding of what sources data was needed to measure the RD workload more accurately.

*Constructed RD work tally sheet and collected tally data*

The team felt that the existing online productivity statistics did not accurately reflect the RDs’ productivity. In addition, the data’s reliability is questionable as most of the values are rounded and many values are missing.

In order to obtain more accurate and reflective RD work volume data, the team created and distributed work tally sheets with the same activities as the work sampling sheets for the RDs to fill out for one work week (03/18/2008 – 03/24/2008). The RDs filled out the number of times each listed activity was performed during the day as well as the number of consults, assessments, reassessments and screens due, done, and overdue that day. The data collected was used as the volume input for the improved staffing model.
Staffing Model Development

Developed two staffing models
The team developed two staffing models to estimate staffing requirements based on the service unit and the day of the month. The first model’s volume data is based on the online productivity statistics while the second model is based on the work tally data. The models have been developed in Microsoft Excel and are flexible for the manager to update and change data as needed.

Analyzed staffing models
The team met weekly with the Coordinator and Nutritional Services Manager to analyze and gain feedback on the model. The model was adjusted accordingly. The main focus of the analysis was to examine the reliability of the staffing model data inputs and outputs. The team also discussed further development of the productivity statistics with the Nutritional Services Manager.

Benchmarking

Created, distributed, and analyzed benchmarking surveys
To determine the levels of staff, level of productivity, and workload allocation used at other institutions, the team created a benchmarking survey (see Appendix N). The Nutritional Services Manager then distributed the survey to a listserv of Nutrition Services Managers. After receiving 12 responses from a diverse set of institutions, the team compiled, compared, and analyzed the benchmarking results.

Conclusions & Recommendations

Formulated conclusions and recommendations
After stratifying the work sampling data and verifying the collected data, the team investigated streamlining opportunities for the work categories that took the longest time to complete. The team then proposed recommendations to eliminate non-value-added tasks, as well as recommendations to shift certain tasks that do not require an RD’s expertise to DTs or to other members of the team.

VI. Findings

Literature search
The current RD staffing pattern at the Patient Food and Nutrition Services often does not meet the daily demand. To effectively create a staffing plan, the literature search has guided the initial stage of the project by providing a benchmark staffing level and providing the general approach to develop a staffing model. Below are the three resources that provide information on basic staffing patterns in dietetic services.

1. What Is ADA’s Staffing Ratio For Clinical Dietitians by the American Dietetic Association
- RD staffing is often determined by the institutional setting, patient population, budget limitations, and benchmarking targets.

- The staff-to-patient ratio of pediatric hospitals in the United States and Canada vary between 1:24 to 1:159.

- In the Patient Acuity Staffing guidelines developed by the Clinical Nutrition Management practice group, the ratio of RDs per patient was 1:65 to 1:75 for medical services and 1:30 to 1:60 for an intensive care unit.

2. Development and Implementation of A Clinical Inpatient Staffing Model In An Academic Medical Center by The University of Iowa Hospitals and Clinics

- Staffing modeling should include both direct and indirect patient care.

- Total Direct Time:
  
  Initial Assessments/week*0.75 (hours/assessment) + Follow-up Assessments/week*0.75 (hours/assessment) + Education Time (hours/week) + Rounds (hours/week) + Monitoring Time (hours/week)

- Non-direct patient care time is assigned by adding 8 hours per week per dietitian FTE.

3. Clinical Staffing: Determining the Right Size by the American Dietetic Association

- To develop an accurate staffing level, five areas needed to be considered: 1) Facility 2) Department services/operations 3) Legislation 4) Accreditation standards 5) Professional practice issues and guidelines.

**RD Work Process Familiarization**

The team interviewed and shadowed 11 RDs. The interviews were used as a guideline for the initial stage of the project as we became familiarized with the RDs’ daily work processes. The interviews presented the perceptions of the RDs about their current work environment. The findings from the interviews were later cross-checked with data collection and data analysis.

Key findings from the RD interviews:

- RDs stated that they do not have adequate time to attend to all their patients everyday
- RDs reported that charting consumes 20% - 50% of their work days)
- RDs complain that Web-DOES and UM-CareLink are not compatible causing RDs to switch between Web-DOES and UM-CareLink when they examine patient info and plan their daily workload. Furthermore, information in Web-DOES is not reliable as unit clerks have to manually translate patient information from UM-CareLink to Web-DOES.
- Some of the RDs get interrupted by outpatient issues either by phone calls or pagers, and spend time travelling to and from clinics
- RDs stated that the formula booklets have insufficient formula information; thus, they have to search for the information on the internet
• Some of the RD’s are not proficient with using computers

Key findings from the RD shadowing:

• One of the RDs took 1 hour 7 minutes to chart one patient. The team observed similar duration for charting by other RDs
• During the weekend shift, a RD took 1 hour 5 minutes to update 4 Total Parenteral Nutrition (TPN) orders
• While charting, RDs have to perform manual calculations for many of the required values
• The RDs use 10 to 20 minutes to generate their daily patient sheets and update the formula receipts on UM-CareLink every morning

Based on the interviews and shadowing, the team generated a high level flow chart (see Figure 1 below) to show the daily workflow process for the RD.

```
Figure 1. RD High Level Work Flow Chart
```

The team also learned about the workload drivers and the nutrition care processes of the RDs. The findings are summarized in a flowchart attached in Appendix A.

The team compared the common features between UM-CareLink and Web-DOES and constructed a comparison table (Table 1 below) to show which of the tasks could be integrated into one system and thus reduce the time spent examining patient information and preparing work.
Table 1. UM-CareLink and Web-DOES Comparison

<table>
<thead>
<tr>
<th>RD Workload Planning</th>
<th>CareLink</th>
<th>WebDOES</th>
</tr>
</thead>
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<td>Worklist Manager</td>
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<td>X</td>
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<tr>
<td>Physician Orders</td>
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<td></td>
</tr>
<tr>
<td>Other Functions</td>
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<td></td>
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<td>Food Service Use</td>
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<td>X</td>
</tr>
<tr>
<td>Bill Patients</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

RD Workload Distribution Data Collection

Work Sampling Analysis

The work sampling analysis has two purposes. First, it collects the average time of each workload driver for each RD; second it is the source to map the distribution of the workload drivers and RD tasks.

The work sampling data was first stratified by type of RD care. Figure 2 below illustrates the proportion of total time spent on inpatient care activities, outpatient care activities, and non-patient related activities.

![Figure 2. Overall Breakdown of RD Activities](image)

Further investigation of the time spent on direct and indirect inpatient care is illustrated in Figure 3 below.
RDs spend a majority of their inpatient time on indirect patient care (62.33%). A goal of the project is to increase the amount of time devoted to direct inpatient care.

Further investigation of the time spent on direct and indirect outpatient care is illustrated in Figure 4 below.

Similarly, RDs spend the majority of their outpatient time on indirect patient care (52.9%). A goal of the project is to increase the amount of time devoted to direct outpatient care.

The team then stratified the work sampling data by task, and constructed a Pareto chart to illustrate the five most time consuming workload drivers for the RDs (Figure 5 below). From the five workload drivers, only three were perceived as potential streamlining opportunities: Charting, Examining Patient Information, Travelling. The three tasks sum up to 29.6% of a typical RD work day. The team performed further stratifications of the work sampling data (by task) are summarized in the Pareto charts in Appendix K.
Work Tally Analysis

The Work Tally Sheet data collected in a one week period provided the team information on the timeliness of the RD workload. The percentage of the RD workload drivers that are completed and average workload drivers overdue are shown below in Figures 6 and 7. The low percentage of assessments completed at 25.7% and the high number of overdue consults and reassessments, at 1.34 and 1.08 respectively, could be a cause for concern.
Data Verification (Time Study)

To ensure that the work sampling data was accurate, the team performed a time study of the RD tasks. The time study examined two RDs over two whole work days. The data collected from the time study was compared with the corresponding work sampling data. Based on the time study results, the team was able to verify that no significant difference in time distributions existed between the work sampling data and time study data for the top workload drivers. At least 88% of the differences between the work sampling data and the time study data fall within one standard deviation. The average of the differences between the work sampling data and the time study data is 1.2%. Figure 8 below compares the four most time consuming RD workload drivers (for position D2) based on work sampling and time study data.
Both the time study and work sampling results have the same top four most time consuming workload drivers for the D2 position RD. These four most time consuming workload drivers consist of 45% of the total work volume from the time study and 46% from the work sampling data.

Similarly, the team performed the same time study for the E1 position RD. The time studies of these two RDs confirmed that the work sampling data is accurate. Please refer to Appendix J for a summary of the time studies performed.

Data Verification (Census Data between July-06 to March-08)

The Mott Children’s Hospital census data (June 2006 to March 2008) indicated that the census for March 2008 falls within the upper and lower control limits shown in Figure 9 below. Therefore, the volume data for the staffing model collected in March 2008 is representative of the volume data for the whole year.

Staffing Model Findings

Online Statistics Staffing Model

The online statistics staffing model has the ability to forecast each of the RD positions’ staff volume based on the workload volume entered in the online productivity statistics by the RDs. The model has two input parameters. The first parameter is the workload volume of all the main workload drivers (Consults due, Assessment/Reassessment due, Screens due and TPN counts) in the online productivity statistics sheet. The second parameter is the average time of each workload driver from the work sampling analysis. Next, the average times of all other tasks from the work sampling is added to the previous sum.
The model is based on the empirical model formula shown below:

\[
\text{Total Daily Work Minutes} = \left( \sum \text{Average Primary Workload Driver} \times \text{Workload Volume} \right) + \left( \sum \text{Average Secondary Workload Driver} \right)
\]

The outputs of the model consist of the total daily minutes of each of the RDs, the daily FTE number and the amount of overtime FTE. The managers could easily change the month of the productivity logs input to forecast the monthly FTE requirements for that month. The model has several key findings for the current staff pattern.

The staffing trend figure (excluding weekends) of March 2008 (Figure 10 below) was constructed to illustrate the monthly total expected vs. actual staffing pattern. One of the key findings from the model is that the current required staffing level does not meet the expected staffing level.

![Figure 10. Online Statistics Estimated Daily Total FTE Requirement for 03/08](image)

The daily FTE trend averaged over all positions for all weeks of March 2008 (Figure 11 below) was constructed to illustrate the daily staffing pattern over an average week (excluding weekends). One of the key findings from the following output is that the weekly staffing pattern for March 2008 follows a triple peak trend, with the staffing highest on Mondays, Wednesdays, and Fridays.
Another key finding from the staffing model is the overtime FTE requirements for the RDs. From March 2008 online statistics volume, 8 of the RDs that have online statistics data need to work overtime to meet patient demand. The detailed online statistics staffing model output for March 2008 can be found in Appendix G with charts to illustrate the detailed findings.

**Tally Sheet Staffing Model**

The purpose of the tally sheet staffing model is to verify the online statistics staffing model findings and to determine if this staffing model offers additional insight on the staffing of the RDs. The model uses the tally sheet data as the workload driver volume and same work sampling analysis for the average time of each workload driver. One of the advantages of the tally sheet model is that it distinguishes the main workload drivers (Consults, Assessment/Reassessment, Screens) that are done, due, overdue, and discharged (which occurs when the patient is discharged before he or she is seen by a RD). The tally sheet staffing model concluded that the average daily FTE requirement for each RD position resembles that of the average daily FTE requirement from the online statistics staffing model.

Another finding from the tally sheet staffing model is that the current FTE number cannot satisfy the main workload drivers that are due. The potential FTE difference between done and due tasks are illustrated in Figure 12 and Figure 13 below.
Figure 12 above displays the staffing patterns from March 18 to March 24. It assumes the RDs complete all the workload drivers due every day. The three staffing trends peak on Wednesday and decreases on Thursday and Friday. If the recommendations are implemented, the team expects the total required staffing pattern for teams D and E to shift down by approximately 1.0 FTE.

As shown above, Figure 13 displays the staffing patterns from March 18 to March 24. It assumes the RDs are at their current productivity level. The three staffing trends peak on Wednesday and decreases on Thursday and Friday. If the recommendations are implemented, the team expects the total required staffing pattern for teams D and E to shift down by approximately 1.0 FTE.
Benchmarking

The purpose of the benchmarking findings is to compare the Mott Children’s Hospital staffing patterns and other aspects (Weekend staffing volumes, DT duties, etc.) with other medical institutions. One of the most important findings from the benchmarking report is that some institutions had DTs cover a much wider range of duties that encompass some of the work that RDs perform at Mott. These duties include screens, assessments, attend to and follow up on low to medium risk patients, nutrition and diet education, formula, diet, and supplement orders, and even triage consults. Two of the medical institutions actively provide training to their DTs to prepare them for additional duties or to develop clinical skills. One hospital is collaborating with a local community college to offer additional training to their DTs. These education policies could be a strategy for Mott to follow which would eventually lead to more duties for the DTs.

Comparing the RD to patient ratio of Mott with the average of the twelve institutions that responded to the benchmarking survey, the team noticed Mott has a much lower ratio, 1 RD: 14.0 patients, compared to 1:38.2 for the average of the other hospitals. Mott may have such a low ratio because of the high acuity of patients that visit Mott and because outpatient care was not factored in. The table below compares Mott Children’s Hospital with the institutions that responded to the benchmarking survey.

<table>
<thead>
<tr>
<th>Category</th>
<th>Mott</th>
<th>Average of Other Institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beds</td>
<td>250</td>
<td>217</td>
</tr>
<tr>
<td>Average Daily Patient Census</td>
<td>161</td>
<td>189</td>
</tr>
<tr>
<td>RD : Patients Ratio</td>
<td>14.0</td>
<td>38.2</td>
</tr>
</tbody>
</table>

VII. Conclusion and Recommendations

Based on the team’s findings, conclusions and recommendations were developed to streamline the work processes of the RDs. By reducing the time RDs spend on non-value added tasks, more time can be allocated to patient care activities.

Inefficient and Non-Standardized Work Procedures

Currently, RDs devote 29.6% of their work day on travel time, charting on patients, and examining patient information.

To Reduce Documentation/Charting Time:

1. Purchase digital voice-recognition recorders

To reduce the time spent charting on patients, the team researched digital voice recorders that use voice recognition software to transcribe the voice recordings to text. Having RDs use such voice recognition devices would reduce the time spent typing and would allow the RD to begin charting while attending to the patient, when the
patient care activity is still fresh in their mind. Prices vary by manufacturer and model; a Sony model offering the features described costs $150 - $200. Further research would be required if management decides to pursue this option.

2. **Implement random audits**

   By having random documentation audits to examine the nutrition documents written by RDs, repetition of information would be eliminated and excess information would be minimized.

3. **Provide training (to improve charting procedures)**

   Training can be offered to RDs to improve the brevity of their nutrition documents while still offering adequate information to meet the ADA guidelines.

4. **Reduce free-text entry**

   By increasing the amount of charting that can be input by a combination of fixed templates and drop down menus, the time spent typing free text would be reduced. This would eliminate repetitive information and minimize excess information.

   By having the RDs chart only on information that is necessary and having improved methods of text-entry, the time spent on charting is reduced which allows for more time spent on direct patient care.

**To Minimize Unnecessary Travel Time:**

Many RDs do not have access to a computer when they visit outpatient clinics or during rounds. When RDs travel to a clinic and are waiting to see an outpatient, they usually spend that time checking patient information or charting on activities they have completed earlier in the day. Without access to a computer they are forced to just wait.

5. **Purchase laptop or tablet computers**

   Purchasing a laptop or tablet computer for the 10 RDs with outpatient services would allow them to chart and look up patient information on-the-go, and from almost anywhere in the hospital. The cost of a laptop or tablet computer varies by manufacturer and model, and is usually purchased through the IT department that supports the department; a basic laptop from Dell costs around $600 and an entry-level tablet from Lenovo costs around $1600. Further research would be required if the management decides to pursue this option.

**To Minimize Time Examining Patient Information and Planning Workload:**

UM-CareLink was put into service at Mott Children’s Hospital in July 2007. Since the implementation, the Worklist Manager function in UM-CareLink has yet to become the standard source for planning workload. This leads to RDs relying on multiple sources (such as Web-
DOES’ Detailed Diet List and CareWeb’s complete patient list) and cross-checking to determine the work that must be completed for the day. This becomes further complicated when a float or cross-covering RD takes over the position for the day and does not know where the previous RD left off. Another issue with UM-CareLink is the incompatibility with the order entry, food service, and billing system Web-DOES. The incompatibility between the two systems leads to unit clerks having to translate nutrition orders from UM-CareLink into Web-DOES for the food services team to view.

6. **Implement standardized work procedures**

By implementing a standard procedure that requires RDs to mark work completed in UM-CareLink, and having the reassessment period properly marked on the Worklist calendar, the RDs will have only one source when planning their workload. In effect, the standard procedure will lead to less confusion and less time spent cross-checking different systems. Implementing this standard procedure also reduces the chance of work not being completed due to a RD checking the wrong system. Audits of the UM-CareLink Worklist Manager function may lead to a quicker adoption. Also, if the standard procedure is properly implemented, the Worklist Manager may eventually be a source of RD productivity information.

7. **Phase out Web-DOES**

Web-DOES should be replaced with a system that is compatible with UM-CareLink while offering the food service and billing features of Web-DOES. CBORD is a system that is being examined as a replacement that offers these features. Replacing Web-DOES with CBORD, or another similar system, eradicates opportunities for incorrectly entered food service orders and reduces the time RDs spend comparing and cross-checking incompatible solutions.

**Current Staffing Pattern Does Not Reflect Required Staffing Pattern**

Based on both our Online Statistics Staffing Model and Tally Sheet Model, the team noticed that the required staffing level was higher on Mondays and Fridays, with a slight increase on Wednesdays as well. From our tally sheet data, the team noticed that workload drivers reassessments and consults had a very high number overdue each day, 1.34 and 1.08 respectively.

8. **Increase staffing to match required staffing**

By increasing staffing to match workload demands, RDs can better meet patient care. This will increase patient satisfaction while reducing the number of overdue workload drivers.

**RDs Perform Tasks That Do Not Require Their Expertise**

From the benchmarking data, the team found that many institutions use DTs to attend to lower risk or lower acuity patients.
9. **Transfer RD duties to DTs**

Rather than having RDs screen patients that reach a certain length of stay, the team believes this task can be handled by the DTs. To further expand the responsibilities of the DTs, training could be provided from RDs, hired trainers, or through training programs offered by the university. The team believes that formula, diet, and supplement orders, along with nutrition and diet education are tasks that could be handled by DTs with additional training. Hiring an additional DT is a lower cost option than hiring an additional RD. Before implementation, management should examine whether these duties comply with the latest Standard of Practice in Nutrition Care provided by the American Dietetic Association. The team verified these activities with the draft of the 2008 Standards of Practice, and they met the responsibilities that can be performed by DTs.

**RDs Perform Nutrition Calculations Using Hand-Held Calculators**

From shadowing and interviewing RDs, the team concluded that many calculations are performed using hand-held calculators. RDs spend approximately 3.3% of their day performing calculations according to the work sampling data. The numerous nutrition calculations needed by the RDs throughout the course of the day provide many opportunities for calculation error. If nutrition recommendations are based on incorrect numbers, these calculation errors could have a big impact on patient safety.

10. **Have RDs perform nutrition calculations using computer-based programs**

To reduce the potential for calculation errors, computer programs can be developed to calculation nutrition values based on numbers entered into the program. This would improve patient safety, while possibly reducing the time RDs spend performing calculations.

**VIII. Expected Impact**

If all of the recommendations are implemented, the team expects each RD to save 1,123 minutes per month or (18.7 hours per month). Table 3 below summarizes the expected impact from implementing each recommendation. For details on how the team arrived to the following results, please refer to Appendix M for the corresponding calculations.
Table 3. Expected Impact of Recommendations

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Minutes/Month Saved</th>
<th>Minutes/Day Saved</th>
<th>FTEs Saved</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>To Reduce Documentation/Charting Time</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Purchase digital voice-recognition recorders</td>
<td>255</td>
<td>12</td>
<td>0.03</td>
</tr>
<tr>
<td>Implement random audits</td>
<td>85</td>
<td>4</td>
<td>0.01</td>
</tr>
<tr>
<td>Reduce free-text entry</td>
<td>85</td>
<td>4</td>
<td>0.01</td>
</tr>
<tr>
<td>Provide training (to improve charting procedures)</td>
<td>85</td>
<td>4</td>
<td>0.01</td>
</tr>
<tr>
<td><strong>To Minimize Unnecessary Travel Time</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Purchase laptop or tablet computers</td>
<td>137</td>
<td>6</td>
<td>0.01</td>
</tr>
<tr>
<td><strong>To Minimize Time Examining Patient Information and Planning Workload</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Implement standardized work procedures</td>
<td>182</td>
<td>8</td>
<td>0.02</td>
</tr>
<tr>
<td>Replace Web-DOES</td>
<td>87</td>
<td>4</td>
<td>0.01</td>
</tr>
<tr>
<td><strong>To Minimize Human Calculation Error</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Implement computer-based calculation program</td>
<td>17</td>
<td>1</td>
<td>0.00</td>
</tr>
<tr>
<td><strong>Current Staffing Pattern Does Not Reflect Required Staffing Pattern</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increase current RD staffing to match required staffing</td>
<td>38</td>
<td>2</td>
<td>0.00</td>
</tr>
<tr>
<td><strong>RD Perform Tasks That Do Not Require Their Expertise</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transfer RD duties to DTs</td>
<td>152</td>
<td>7</td>
<td>0.02</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1123</strong></td>
<td><strong>51</strong></td>
<td><strong>0.12</strong></td>
</tr>
</tbody>
</table>

Note: All Approximate Time Savings Calculations are based on educated estimates of time savings per task.

IX. Areas of Further Study

**Improve RD productivity measuring system (and corresponding staffing model)**

The current productivity statistics sheet has been used since 2003 and has only undergone minor changes. Through interviews with RDs, it has been noted that the RDs view this productivity log as a poor indicator of their productivity. Moreover, through surveying the RDs, the team discovered that the RDs have different understandings of the categories in the productivity statistics sheet. The situation is further complicated by the productivity statistics sheet having different fields asking for workload drivers that are “due” or “done.”

By implementing a productivity measuring system that better addresses the RD workload drivers and does not require RDs to input data, a staffing model based on this data will output more accurate expected staffing level data. Thus management can make better staffing decisions based on this staffing level data.

**Select equipment for purchase and perform cost analysis**

By evaluating the features that are needed on the equipment, a determination can be made on the model to be purchased. A basic cost analysis should be performed to verify the cost of the equipment is recouped though the time savings and patient care improvements provided by the device.
X. Acknowledgements

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All the Dietetic Technicians in Mott Children’s Hospital

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