THE CENTER FOR DISCOVERY

An Examination of the Health and Medication Administration Record Systems of The Center for Discovery®

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Executive Summary

The client, The Center for Discovery (TCFD), is a non-profit organization located in the state of New York. TCFD provides residential, education, and health care facilities for medically complex individuals with conditions including cerebral palsy, Down syndrome, and autism spectrum disorder. Currently, The Center for Discovery utilizes a hybrid Electronic Health Record (EHR) and paper Medication Administration Record (MAR) to organize and store patient information. The primary patient information is stored in physical paper files, but The Center also utilizes several different online elements for medication, such as SigmaCare and eClinicalWorks. Due to the interchanging use of these multiple systems, The Center is faced with many roadblocks, especially when it comes to interpersonal communication, nurse-system interaction, and patient care. In order to maintain TCFD's standards of excellence, our group proposes that The Center for Discovery should invest in a fully electronic medication administration record (eMAR). Implementing a central eMAR would create a more cohesive method of communication, as well as increasingly streamlined information storage and retrieval.

When investigating what would be the best solution for TCFD, we spoke to those that interacted with the system the most, predominantly nursing staff. One of the biggest issues we came across was time management. Time management not only is a worry when it comes to finances, but patient care can be deeply affected by the amount of time it takes to access information. With the current system, nurses were bouncing between several platforms to do basic tasks such as ordering medicine or checking patient history. In addition, there is non-medicine related patient information, such as the nurse notes, that are also tied to each patient that is not being prioritized. With the implementation of an eMAR system, all of these elements of patient care would remain in one location and allow TCFD to save time and energy on bookkeeping and more time on patient care.

In order to make this recommendation, we conducted research that predominantly relied on the testimony of TCFD staff. We asked nurses, administrators, and other TCFD team members how they interacted with the system and used their experiences to craft a general timeline of care. We utilized our findings to evaluate the potential benefits of an eMAR system, while also weighing these benefits against the shortcomings of the current system. Our

group always prioritized patient care when evaluating and discussing the current model with staff, and used various rating systems to determine how the team feels about the present system.

The adoption of an eMAR system comes with many anticipated benefits. In terms of The Center's operations, we expect the implementation of eMAR will create a more efficient work flow for nursing staff and minimise time spent on paperwork. This program will work to enhance TFCD's core value of patient care by minimising error and creating stronger interpersonal relationships between departments. Most importantly, an eMAR will assist TCFD as we enter a new age in patient care that is more digitally accessible and transparent

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Description of Current System

Part One: **Problem Definition**

I. *Setting and Environment*

An electronic Medication Administration Record, or an eMAR, is a digital system for collecting and recording point of care medication administration. It also serves as a legal record of all drugs administered to patients and residents of a hospital or care facility by a healthcare professional. The client, The Center for Discovery (TCFD), is a non-profit organization that provides residential, education and health care facilities for medically complex individuals with conditions including cerebral palsy, down syndrome, and autism spectrum disorder. Currently, they utilize a hybrid Electronic Health Record (EHR) and paper Medication Administration Record (MAR).

II. *Problem Statement*

The current hybrid model leads to significant inefficiencies and potential for human error due to continued reliance on substantial paper records. Nursing is required to review each individual's current medical orders in the EHR, then physically go to each residential location in order to print off the MAR for the patient. Next, nursing must review the paper MAR document against the EHR to ensure there is no discrepancy. After this, a

second nurse validates the record in question, checks for missing signatures, and finally stores it in a physical binder. This is not only inefficient and potentially error-prone, but substantial cost is incurred for the printing and storage of unnecessary paper. In addition, nursing staff lose valuable working hours carrying out this time-consuming activity.

Many secondary impacts exist, including issues with staff recruitment and retention. This is due to younger graduates having little experience with paper records, which The Center utilizes quite heavily. The hybrid model also poses a hindrance to TCFD in terms of medical research. Because TCFD does not have ready access to digital medication data, they are not able to effectively analyze the impact of medication on comorbid conditions that occur in the medically complex.

III.   *Preliminary Observations*

Preliminary analysis indicates that the inefficiencies created by the hybrid paper MAR and EHR lead to substantial financial losses due to misappropriated use of nursing resources. Additionally, substantial paper records, by definition, are more susceptible to human error, which leaves open the possibility of medication dispensing errors. This represents a significant risk to health and well-being, not to mention the potential liability.

IV.   *Stakeholders*

Our client, as mentioned previously, is The Center for Discovery. Throughout the course of our project, we conducted eight contextual interviews with nine different staff members from TCFD. We attempted to gain insight into every level of the organization in order to be as representative as possible. A wide variety of subjects were interviewed, ranging from nursing directors to the President of the organization. Each role in the organization has different responsibilities and impacts on the system. The table below (table 1.1) documents the primary responsibilities and involvement levels of our interview subjects.

Name	Role	Primary Responsibilities	Impact	Implication	Influence
Theresa Hamlin	President	• Oversees almost everything. • Know what is happening day to day. • Plan what the future should look like. What are the needs? State and federal level. • Assure that the program is operating as efficiently as possible.	High	Medium	High
Susan Sayers	Chief of Nursing	• Leads innovation that occurs at The Center. • Holistic training; engage and make sure every facet of the program is carried out on the ground level. • Promote prevention, health, and wellness. • Ensure that staff are healthy and well. • Influence how general care is provided.	High	High	Medium
Angelica Marmanillo	Director of Nursing Informatics	• Works with the Executive Director, as well as Health Services. • Research • Project management • Assure that our agency is compliant and regulated with one system of communication. • Attempts to make the system easier to use.	High	High	Medium
Diane Goldberg	Assistant Chief of Nursing: Adult	• Oversees 7 Nursing Directors • Supervision of department • Conduct all interviews for potential staff • Assists with budgeting • Policy development • Disciplinary action	High	High	Low
Melissa Pena	Assistant Chief of Nursing: Pediatric	• Oversees Pediatric Nursing Program • Highly involved in the technology administration side of Nursing Program • Systems Administrator for SigmaCare (gives authorization to nurses to access records for different patients)	High	High	Low

Jamie Bowers	Nurse Director: Adult	• Oversees non-24-hour nursing office. • Ensure patients are getting the care they need and advocating for any changes that might need to occur with other members of the interdisciplinary team. • Communication between team members.	High	High	Low
Krista Cummings	Nurse Director: Adult	• Oversees certain aspects of the adult residences. • Assures paperwork and shifts are going smoothly. • Overall well-being of the residents as well as the staff.	High	High	Low
Matthew Dominick	I.T. Administrator	• Help Desk oversight. • Implementation and troubleshooting of network equipment and various systems. • Infrastructure management.	Medium	High	Low
Cheryl Darling	Nurse Director: Pediatric	• Oversees five separate houses. • Responsible for training new staff.	High	High	Low

Table 1.1 *Client Responsibilities and Involvement*

V. *Objectives*

Our project aimed to address The Center for Discovery's problems by fulfilling three central goals:

1. Conduct a series of contextual inquiries to identify system requirements.
2. Use systems analysis models to identify inefficiencies present in the current system.
3. Carry out a cost analysis regarding the inefficiencies of the current system.

Part Two: **Investigation**

I. *Data Gathering*

We gathered the majority of our data from two different sources:

1) Data Office of the organization (QI? Forgot the name)
    a) Salary
        i) Wait for Conor's data
    b) Number of staffs
        i) 142 active nursing staffs
        ii) 150 vacancy staffs
        iii) 80% registered nurses
        iv) 20% licensed practical nurses
    c) Number of Patients:
        i) 342 individual living on campus
        ii) Around 172 adult patients
    d) Complexity of patient medication:
        i) Avg 10 different meds administered multiple times per day
        ii) 1.5 million medication administrations on annual bases
    e) Errors:
        i) Top 2 Errors: Transcription and omitted error
        ii) Transcription error: 30- 40%
        iii) Medication administration error rate is 0.0007
        iv) 45-50 medication error a year
    f) Patients' information stored
        i) 3 months in physical residence
        ii) 7 Years in storage
2) Staff in the organization
    a) Time spent on system
        i) Avg 10-15 minute per patient for data entering/ printing
        ii) Up 20-minute traveling time between departments
        iii) 1.5 to 2 hours for double-checking MARs
        iv) Nurses: 10 hour a day
3) MAR
    a) 2-20 pages per resident

4) How many housed/ how busy
   a) Over 3 shifts administering the medication
   b) Need 2 nurses to review MAR sheet for accuracy
   c) 10 Nursing bodies to maintain the system
5) Overall Satisfaction (Scale of 1-10)
   a) Average 3.125
6) Inefficiency of system (scale of 1-10)
   a) Average 7.625

II. *Data Analysis*

We need to move some of the info above into this section.

III. *Data Interpretation*

Our group created a number of different models in order to interpret our collected data.

Sequence Model: Melissa Pena	
Intent: Updating medication information for a patient	**Trigger: Receive new prescription from provider.**
Subintent (1-2): Enter new prescription into the electronic SigmaCare system so it can be filled by the pharmacy.	1. Enter new prescription into SigmaCare online. ↓ 2. Send prescription to pharmacy electronically. ↓
Subintent (3-5): Make sure that physical copy of patient record (paper MAR) is updated to reflect the change in medication.	3. Print new page to be added to paper MAR. ↓ 4. Travel to where paper MAR is located. ↓ 5. Add new page for new prescription to paper MAR and get rid of outdated pages. ↓
Subintent (6): Alert medication administration staff of the change in patient medication.	6. Alert non-nursing medication administration staff of update to MAR.

Figure 1.1 *Sequence Model for Updating Patient Medication Information*

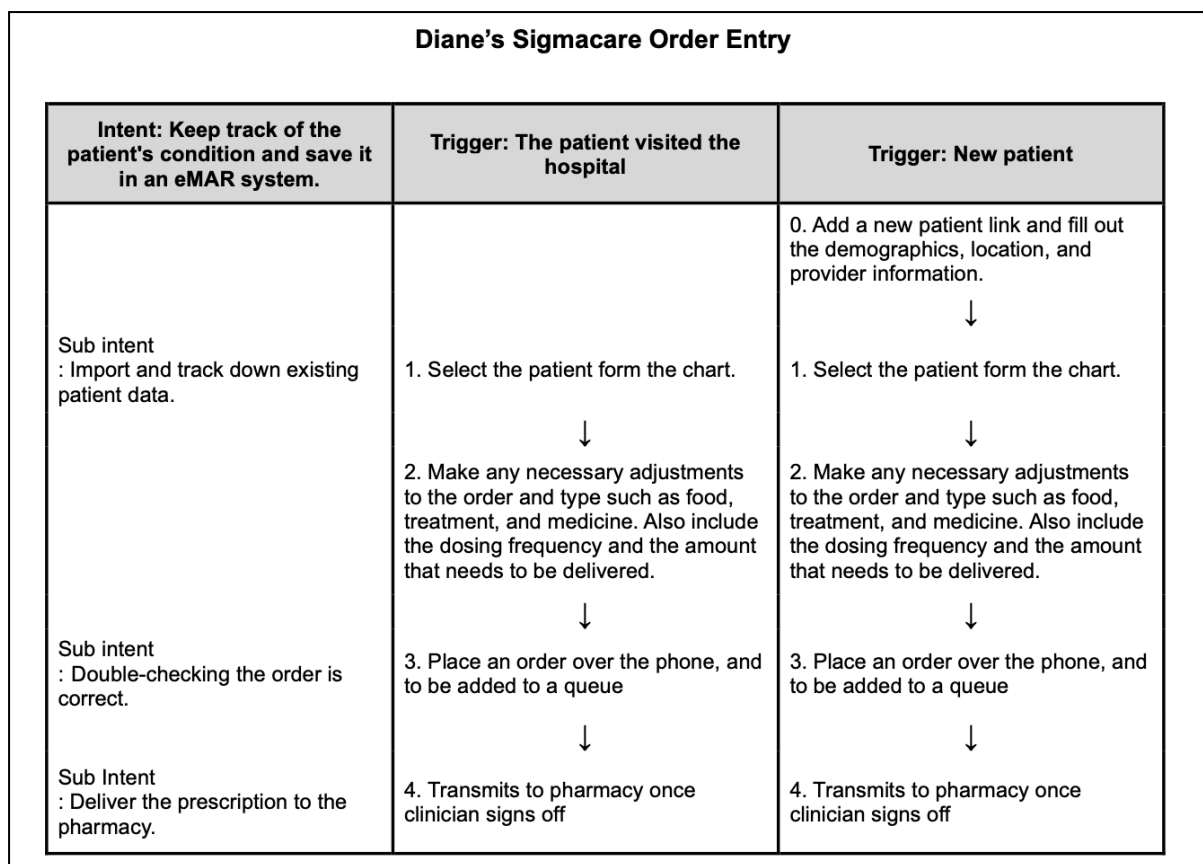| Diane's Sigmacare Order Entry		
Intent: Keep track of the patient's condition and save it in an eMAR system.	**Trigger: The patient visited the hospital**	**Trigger: New patient**
		0. Add a new patient link and fill out the demographics, location, and provider information. ↓
Sub intent : Import and track down existing patient data.	1. Select the patient form the chart. ↓	1. Select the patient form the chart. ↓
	2. Make any necessary adjustments to the order and type such as food, treatment, and medicine. Also include the dosing frequency and the amount that needs to be delivered. ↓	2. Make any necessary adjustments to the order and type such as food, treatment, and medicine. Also include the dosing frequency and the amount that needs to be delivered. ↓
Sub intent : Double-checking the order is correct.	3. Place an order over the phone, and to be added to a queue ↓	3. Place an order over the phone, and to be added to a queue ↓
Sub Intent : Deliver the prescription to the pharmacy.	4. Transmits to pharmacy once clinician signs off	4. Transmits to pharmacy once clinician signs off

Figure 1.2 *Sequence Model for Updating Patient Information After Hospital Visit*

IV.   Data Consolidation and Breakdowns
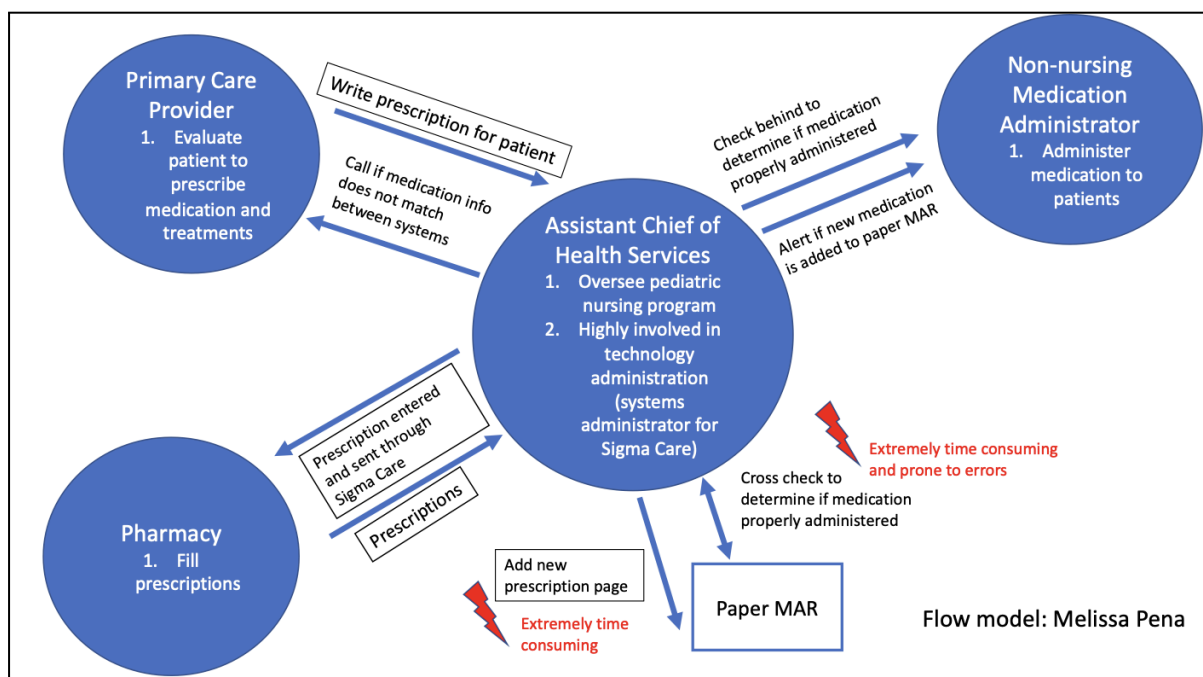

Figure 1.3 *Consolidated Flow Model for System Interaction*

We utilized an affinity diagram to analyze and specify our key findings. During this process, we identified five different system breakdowns and grouped them as follows:

1. Interpersonal communication

2. Multiple systems

3. Nurse system interaction

4. Effects on patient care

5. MAR and medicine

Recommendations for New System

New System Overview

Based on the data collected during the contextual inquiry process, we determined that the current paper MAR system should be transferred to an electronic MAR system. Instead of physically printing medical administration orders, storing, and taking notation in binders, an electronic MAR system would use an existing eMAR provider (like SigmaCare) to maintain administration orders and records. This system could be updated and checked remotely from a central location. This is based on the main concerns expressed by the system users and directors:

- ***Efficiency***: physical checking of paper MARs is a time-consuming task for nurses who already feel under-staffed.

- ***Accuracy***: paper systems require manual oversight, which has a higher propensity for human-caused errors.

- ***Accessibility***: manual oversight means nurses must physically travel to each location to check paper MARs, making the system less accessible.

- ***Morale***: the tedious checking of paper MARs decreases morale for nurses who have more specialized education for more difficult tasks.

Table 2.1 (below) provides a head-to-head comparison of the performance of the current paper MAR system (if no changes were implemented) and an electronic MAR system. These are based on notes from our contextual inquiry process with system users and our models of the current system operation.

	Paper MAR	Electronic MAR (eMAR)
Efficiency	- When updating the system, nurses must print out up to 20 pages per resident and organize by house and alphabetical order. - The updating and checking of MARs requires travelling up to 20 min (driving) to different houses across the campus. - This is an extremely inefficient process, especially because it is conducted by nurses who already feel understaffed.	- Updating and checking of MARs can be conducted from any location as records are stored in a computer-based system. - Travel and printing time would be reduced to 0. - Nurses would have more time to accomplish more difficult and specialized tasks.
Accuracy	- There is increased risk of human error at every step of the paper MAR system. Records could be misplaced, and important details could be missed. - When a medication is missed or not properly administered, there is no automatic warning system to alert nurses. This can only be noticed through the manual oversight process.	- Human error can still be present in an electronic system, but automatic controls built into an electronic MAR can reduce their likelihood and severity. - For example, if a medication is missed or not properly administered, it can trigger an automatic alert from the program which notifies nurses of the mistake. - Transcription errors are not currently widespread, but an electronic system would virtually eliminate all transcription errors.
Accessibility	- Nurses must be able to physically travel from house to house across a large campus to check and update MARs. - Some of these trips may be up to 20 minutes away by car.	- An electronic system can be accessed from everywhere as long as one is connected to power and the internet. - Records can easily be shared with patients and other providers if

	● Access to records cannot be easily shared with patients and other care providers since they are physically located in a binder.	necessary.
Morale	● The current system reduces morale for nurses, who feel overworked and undervalued. ● Updating and checking MARs is a repetitive and tedious task for nurses who have more specialized skills. ● The CFD is known as an advanced, innovative health organization. The lack of investment in health information technology will impede the hiring of the best and brightest staff.	● Nurses could devote more time to more challenging and specialized tasks. ● Nurses' repeated concerns would be addressed and opinions valued. ● The commitment to modern technology will reflect well on the CFD for potential patients and staff. ● Current staff will be excited to train and implement a more efficient system.
Cost	● Money currently spent in nurse salaries, printers, record storage and vehicle maintenance would be the same. ● This system has a higher environmental impact due to frequent paper and car usage.	● Large upfront cost in system implementation and training. ● Less money would be spent on printers, record storage and vehicle maintenance. ● Lower environmental impact of electronic records. ● Nurse salaries would be paying for specialized tasks rather than tedious MAR updates and oversight.

Table 2.1 *Comparison of Important Factors Between the Current Paper MAR System and an eMAR System*

Models

Figure 2.1
- Time/cost comparison model?

Figure 2.2

Figure 2.2 (below) illustrates improvements to the communication network for nurses and nurse directors with the implementation of an eMAR system. The

flow model has been modified with green boxes to indicate where communication can pass through the eMAR system rather than through the addition of pages to paper MARs, phone calls, or in-person conversations. All of these points produce time savings for nurses, as well as savings in paper and vehicle resources. Additionally, an eMAR can alert nurses of errors in the administration record, which improves patient safety. Concerns can also be easily shared across the network with the primary care provider and non-nursing staff.
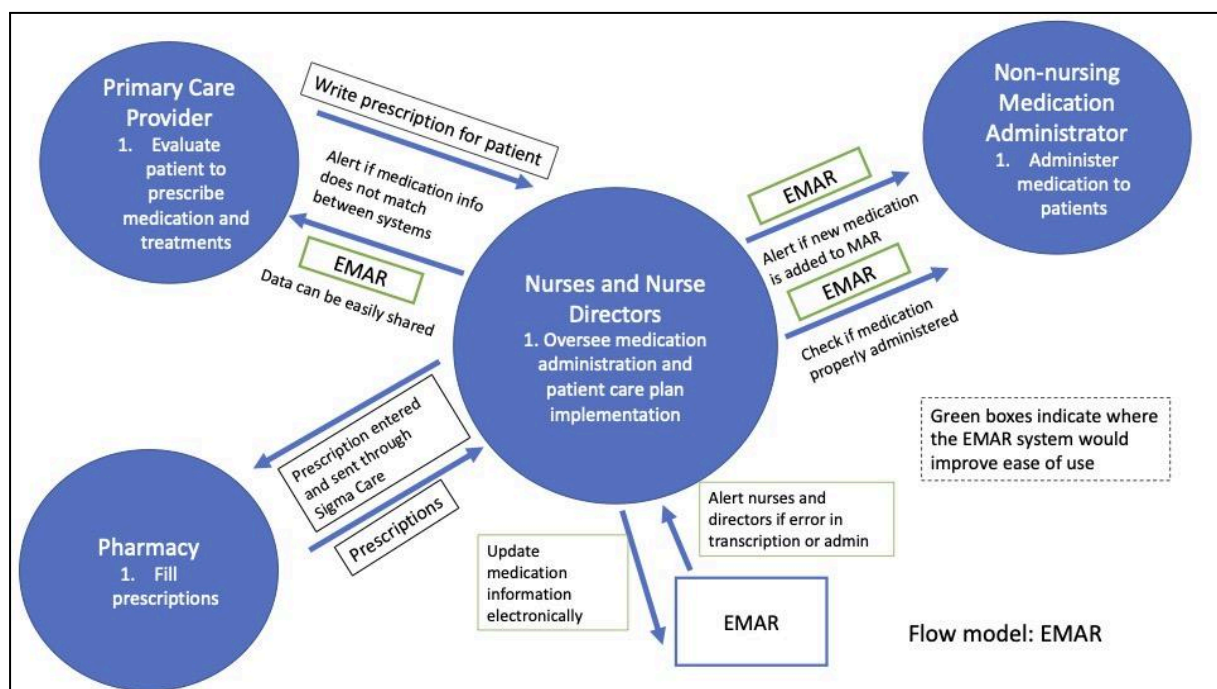

Figure 2.2 *Nurse and Nurse Director Interaction Improvements with eMAR Implementation*

Summary

Nursing staff have expressed numerous concerns about the efficiency, accuracy, and accessibility of the current paper MAR system, most of which could be solved by the implementation of an electronic MAR system. Proposals for electronic MAR systems have been delivered in the past, but the Center for Discovery has declined to invest in an electronic system. The Center already utilizes electronic systems for provider communication with patients (eClinical) and for prescription orders with pharmacies (SigmaCare). While the selection of a specific eMAR system is outside the scope of this project, past proposals for eMAR implementations provide estimates for the resources necessary to invest in an eMAR. The SigmaCare MAR specifically would integrate easily with existing systems, as well as with staff familiarity with the program.

High upfront implementation and training costs are major drawbacks in the adoption of an eMAR system. However, we believe that over the long-term, savings in nurse time, printers, paper, vehicles, and record storage would provide savings for the CFD. Further, the intangible cost savings in employee morale, accessibility, and accuracy would extend beyond the cost of purchasing the software.

Not only would an eMAR deliver accuracy, accessibility, and long-term cost benefits, it would also boost the morale of nurses who feel undervalued for their skill level. eMARs are already used throughout the medical industry, so as an advanced and innovative medical institution, it is notable that the CFD is still using an outdated paper system. If funding can be secured for an eMAR system, we recommend pursuing implementation as soon as possible.

Appendix

Research Methods and Instruments

We have used the video-conferencing application Zoom for conducting interviews with the employees at the hospital, for which the invitations were sent through email. Once we got a response to the email from the participant with their convenient time to participate in the online interview, the information regarding that online meeting was entered in a Google Sheet. To maintain data of all scheduled interviews, the spreadsheet had the participant's name, designation, date, and time the participant mentioned for the interview. Interviewers and note takers were assigned for each interview by entering their names on this spreadsheet against the scheduled interviews, according to their availability.

Contextual Inquiries

For contextual inquiry, we used the record feature on the Zoom application to capture the entire interview process, and the participant's answers to each of the questions. A document containing a standard set of questions relevant to all participants was created before the interviews. On a separate idea sharing document, everyone in the team collaborated on the question making process.

The questions were customized for participants that required specifically tailored questions; like the employees from the IT department. Within a day after the interview, the notes from the note taker, the recording of the interview, and the interviewer's memory were used to do the interpretation sessions which helped in producing flow and sequence models of the system. We have included figure 2.3 showcasing our interview questions below.

General Interview Questions

1. Please explain your role within the company. What responsibilities does your position entail?
   a. Do you interact with your current system closely? (If not, who operates the system on a regular basis?)
   b. Could you provide a little more detail on the current systems?
2. Are there different branches of the current system? (e.g., adult care vs. pediatric care)
   a. Does every department interact with the system in the same way?
3. Does every employee have equal access to the current system?
   a. Are there "clearance" levels when it comes to certain information/data?
   b. How is this organized?
4. Walk us through the process (step-by-step) of adding new information to your current system. *It may be easier to catalog this process while performing it. If so, we can provide a template for you to record the steps taken.*
   a. How long does it take you to finish one round of adding new information?
   b. Walk us through the process of updating existing information in your current system.
   c. Can you give examples of different types of scenarios you experience with the current system?
   d. How do the multiple systems you use interact?
5. What are the components and/or organization of your current system? (e.g., folders, binders, charts, any digital aspects?)
6. What aspects of your current system do you appreciate?
7. What aspects would you like to see change?
   a. What aspect of your current system causes the most frustration?
   b. Have your coworkers expressed similar frustrations? Have you encountered any additional concerns from coworkers?
8. Are there any features or aspects you would like to see added to the system?

9. What are typical "roadblocks" or "breakdowns" you encounter while interacting with your current system?
10. How do these system breakdowns affect your workflow?
    a. Lost time?
    b. Frustrated patients?
    c. Creates more work?
11. What information is stored in your current system?
    a. What are ALL the current responsibilities of the system?
    b. What type of information is stored? (e.g., who, where, when, etc.)
    c. How long is a patient's information stored?
    d. Does the current system have any other capabilities besides health record storage?
12. How often do you interact with the system in a typical work day?
13. How much time do you spend on using the system? (hr/day)
14. On a scale of 1-10, how satisfied do you feel about the current system?
15. On a scale of 1-10, how inefficient is the current system?
16. How many physical locations do you have to work with?
17. Do you think a paper MAR would be more prone to med errors than an eMAR?
18. What are the additional systems you need to interact with, and how do they impact the maintenance of the paper MAR?
19. Does everyone have equal access to all systems?
20. What is the daily interaction with pharmacy, and how would that be affected by implementation of an eMAR?
21. Are there any questions you feel we missed, or any other aspects of the system you would like to discuss?
22. How does the current system impact recruitment and retention?
23. What are we losing in billable nursing work?

I.T. Specific Interview Questions

1. How is the current system implemented from an IT infrastructure perspective?
2. What are the system requirements to implement an eMAR?
3. Is there a server space requirement, if so, what is the requisite disk space?
4. What information is stored in your current system?
    a. What are the current responsibilities of the system?
    b. How long is a patient's information stored?
    c. Does the current system have any other capabilities besides health record storage?
5. Does the current system integrate with existing internal IT systems?
6. Can an eMAR be integrated with the current system?

7. Would a HL7 connection be beneficial for data transfer and storage?
8. Is there an eMAR add-on available for the current EHR platform?
9. Are you aware of data validations options available on existing eMAR/EHR platforms?
10. Do you see a benefit for IT in having integrated systems?

Figure 3.1 *List of Interview Questions*

Affinity Diagram

Figure 3.2 *Image of our Group's Affinity Diagram*

Why eMAR?

1. **No paperwork:** It makes less sense for care hospital staff members to physically fill out paper-based MAR sheets in this digital age. The danger of medication errors is substantial when care hospitals employ traditional paper-based MAR sheets. Medical errors caused by overwriting, poor handwriting, and incorrect abbreviation might

jeopardize patient safety. Care employees will be less stressed as a result of eMAR's elimination of paperwork.

2. **Easy to learn and use:** The electronic MAR sheets are similar to the paper MAR sheets, making the software simple to learn and use. You can also enroll your employees in online training classes. Internally and externally, the software may be simply shared with medical specialists. You can also share it with pharmacies to help them with inventory concerns. It offers a user-friendly interface that allows several users to access records at once. Not only that, but the medicine administration record template can be tailored to the nature and operations of your care facility.

3. **Better accountability:** While MAR sheets were paper-based, they made it practically hard to track who made which changes. It's a case of one person's word vs another's. With eMAR, this is no longer the case. It keeps track of all the changes, as well as the names of the people who made them. This makes assigning accountability to employees simple.

4. **Real-time monitoring:** To check the records in a paper-based MAR, you must be physically present. The eMAR medication system, on the other hand, enables real-time recording, documentation, and viewing without having to be present at the care facility. eMAR also provides alerts to caregivers. An alert is sent to the care home manager if the medicine is not taken despite the reminders.

5. **Generate audit reports instantly:** Using paper-based MAR sheets to prepare audit reports is time-consuming and prone to human mistakes. eMAR, on the other hand, allows you to create thorough daily, weekly, monthly, or annual reports without having to go through each and every page manually.

Team Appendix

Team Roles

We started the project by creating a "Responsibility Assignment Matrix." In the beginning, roles for the team project were chosen somewhat awkwardly.

However, as the project progressed, we sensed that some responsibility was assigned based on personal inclinations. Overall, our team's collaboration was excellent. We individually gave it our all in the tasks. We were willing to guide and assist one another in completing the tasks allocated to each phase of the process, such as scheduling the interviews, creating interview questions, establishing a model, creating an affinity diagram, and composing a document.

	Somang	Conor	Vernnica	Delia	Vamsy	Elizabeth	Olivia
Project Management		█					
Team Management		█	█		█		
Client Contact		█				█	
Model Design	█		█	█	█	█	█
Data Analysis	█	█	█	█			█
Document Management	█					█	█
Interviews		█		█	█	█	
Meeting Management			█	█	█		
Note-Taking			█	█			█
Presentation Design	█		█		█	█	█
Class Presentation	█	█	█	█	█	█	█

Figure 4.1 *Responsibility Assignment Matrix (RACI)*

Project Timeline

We used a structured-agile methodology and Gnatt chart on the ClickUp app. We segmented the tasks and developed the timeline so that we could respond quickly and transition over according to a plan. As a result, we were able to keep

on pace with the entire project while still maintaining flexibility by using weekly sprints.
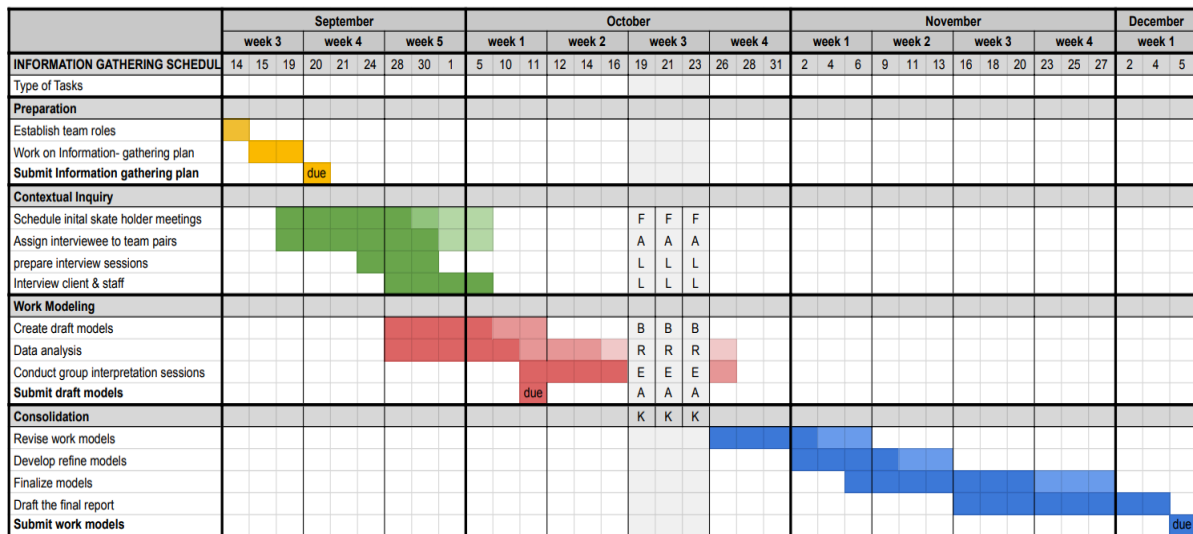
INFORMATION GATHERING SCHEDUL	September									October												November												December		
	week 3			week 4			week 5			week 1			week 2			week 3			week 4			week 1			week 2			week 3			week 4			week 1		
	14	15	19	20	21	24	28	30	1	5	10	11	12	14	16	19	21	23	26	28	31	2	4	6	9	11	13	16	18	20	23	25	27	2	4	5
Type of Tasks																																				
Preparation																																				
Establish team roles																																				
Work on Information- gathering plan																																				
Submit Information gathering plan				due																																
Contextual Inquiry																																				
Schedule inital skate holder meetings																F	F	F																		
Assign interviewee to team pairs																A	A	A																		
prepare interview sessions																L	L	L																		
Interview client & staff																L	L	L																		
Work Modeling																																				
Create draft models																B	B	B																		
Data analysis																R	R	R																		
Conduct group interpretation sessions																E	E	E																		
Submit draft models														due		A	A	A																		
Consolidation																K	K	K																		
Revise work models																																				
Develop refine models																																				
Finalize models																																				
Draft the final report																																				
Submit work models																																				due

Figure 4.2 *Gnatt Chart*

Meeting Summaries

We had a regular meeting on Tuesdays at least once a week via Zoom, in addition to affinity diagram meet-up sessions at school. We also conducted Zoom sessions occasionally to discuss assignments, especially to consolidate models and prepare for the final presentation. Although we defined our roles, as students of contextual design, we all got involved, shared ideas, and steered each other in a better direction.

In order to maximize team attendance, we used the GroupMe application about a week in advance and used availability polls to maximize team attendance. We respected everyone's schedule by arranging meetings roughly a week in advance. Every meeting had an agenda to help us manage time and guarantee that the most pressing topics of the day were addressed.

We created meeting minutes and uploaded them to Google Drive to leave a paper trail and assist the occasional team member who couldn't attend a meeting. This gave us a sense of success by allowing us to see how far we'd come for each task, overall the project.

Agenda
Tuesday, September 28th

1. Recap from the last meeting. (Connor)   5 mins
2. Review Progress (Everyone)   10 mins
3. Reflected on first interview (Elizabeth)   5 mins
4. Further plan, creating draft models (Everyone) 25 mins
5. Talking about class, questions (Everyone)   5 mins

Figure 4.3 *Example Agenda*

This (fig. 4.3) is an example of an agenda from one of our meetings. Each task is listed on the left side, with a brief timeline to help us to manage the time and finish in under an hour. Most of the time, we were able to complete tasks efficiently in each meeting because we only put on the agenda the amount of workload that could be completed in one meeting.

Meeting Minutes
Tuesday, September 28th
Members: Conor, Vernnica, Delia, Elizabeth, Olivia, Somang, Vamsy

Agenda
- Reflected on first interview
- Further interview plans

In the past week
- Arrange the meetings with 6 nurse and 1 IT position
- Create interview questions

•**Reflected on first interview from today**
- Thought it went well
- Lasted 45 minutes
- Added new questions to the google doc
  - More specific questions about paper MAR, Sigmacare, E clinical
  - More in depth questions about what systems are interacted with, when and why
  - Some IT specific questions: validation

•Need to start creating draft models for next deadline 10/6
•IT interview time needs to get pushed, Elizabeth emailing him to plan new time in the next couple of days
•Need to also revise Info Gathering Plan based on Karthik's input
- Made a copy of doc and added some revisions
- Lessened scope and objectives
- Focus more on users

•Affinity diagram
- Need to start taking notes from meetings —> build out affinity diagram
- Debriefing after interview

Figure 4.4 *Example Meeting Minutes*

This (fig. 4.4) is the agenda for our meeting on September 28th, which corresponds to the sample agenda. It comprises what we discussed that day, based on the topic we were talking about. We may then go back to the minutes at a later date to double-check that all ideas were properly considered.

Name	Position	Date	Time	Interviewer 1	Interviewer 2 (notes)	Interviewer 3 (optional)	Model
Krista Cummings	Nurse Director-Adult	11:00 AM	Tues, Sept 28	Elizabeth Ranatza	Vamsy Marni		Elizabeth
Melissa Pena	Assistant Cheif of Health Services	9:00 AM	Wed, Sept 29	Conor Anderson	Delia Wegner		Delia
Cheryl Darling	Director of Nursing-Pediatrics	10:00 AM	Wed, Sept 29	Vernnica Tseng	Vamsy Marni		Vernnica
Jamie Bowers	Nurse Director-Adult	11:00 AM	Wed, Sept 29	Vamsy Marni	Vernnica Tseng	Somang Song	Vamsy
Diane Goldberg	Assistant Cheif of Health Services	11:00 AM	Fri, Oct 1	Somang Song	Olivia Reich		Somong
Angelica Marmanillo	Director of Nursing Informatics	11:00 AM	Tue, Oct 5	Olivia Reich	Conor Anderson		Conor
Matthew Dominick	IT						Olivia

Figure 4.5 *Interview Schedule*

Our team shared the interview schedule (fig. 4.5) on Google Drives to keep things organized. This requires team members' voluntary participation when the

interview is scheduled. Most of each interview was conducted by two members of the team, one of whom hosted the interview and the other took notes. As a result, we were given the opportunity to participate in multiple interviews.
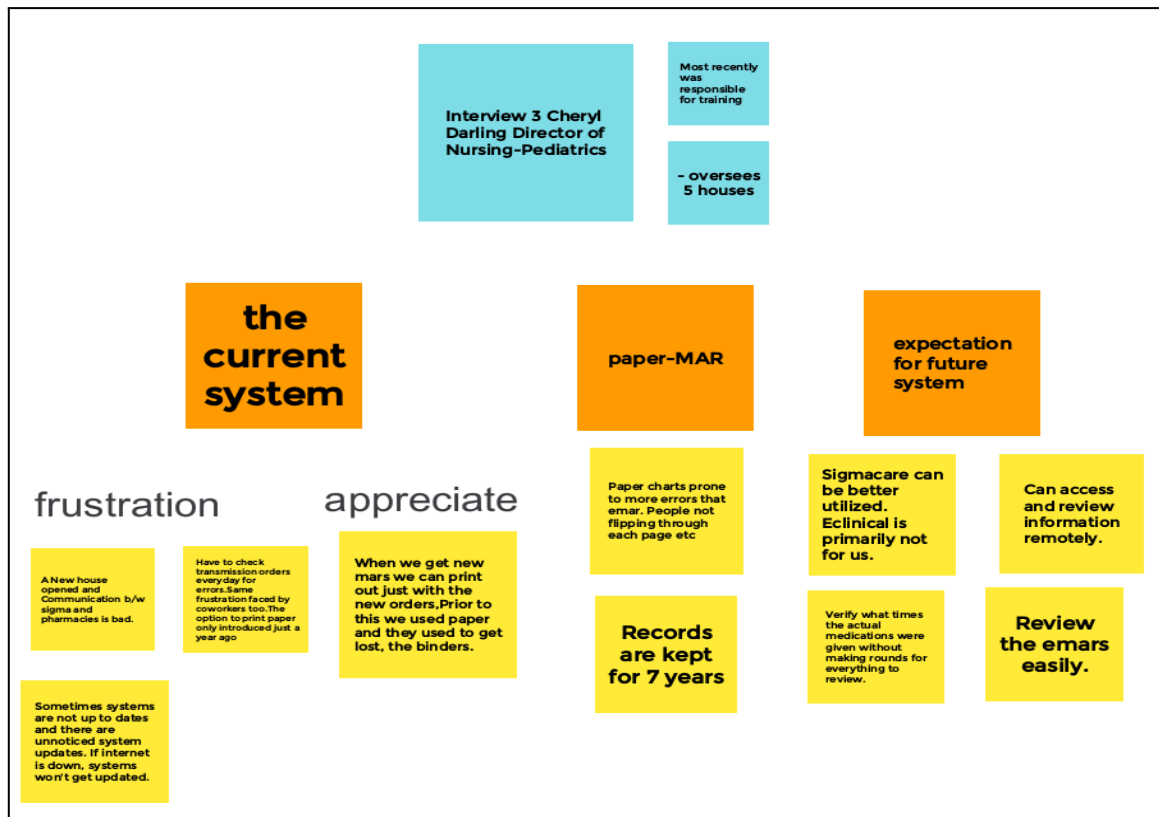

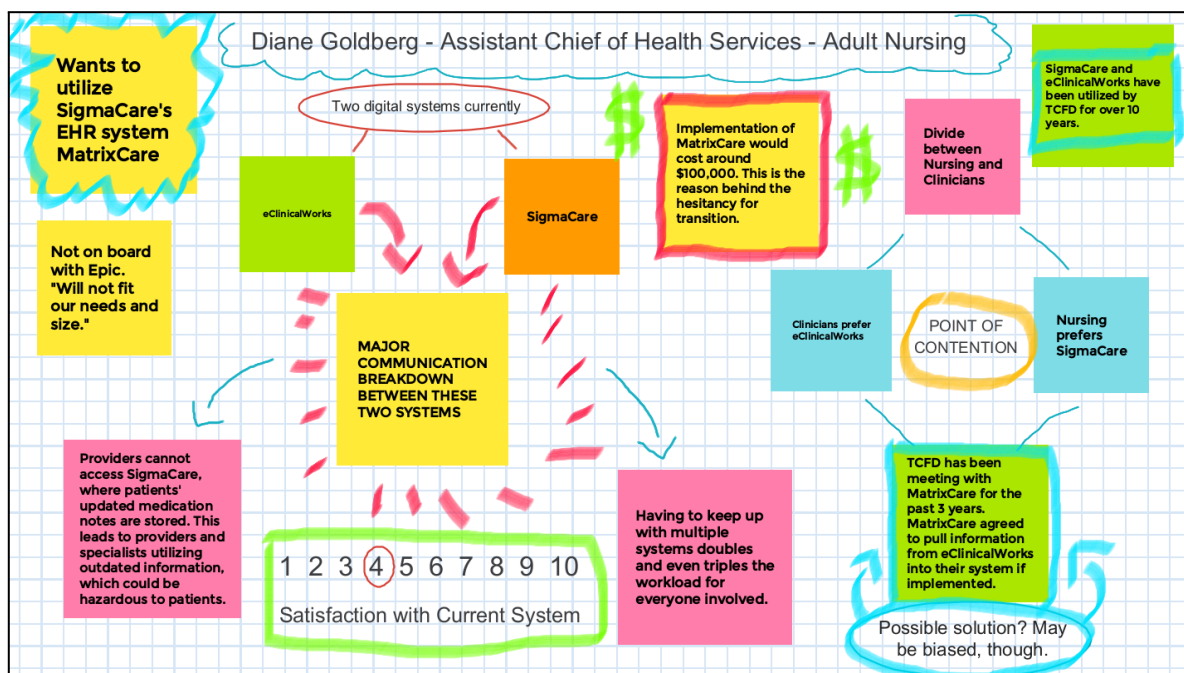Figure 4.6 *Cheryl Darling Interview Summary*

Figure 4.7 *Diane Goldberg Interview Summary*

The above figures (fig. 4.6 and fig. 4.7) are the notes from the third (Cheryl Darling) and fifth interviews (Diane Goldberg). After the interview, the notes were comprehensively documented. The interviews were also videotaped and archived, but because the notes were brief, we didn't have to watch the footage again. As a result, we were able to save a significant amount of time, which came in use when it came time to create the affinity diagram, which was a later activity.

Team Performance and Results

Weaknesses

1. Due to the pandemic, it was challenging to meet and implement the project. Therefore, most of the meetings were conducted via Zoom, but it was often difficult to keep the time due to personal obligations. However, we were well aware that the team needed to work together and that sharing ideas and making plans for the future was critical. As a result, most meetings maintained an attendance of six members or more.

2. We prepared a lot of ideas and materials because we had high expectations and enthusiasm, but we got feedback that the project seemed too large to complete in three months. Accordingly, we narrowed the scope and concentrated on users interacting with the system. As a result, we adjusted our model to focus on certain occupational groups, such as nurses, and how they implement eMAR in the workplace, as well as the system's benefits and drawbacks.

3. The data collection process took a long time. We were fortunate enough to arrange interviews with nine people, allowing each of us to host at least one interview. However, because there was so much information, we had no choice but to spend a significant amount of time drafting and organizing interview notes.

Strengths

1. As a team, we each tried to do our best to the end. When we felt regular meetings were not enough, we gathered on weekends to solve problems together. We were able to embrace each other's viewpoints and communicate well with one another. This is because we are all busy with work and school and understand our own time's worth. We kept to our time commitments and attempted to complete all of the tasks we had set for the week within that time. It was extremely efficient, with a high level of productivity.

2. We were entirely dedicated to the project. We predicted that creating an affinity diagram would take too long, so we met together for the first time in school and worked on the project. With a large number of sticky notes, it took more than three hours to organize. By using the "Big Picture" Models learned in class, a hierarchical structure revealed common issues among all interviewees. As a result of applying this methodology, we were able to categorize numerous notes and identify all issues, concerns, and key elements.

3. We were well-organized, and we communicated well. The majority of materials were shared using Google Docs as well as ClickUp, and the GroupMe chat was used frequently to communicate. As a result of this, the interviews with nine people went off without a hitch, and it was enough to make us feel accomplished, especially afterward. Furthermore, a large amount of data, such as Zoom video and interview notes, could be shared and managed efficiently. It was more fun than dissonance in the process, and it allowed us to learn a lot.

Lessons Learned

1. **Team communication is the key to successfully finishing the project.**
   Despite our physical distance, we managed segmented tasks with flexibility due to excellent coordination and communication. It led to better solutions by ensuring that all team members were aware of the issues and had an equal chance to participate in the discussion.

2. **Use the model!**
   It was challenging to choose which model to utilize right after the interview. This is because, despite narrowing the scope to the nursing profession, they responded differently to the preferred program as well as the benefits and drawbacks of the current program depending on their level and work type. We were able to narrow down the problem they were describing by using the models we learned in class.

3. **Always break work down into the smallest possible chunks.**
   This is useful for sprint planning as well as increasing speed during a sprint. We were able to fit more of our main objectives into each sprint by breaking down user stories into smaller chunks. Also, it gave us increased flexibility.

4. **Project management in the real world is more complicated and sophisticated.**

The scope we initially planned was much broader and resembled a large amount of content, thus the goal was to solve problems across multiple fields. Although we narrowed it down for the class project and tried to proceed according to the plan, several follow-ups took a long time to sort out.

5. **Trust the process and team members.**
   When working on a project, we believe that the best outcomes will come from trusting the members and doing your best on the segmented tasks.

For links to all of our relevant meeting minutes and interview notes, please see our Google Drive

Thank you!