

# **EHR Usability Test Report of Empower 1.1.57**

## **Report based on NISTIR 7742 - Customized Common Industry Format Template for Electronic Health Record Usability Testing**

Empower 1.1.57

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Report Prepared By: ECPS  
John E. Ratko, RN  
7086061677  
PO Box 3753 Chinle, AZ 86503  
jratko@empower.md

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### 3.0 - EXECUTIVE SUMMARY

Usability testing of Empower Version 1.1. 57 inpatient EHR was conducted on December 8, 11 and 13 in Chinle, AZ, and on January 3,4 and 13 in Chicago, IL. by ECPS. The purpose of this test was to test and validate the usability of the current user interface, and provide evidence of usability in the EHR Under Test (EHRUT). During the usability test, 10 healthcare providers matching the target demographic criteria served as participants and used the EHRUT in simulated, but representative tasks.

This study collected performance data on 12 major tasks with 41 total tasks typically conducted on an EHR:

1. CPOE medications entry, change, review
2. CPOE Laboratory entry, change, review
3. CPOE Imaging entry, change, review
4. Drug to drug/drug to allergy detection
5. Demographic entry
6. Problem list entry, change, review
7. Medication list entry, change, review
8. Medication allergy list entry, change, review
9. Clinical Decision Support
10. Implantable devices entry, inactivate, review
11. Clinical reconciliation and incorporation
12. E-Rx entry, change, review, Refill request, Fill status

During the 60 minute one-on-one usability test, each participant was greeted by the administrator and asked to review and sign an informed consent/release form and non-disclosure agreement (included in Appendix 3); they were instructed that they could withdraw at any time. 4 participants had some prior experience with the older versions of the EHR, and 6 participants had no prior experience with the EHR. Each user was given the same orientation to the EHR at the outset of the testing. The administrator introduced the test, and instructed participants to complete a series of tasks (given one at a time) using the EHRUT. During the testing, the administrator timed the test and recorded user performance data on paper that was transposed electronically. The administrator did not give the participant assistance in how to complete the task.

The following types of data were collected for each participant:

- Number of tasks successfully completed
- Time to complete the tasks
- Number and types of errors
- Path deviations
- Participant's verbalizations
- Participant's satisfaction ratings of the system

All participant data was de-identified – no correspondence could be made from the identity of the participant to the data collected.

Following the conclusion of the testing, participants were asked to complete a post-test questionnaire and were compensated RN - \$100, NP/PA - \$150, MD/DO - \$200 for their time. Participants signed an acknowledgement of incentive (included in appendix 3).

Various recommended metrics, in accordance with the examples set forth in the *NIST Guide to the Processes Approach for Improving the Usability of Electronic Health Records*, were used to evaluate the

usability of the EHRUT.

Following is a summary of the performance and rating data collected on the EHRUT;

Measure/Task	N	Task Success	Path Deviation	Task Time (secs)		Errors	Task Ratings (5=Easy)			
Task	#	Mean	STDEV	Deviations observed/optimal	Mean	STDEV	Deviations observed/optimal	Mean	Mean	STDEV
1A	10	10	0.00	0.00%	21.5	5.08	0	0	4.8	0.63
1B	10	4	0.52	30.00%	57.5	33.04	0	3	3.7	1.57
1C	10	10	0.00	0.00%	5.4	1.78	0	0	5	0.00
2A	10	10	0.00	10.00%	13	6.36	0	0	4.9	0.32
2B	10	10	0.00	20.00%	39.1	28.08	0	0	4.3	0.95
2C	10	10	0.00	0.00%	5	3.97	0	0	5	0.00
3A	10	10	0.00	0.00%	18.4	13.05	0	0	4.7	0.95
3B	10	10	0.00	10.00%	36.1	12.65	0	0	4.7	0.67
3C	10	10	0.00	0.00%	3.8	1.32	0	0	5	0.00
4A	10	10	0.00	0.00%	15.9	5.76	0	0	5	0.00
4B	10	10	0.00	10.00%	16.9	6.33	0	0	5	0.00
4C	10	10	0.00	10.00%	25.6	27.65	0	0	4.9	0.32
5A	10	8	0.42	10.00%	107.4	27.54	0	0	4.5	0.71
5B	10	9	0.32	20.00%	98.3	27.45	0	0	4.7	0.48
5C	10	10	0.00	0.00%	11.4	10.64	0	0	4.9	0.32
6A	10	10	0.00	0.00%	19.8	11.72	0	0	4.7	0.48
6B	10	10	0.00	20.00%	32.9	15.28	0	0	4.9	0.32
6C	10	10	0.00	10.00%	17.7	15.81	0	0	5	0.00
7A	10	10	0.00	0.00%	19.2	8.24	0	0	5	0.00
7B	10	10	0.00	20.00%	37.8	20.39	0	0	4.2	1.23
7C	10	10	0.00	0.00%	8.1	3.25	0	0	4.9	0.32
8A	10	10	0.00	0.00%	37.7	9.20	0	0	4.8	0.42
8B	10	10	0.00	10.00%	23.5	8.37	0	0	4.8	0.42
8C	10	9	0.32	0.00%	6.8	2.44	0	0	4.8	0.63
9A	10	10	0.00	20.00%	61.37	35.99	0	0	4.7	0.67
9B	10	10	0.00	0.00%	89.1	34.79	0	0	4.9	0.32
9C	10	10	0	10.00%	56.6	30.43	0	0	4.7	0.67
9D	10	9	0.32	0.00%	59.8	32.21	0	0	4.7	0.67
9E	10	10	0.00	0.00%	25	9.03	0	0	4.9	0.32
10A	10	10	0.00	0.00%	14.4	11.26	0	0	5	0.00
10B	10	9	0.32	20.00%	25.1	19.40	0	0	4.5	0.85
10C	10	10	0.00	0.00%	11.5	7.32	0	0	4.9	0.32
11A	10	10	0.00	20.00%	45.8	25.84	0	0	4.1	0.99
11B	10	10	0.00	0.00%	28.3	14.34	0	0	5	0
11C	10	9	0.32	00.00%	46.8	46.34	0	0	4.3	1.16
12A	10	10	0.00	00.00%	63.9	17.94	0	0	4.9	0.32
12B	10	10	0.00	00.00%	23.3	11.15	0	0	5	0
12C	10	10	0.00	00.00%	7.7	4.06	0	0	5	0
12D	10	10	0.00	00.00%	7.1	2.38	0	0	5	0
12E	10	10	0.00	00.00%	21.5	5.08	0	0	5	0

The average task rating = 4.77.

The task time optimal efficiency = 0.98

Total task success was 387/400 = 96.75%

The results from the System Usability Scale scored the subjective satisfaction with the system based on performance with these tasks to be;

Question	Total score	Average Score
I think I would like to use this system frequently:	39	3.9
I found the system unnecessarily complex:	17	1.7
I thought the system was easy to use:	44	4.4
I think that I would need the support of a technical person to be able to use this system:	17	1.7
I found the various functions of this system were well integrated:	44	4.4
I thought there was too much inconsistency in this system:	29	2.9
I would imagine that most people would learn to use this system quickly:	47	4.7
I found the system cumbersome to use:	17	1.7
I felt very confident using this system:	40	4.0
I needed to learn a lot of things before I could get going on this system:	13	1.3

#### Major Findings:

- Users found the system very user friendly and easy to use for the first time
- Users appreciated the reconciliation function for medications, allergy and problem list
- Users were able to receive and manage CDS information and alerts
- Users were able to complete assigned tasks with minimal training and no input

#### Areas for improvement:

- Inconsistent tab order for data entry in demographics fields
- Inconsistent completion of demographics – list box, dropdown, fill in.
- Reconciliation function needs reduced click path and sequencing of entry, ability to re-enter
- Reduction of movement from mouse to keyboard

## 2.0 - INTRODUCTION

The EHRUT tested for this study was Empower version 1.157. Designed to present medical information to healthcare providers in hospitals and inpatient care settings, Empower consists of an interactive platform that has functions tailored to the multiple disciplines involved in patient care. The usability testing attempted to represent realistic exercises and conditions.

The purpose of this study was to test and validate the usability of the current user interface, and provide evidence of usability in the EHR Under Test (EHRUT). To this end, measures of effectiveness, efficiency and user satisfaction, such as Task success or failure, task path deviation, time to complete task and task satisfaction were captured during the usability testing.

## 3.0 - METHOD

### 3.1 - Participants:

NISTIR 7742 - Customized Common Industry Format Template for Electronic Health Record Usability Testing process was followed. A total of 10 participants were tested on the EHRUT. Participants in the test were Physicians, Mid level providers like NP's and PA's, and RN's. Participants were recruited by ECDS and were compensated for their time at \$200, \$150 and \$100 respectively for their time. In addition, participants had no direct connection to the development of or organization producing the EHRUT. Participants were not from the testing or supplier organization. Participants were given the same orientation and training. For the test purposes, end-user characteristics were identified and translated into a recruitment screener used to solicit potential participants; an example of a screener is provided in Appendix 1. Recruited participants had a mix of backgrounds and demographic characteristics conforming to the recruitment screener. The following is a summary of participants by characteristics, including demographics, professional experience, computing experience and user needs for assistive technology. Participant names were replaced with Participant IDs so that an individual's data cannot be tied back to individual identities. The following is an overview of the demographic makeup of participants. See Appendix 2

Total - 10  
Males – 6  
Females – 4  
MD/DO – 4  
NP/PA – 4  
RN – 2  
Combined years clinical experience – 155  
Need assistive device – None  
Active computer users – 10  
EHR daily use – 10

14 participants were recruited and 10 participated in the usability test. 4 participants failed to show for the study. Participants were scheduled for 60 minute sessions with ample time in between each session for debrief by the administrator, and to reset systems to proper test conditions. Individual appointments were used to keep track of the participant schedule.

### 3.2 - STUDY DESIGN

Overall, the objective of this test was to uncover areas where the application performed well – that is, effectively, efficiently, and with satisfaction – and areas where the application failed to meet the needs of the participants. The data from this test may serve as a baseline for future tests with an updated version of the same EHR and/or comparison with other EHRs provided the same tasks are used. In short, this testing serves as both a means to record or benchmark current usability, but also to identify areas where improvements must be made.

During the usability test, participants interacted with 1 EHR. Each participant used the system in the same setting, and was provided with the same instructions. The system was evaluated for effectiveness,

efficiency and satisfaction as defined by measures collected and analyzed for each participant:

- Number of tasks successfully completed without assistance
- Time to complete the tasks
- Number and types of errors
- Path deviations
- Participant's verbalizations (comments)
- Participant's satisfaction ratings of the system

Additional information about the various measures can be found in Usability Metrics Section 3.9.

### 3.3 - TASKS

A number of tasks were constructed that would be realistic and representative of the kinds of activities a user might do with this EHR, including:

1. CPOE medications entry, change, review
2. CPOE Laboratory entry, change, review
3. CPOE Imaging entry, change, review
4. Drug to drug/drug to allergy detection
5. Demographic entry
6. Problem list entry, change, review
7. Medication list entry, change, review
8. Medication allergy list entry, change, review
9. Clinical Decision Support
10. Implantable devices entry, inactivate, review
11. Clinical reconciliation and incorporation
12. E-Rx entry, change, review, Refill request, Fill status

Tasks were selected based on their frequency of use, criticality of function, and those that may be most troublesome for users. Tasks should always be constructed in light of the study objectives.

### 3.4 - PROCEDURES

Upon arrival, participants were greeted; their identity was verified and matched with a name on the participant schedule. Participants were then assigned a participant ID. Each participant reviewed and signed an informed consent and non-disclosure agreement (See Appendix 3). A representative from the test team witnessed the participant's signature.

The administrator moderated the session including administering instructions and tasks. The administrator also monitored task times, obtained post-task rating data, and took notes on participant comments.

Participants were instructed to perform the tasks (see specific instructions below):

- As quickly as possible making as few errors and deviations as possible.
- Without assistance; administrators were allowed to give immaterial guidance and clarification on tasks, but not instructions on use.
- Without using a think aloud technique.

For each task, the participants were given a written copy of the content to be entered during the task via power point (see appendix 4). Task timing began once the administrator finished reading the question. The task time was stopped once the participant indicated they had successfully completed the task, either by verbalizing or when administrator observed the participant "save" the entry. Scoring is discussed below in Usability Metrics Section.

Following the session, the administrator gave the participant the post-test questionnaire and completed

the system usability scale (see Appendix 5). Participants were thanked for their time and compensated. Participants signed a receipt and acknowledgement form (See Appendix 6) indicating that they had received the compensation.

### 3.5 - TEST LOCATION

The test facility included a waiting area and a quiet testing room with a table, computer for the participant, and recording computer for the administrator. Only the participant and administrator were in the test room. To ensure that the environment was comfortable for users, noise levels were kept to a minimum with the ambient temperature within a normal range. Beverage was provided. All pertinent safety instruction and evacuation procedures were in place.

### 3.6 - TEST ENVIRONMENT

The EHRUT would be typically be used in a healthcare office or facility. In this instance, the testing was conducted in an office. For testing, the computer used was a HP 4540S with 17" HP monitor running windows operating system. The participants used a mouse and keyboard when interacting with the EHRUT.

The [EHRUT] used 1024x768 resolution and color settings. Print based documents used 32 point font. The application was set up by the ECDS according to the vendor's documentation describing the system set-up and preparation. The application itself was using a test database on a WAN connection. Technically, the system performance (i.e., response time) was representative to what actual users would experience in a field implementation. Additionally, participants were instructed not to change any of the default system settings (such as control of font size).

### 3.7 - TEST FORMS AND TOOLS

During the usability test, various documents and instruments were used, including:

1. Informed Consent
2. Non-Disclosure Agreement
3. Moderators guide
4. Introduction
5. Observation log
6. System Usability Scale
7. Post test questions Incentive receipt and acknowledgement form
8. Power point data entry content guide  
(See appendix 7, 8 for examples of these forms not already referenced)

### 3.8 - Participant Instructions

Orientation (10 minutes) – The following orientation was followed for each participant and read aloud;

Thank you for participating in this study. Our session today will last approximately 50minutes. During that time you will take a look at an electronic health record system.

I will ask you to complete a few tasks using this system and answer some questions. We are interested in how easy (or how difficult) this system is to use, what in it would be useful to you, and how we could improve it. You will be asked to complete these tasks on your own trying to do them as quickly as possible with the fewest possible errors or deviations. Do not do anything more than asked. If you get lost or have difficulty I cannot answer or help you with



anything to do with the system itself. Please save your detailed comments until the end of a task or the end of the session as a whole when we can discuss freely.

I did not have any involvement in its creation, so please be honest with your opinions. The product you will be using today is the proposed 2015 Edition of Empower Systems Emergency and Inpatient Documentation System which is currently undergoing testing for MU3 certification. .

Some of the data may not make sense as it is placeholder data.

We are recording the audio and screenshots of our session today. All of the information that you provide will be kept confidential and your name will not be associated with your comments at any time.

Do you have any questions or concerns?

Upon completion of the orientation, the participant was shown the power point content entry tool. After review, the participant was then given a brief training session (approx 5 minutes) on the EHRUT. All participants were given the same training following the content in the power point packet.

Once this task was complete, the administrator gave the following instructions: For each task, I will read the description to you and say “Begin.” At that point, please perform the task and say “Done” once you believe you have successfully completed the task. I would like to request that you not talk aloud or verbalize while you are doing the tasks. Participants were then given 39 tasks to complete. All tasks are listed in the moderator’s guide in Appendix 9.

### 3.9 - USABILITY METRICS

According to the *NIST Guide to the Processes Approach for Improving the Usability of Electronic Health Records*, EHRs should support a process that provides a high level of usability for all users. The goal is for users to interact with the system effectively, efficiently, and with an acceptable level of satisfaction. To this end, metrics for effectiveness, efficiency and user satisfaction were captured during the usability testing. The goals of the test were to assess:

1. Effectiveness of [EHRUT] by measuring participant success rates and errors
2. Efficiency of [EHRUT] by measuring the average task time and path deviations
3. Satisfaction with [EHRUT] by measuring ease of use ratings

## 4.0 - Results

### 4.1 - DATA analysis and reporting

The following table details how tasks were scored, errors evaluated, and the time data analyzed.

Measures	Rationale and Scoring
Effectiveness: Task Success	A task was counted as a “Success” if the participant was able to achieve the correct outcome, without assistance on a per task basis. The total number of successes were calculated for each task and then divided by the total number of times that task was attempted. The results are provided as a percentage. Task times were recorded for successes. Observed task times divided by the optimal time for each task is a measure of optimal efficiency. Optimal task performance time, as benchmarked by expert performance under realistic conditions, is recorded when constructing tasks. Target task times used for task times in the Moderator’s Guide must be operationally defined by taking multiple measures of optimal performance and multiplying by some factor [1.5] that allows some time buffer because the participants are presumably not trained to expert performance. Thus, if expert, optimal performance on a task was [x] seconds then allotted task time performance was [x * 1.5] seconds.
Effectiveness: Task Failures	If the participant abandoned the task, did not reach the correct answer or performed it incorrectly, the task was counted as a “Failure”. The total number of errors was calculated for each task and then divided by the total number of times that task was attempted. Not all deviations would be counted as errors.
Efficiency: Task Deviations	The participant’s path (i.e., steps) through the application was recorded. Deviations occur if the participant, for example, went to a wrong screen, clicked on an incorrect menu item, followed an incorrect link, or interacted incorrectly with an on-screen control. This path was compared to the optimal path. The number of steps in the observed path is divided by the number of optimal steps to provide a ratio of path deviation.
Efficiency: Task Time	Each task was timed from when the administrator said “Begin” until the participant said, “Done.” If he or she failed to say “Done,” the time was stopped when the participant stopped performing the task. Average time per task was calculated for each task. Variance measures (standard deviation) were also calculated.
Satisfaction: Task Rating	Participant’s subjective impression of the ease of use of the application was measured by administering both a simple post-task question as well as a post-session questionnaire. After each task, the participant was asked to rate “Overall, this task was:” on a scale of 1 (Very Difficult) to 5 (Very Easy). These data are averaged across participants. Common convention is that average ratings for systems judged easy to use should be 3.3 or above. To measure participants’ confidence in and likeability of the [EHRUT] overall, the testing team administered the System Usability Scale (SUS) post-test questionnaire. Questions included, “I think I would like to use this system frequently,” “I thought the system was easy to use,” and “I would imagine that most people would learn to use this system very quickly.” See full System Usability Score questionnaire in Appendix 5

The results of the usability test were calculated according to the methods specified in the Usability Metrics section above. Participants who failed to follow session and task instructions had their data excluded from the analyses, there were no exclusions. There was concern at failure rate of Task 1B. However, Tasks 2B and 3B were same workflow. Once participant did it the first time, the error rate dropped significantly on second and third attempts. Data was included despite this issue.

The usability testing results for the EHRUT are detailed below. The results should be seen in light of the objectives and goals outlined in Section on Study Design. The data should yield actionable results that, if corrected, yield material, positive impact on user performance.

(See Appendix 10 for all results)

Measure/Task	N	Task Success		Path Deviation	Task Time (secs)			Errors	Task Ratings (5=Easy)	
Task	#	Mean	STDEV	Deviations observed/optimal	Mean	STDEV	Deviations observed/optimal	Mean	Mean	STDEV
1A	10	10	0.00	0.00%	21.5	5.08	0	0	4.8	0.63
1B	10	4	0.52	30.00%	57.5	33.04	0	3	3.7	1.57
1C	10	10	0.00	0.00%	5.4	1.78	0	0	5	0.00
2A	10	10	0.00	10.00%	13	6.36	0	0	4.9	0.32
2B	10	10	0.00	20.00%	39.1	28.08	0	0	4.3	0.95
2C	10	10	0.00	0.00%	5	3.97	0	0	5	0.00
3A	10	10	0.00	0.00%	18.4	13.05	0	0	4.7	0.95
3B	10	10	0.00	10.00%	36.1	12.65	0	0	4.7	0.67
3C	10	10	0.00	0.00%	3.8	1.32	0	0	5	0.00
4A	10	10	0.00	0.00%	15.9	5.76	0	0	5	0.00
4B	10	10	0.00	10.00%	16.9	6.33	0	0	5	0.00
4C	10	10	0.00	10.00%	25.6	27.65	0	0	4.9	0.32
5A	10	8	0.42	10.00%	107.4	27.54	0	0	4.5	0.71
5B	10	9	0.32	20.00%	98.3	27.45	0	0	4.7	0.48
5C	10	10	0.00	0.00%	11.4	10.64	0	0	4.9	0.32
6A	10	10	0.00	0.00%	19.8	11.72	0	0	4.7	0.48
6B	10	10	0.00	20.00%	32.9	15.28	0	0	4.9	0.32
6C	10	10	0.00	10.00%	17.7	15.81	0	0	5	0.00
7A	10	10	0.00	0.00%	19.2	8.24	0	0	5	0.00
7B	10	10	0.00	20.00%	37.8	20.39	0	0	4.2	1.23
7C	10	10	0.00	0.00%	8.1	3.25	0	0	4.9	0.32
8A	10	10	0.00	0.00%	37.7	9.20	0	0	4.8	0.42
8B	10	10	0.00	10.00%	23.5	8.37	0	0	4.8	0.42
8C	10	9	0.32	0.00%	6.8	2.44	0	0	4.8	0.63
9A	10	10	0.00	20.00%	61.37	35.99	0	0	4.7	0.67
9B	10	10	0.00	0.00%	89.1	34.79	0	0	4.9	0.32
9C	10	10	0	10.00%	56.6	30.43	0	0	4.7	0.67
9D	10	9	0.32	0.00%	59.8	32.21	0	0	4.7	0.67
9E	10	10	0.00	0.00%	25	9.03	0	0	4.9	0.32
10A	10	10	0.00	0.00%	14.4	11.26	0	0	5	0.00

10B	10 9	0.32	20.00%	25.1	19.40	0	0	4.5	0.85
10C	10 10	0.00	0.00%	11.5	7.32	0	0	4.9	0.32
11A	10 10	0.00	20.00%	45.8	25.84	0	0	4.1	0.99
11B	10 10	0.00	0.00%	28.3	14.34	0	0	5	0
11C	10 9	0.32	00.00%	46.8	46.34	0	0	4.3	1.16
12A	10 10	0.00	00.00%	63.9	17.94	0	0	4.9	0.32
12B	10 10	0.00	00.00%	23.3	11.15	0	0	5	0
12C	10 10	0.00	00.00%	7.7	4.06	0	0	5	0
12D	10 10	0.00	00.00%	7.1	2.38	0	0	5	0
12E	10 10	0.00	00.00%	21.5	5.08	0	0	5	0

The results from the System Usability Scale scored the subjective satisfaction with the system based on performance with these tasks to be;

Question	Total score	Average Score
I think I would like to use this system frequently:	39	3.9
I found the system unnecessarily complex:	17	1.7
I thought the system was easy to use:	44	4.4
I think that I would need the support of a technical person to be able to use this system:	17	1.7
I found the various functions of this system were well integrated:	44	4.4
I thought there was too much inconsistency in this system:	29	2.9
I would imagine that most people would learn to use this system quickly:	47	4.7
I found the system cumbersome to use:	17	1.7
I felt very confident using this system:	40	4.0
I needed to learn a lot of things before I could get going on this system:	13	1.3

#### 4.2 - Discussion of findings (See appendix 10 for master task log)

**Effectiveness** – There was an overall success rate of 96.76%. Task 1B had 6/10 failures due to the task approach. Once participants had experienced this once, the errors did not repeat. Evaluation across users showed a range of 0-3 errors with 1 having 3 errors, 3 had 2 errors, 4 had 1 error, and 2 had no errors. Given that most participants had no prior experience and minimal training we are overall satisfied with this result.

**Efficiency** – All times were included in analysis. The predicted time was based on an expert user timing task completion 3 times per task, averaging, and then using a multiplier of 1.5 per time per task. Overall the optimal efficiency for all tasks and all users was 0.98. Overall expected time was 1345 seconds and the average for all users was 1244 seconds. Given that most participants had no prior experience and minimal training we are overall satisfied with this result.

**Satisfaction** – Participants had an overall average rating of 4.76/5. There were 3 participants with a total range in between 170 – 179; 3 participants with total range between 180-189; and 4 participants with a total range over 190 out of 200 possible. No task had an average rating less than 4. These ratings are reinforced by verbal comments recorded regarding user friendliness, intuitive completion, easy navigation, minimal problems during testing. Most users appreciated reconciliation from CCDA and CDS information and alerts. One user flatly stated that they “ignore all alerts” but found other CDS information of benefit. Given that most participants had no prior experience and minimal training we are overall satisfied with this result.

Major Findings:

- Users found the system very user friendly and easy to use for the first time
- Users appreciated the reconciliation function for medications, allergy and problem list
- Users were able to receive and manage CDS information and alerts
- Users were able to complete assigned tasks with minimal training and no input

Areas for improvement:

- Inconsistent tab order for data entry in demographics fields
- Inconsistent completion of demographics – list box, dropdown, fill in.
- Reconciliation function needs reduced click path and sequencing of entry, ability to re-enter
- Reduction of movement from mouse to keyboard

## **5.0 - APPENDICES**

Appendix – 1 Recruiter Screener

Appendix 2 – Demographic Spreadsheet

Appendix 3 – Consent/NDA

Appendix 4 – Power Point Data Entry Content

Appendix 5 – System Usability Scale/Post Questions

Appendix 6 – Incentive Receipt

Appendix 7 – Moderator guide

Appendix 8 – Introduction

Appendix 9 – Task list

Appendix 10 – Admin task observation log

## Appendix 1

Hello, my name is John Ratko, calling from Empower Systems. We are recruiting individuals to participate in a usability study for an electronic health record. We would like to ask you a few questions to see if you qualify and if you would like to participate. This should only take a few minutes of your time. This is strictly for research purposes. If you are interested and qualify for the study, you will be paid to participate. Can I ask you a few questions?

1. [If not obvious] Are you male or female? [Recruit a mix of participants]
2. Have you participated in a focus group or usability test in the past xx months? [If yes, Terminate]
3. Do you, or does anyone in your home, work in marketing research, usability research, web design [...etc.]? [If yes, Terminate]
4. Do you, or does anyone in your home, have a commercial or research interest in an electronic health record software or consulting company? [If yes, Terminate]
5. Which of the following best describes your age? [23 to 39; 40 to 59; 60 - to 74; 75 and older] [Recruit Mix]
6. Which of the following best describes your race or ethnic group? [e.g., Caucasian, Asian, Black/African-American, Latino/a or Hispanic, etc.]
7. Do you require any assistive technologies to use a computer? [if so, please describe]

## Professional Demographics

8. What is your current position and title? (Must be healthcare provider)
  - RN: Specialty
  - Physician: Specialty
  - Resident: Specialty
  - Administrative Staff
  - Other [Terminate]
9. How long have you held this position?
10. Describe your work location(or affiliation) and environment?(Recruit according to the intended users of the application) [e.g., private practice, health system, government clinic, etc.]
11. Which of the following describes your highest level of education? [e.g., high school graduate/GED, some college, college graduate (RN, BSN), postgraduate (MD/PhD), other (explain)]

## Computer Expertise Customize this to reflect what you know about your EHR's audience

1. Besides reading email, what professional activities do you do on the computer? [e.g., access EHR, research; reading news; shopping/banking; digital pictures; programming/word processing, etc.] [If no computer use at all, Terminate]
2. About how many hours per week do you spend on the computer? [Recruit according to the demographics of the intended users, e.g., 0 to 10, 11 to 25, 26+ hours per week]
3. What computer platform do you usually use? [e.g., Mac, Windows, etc.]
4. In the last month, how often have you used an electronic health record?
5. How many years have you used an electronic health record?
6. How many EHRs do you use or are you familiar with?
7. How does your work environment patient records? [Recruit according to the demographics of the intended users]
  - a. On paper
  - b. Some paper, some electronic
  - c. All electronic

Contact Information If the person matches your qualifications, ask

Those are all the questions I have for you. Your background matches the people we're looking for. [If you are paying participants or offering some form of compensation, mention] For your participation, you will be paid [amount].

Would you be able to participate on [date, time]? [If so collect contact information]

May I get your contact information?

Name of participant:

Address:

City,State,Zip:

Daytime phone number:

Evening phone number:

Alternate[cell]phone number:

Emailaddress:

Before your session starts, we will ask you to sign a release form allowing us to videotape your session. The videotape will only be used internally for further study if needed. Will you consent to be videotaped?

This study will take place at [location]. I will confirm your appointment a couple of days before your session and provide you with directions to our office. What time is the best time to reach you?



Appendix 2 - **Double click on report body to get full excel report**

Participant		Male	Female	Past UCD test YES/NO	Related research YES/NO
1			1	No	No
2			1	No	No
2			1	No	No
3		1		No	No
4		1		No	No
5		1		No	No

## Appendix 3

## Informed Consent

Test Company would like to thank you for participating in this study. The purpose of this study is to evaluate an electronic health records system. If you decide to participate, you will be asked to perform several tasks using the prototype and give your feedback. The study will last about 60 minutes. At the conclusion of the test, you will be compensated for your time.

## Agreement

I understand and agree that as a voluntary participant in the present study conducted by Test Company I am free to withdraw consent or discontinue participation at any time. I understand and agree to participate in the study conducted and videotaped by the Test Company.

I understand and consent to the use and release of the videotape by Test Company. I understand that the information and videotape is for research purposes only and that my name and image will not be used for any purpose other than research. I relinquish any rights to the videotape and understand the videotape may be copied and used by Test Company without further permission.

I understand and agree that the purpose of this study is to make software applications more useful and usable in the future.

I understand and agree that the data collected from this study may be shared with outside of Test Company and Test Company's client. I understand and agree that data confidentiality is assured, because only de-identified data – i.e., identification numbers not names – will be used in analysis and reporting of the results.

I agree to immediately raise any concerns or areas of discomfort with the study administrator. I understand that I can leave at any time.

Please circle one of the following:

YES, I have read the above statement and agree to be a participant. NO, I choose not to participate in this study.

Signature: Date:

**NON-DISCLOSURE AGREEMENT AND INFORMED CONSENT FORM**

THIS AGREEMENT is entered into as of \_\_\_\_\_, 2017, between  
("the Participant") and the testing organization Test Company located at:

1200 Harger Road, Suite 408  
Oak Brook, IL 60523

The Participant acknowledges his or her voluntary participation in today's usability study may bring the Participant into possession of Confidential Information. The term "Confidential Information" means all technical and commercial information of a proprietary or confidential nature which is disclosed by Test Company, or otherwise acquired by the Participant, in the course of today's study.

By way of illustration, but not limitation, Confidential Information includes trade secrets, processes, formulae, data, know-how, products, designs, drawings, computer aided design files and other computer files, computer software, ideas, improvements, inventions, training methods and materials, marketing techniques, plans, strategies, budgets, financial information, or forecasts.

Any information the Participant acquires relating to this product during this study is confidential and proprietary to Test Company and is being disclosed solely for the purposes of the Participant's participation in today's usability study. By signing this form the Participant acknowledges that s/he will receive monetary compensation for feedback and will not disclose this confidential information obtained today to anyone else or any other organizations.

Participant's printed name: \_\_\_\_\_

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Appendix 4 - **Double click on report body to get full Power Point**

# Empower Systems

MU Stage 3 -User Centered Design  
Test Information Entry Content

## Appendix 5

## SYSTEM USABILITY SCALE QUESTIONNAIRE

In 1996, Brooke published a “low-cost usability scale that can be used for global assessments of systems usability” known as the System Usability Scale or SUS.<sup>16</sup> Lewis and Sauro (2009) and others have elaborated on the SUS over the years. Computation of the SUS score can be found in Brooke’s paper, in at <http://www.usabilitynet.org/trump/documents/Suschapt.doc> or in Tullis and Albert (2008).

Strongly 1  
Disagree

Strongly 5  
Agree

1. I think that I would like to use this system frequently
2. I found the system unnecessarily complex
3. I thought the system was easy to use
4. I think that I would need the support of a technical person to be able to use this system
5. I found the various functions in this system were well integrated
6. I thought there was too much inconsistency in this system
7. I would imagine that most people would learn to use this system very quickly
8. I found the system very cumbersome to use
9. I felt very confident using the system
10. I needed to learn a lot of things before I could get going with this system

## **Final Questions**

What was your overall impression of this system?

What aspects of the system did you like most?

What aspects of the system did you like least?

Were there any features that you were surprised to see?

What features did you expect to encounter but did not see? That is, is there anything that is missing in this application?

Compare this system to other systems you have used:

Would you recommend this system to your colleagues?

Appendix 6

## INCENTIVE RECEIPT AND ACKNOWLEDGMENT FORM

### Acknowledgement of Receipt

I hereby acknowledge receipt of \$\_\_\_\_\_ for my participation in a research study run by Test Company.

Printed Name: \_\_\_\_\_

Address: \_\_\_\_\_

Signature: \_\_\_\_\_

Usability Researcher: \_\_\_\_\_

Signature of Usability Researcher: \_\_\_\_\_

Date: \_\_\_\_\_

Witness: \_\_\_\_\_

Witness Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Appendix 7

## EHRUT Usability Test Moderator's Guide

Administrator  
Data Logger  
Date Time Participant #  
Location

### Prior to testing

Confirm schedule with Participants  
Ensure EHRUT lab environment is running properly  
Ensure lab and data recording equipment is running properly

### Prior to each participant:

Reset application - run delete script for each task, then run insert script

Start session recordings with tool (join me and skype)

### Prior to each task:

Reset application to starting point for next task

### After each participant:

End session recordings with tool

### After all testing

Back up all video and data files



## Appendix 8

### Orientation (10 minutes)

Thank you for participating in this study. Our session today will last 50minutes. During that time you will take a look at an electronic health record system.

I will ask you to complete a few tasks using this system and answer some questions. We are interested in how easy (or how difficult) this system is to use, what in it would be useful to you, and how we could improve it. You will be asked to complete these tasks on your own trying to do them as quickly as possible with the fewest possible errors or deviations. Do not do anything more than asked. If you get lost or have difficulty I cannot answer or help you with anything to do with the system itself. Please save your detailed comments until the end of a task or the end of the session as a whole when we can discuss freely.

I did not have any involvement in its creation, so please be honest with your opinions. The product you will be using today is the proposed 2015 Edition of Empower Systems Emergency and Inpatient Documentation System which is currently under going testing for MU3 certification. .

Some of the data may not make sense as it is placeholder data.

We are recording the audio and screenshots of our session today. All of the information that you provide will be kept confidential and your name will not be associated with your comments at any time.

Do you have any questions or concerns?

Preliminary Questions (5 minutes) What is your job title / appointment?

How long have you been working in this role?

What are some of your main responsibilities?

Tell me about your experience with electronic health records.

## Appendix 9

Task 1a: Add Medication (30 Seconds)

Use UCD Medication patient

Login as ecdsmdmd

Take the participant to medical orders screen for this task.

Have the user add this medication

Augmentin 250 mg-125 mg Tab  
Take 1 tablet by oral route every 8 hours

Success:

Task Time:

Optimal Path: double click on the empty row -> type augmentin in the pharmacy drop down -> choose the drug -> dosage selection screen -> Double click dosage - Save and Close

Correct

Minor Deviations / Cycles :: Describe below Major Deviations :: Describe below Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was:

Show participant written scale: "Very Difficult" (1) to "Very Easy" (5)

Administrator / Notetaker Comments:

Task 1b: Change Medication (45 Seconds)

Use UCD Medication patient

Have the user change the medication dose

Augmentin 250 mg-125 mg Tab  
Take 1 tablet by oral route every 8 hours

**Change to:**

Augmentin 500 mg-125 mg Tab  
Take 1 tablet by oral route every 8 hours

Success:

Task Time:

Optimal Path:

Cancel the below medical order

Double click in blank row > Click in to other medical orders and comments > Type in to DC Augmentin 250-125 Tab every 8 hours > Click add another - order pop up remains open ready to insert next order

Add new medical order

Click in Pharmacy orders > type augmentin in the pharmacy drop down -> choose the drug -> dosage selection screen -> Double click dosage - Save and Close

Correct

Minor Deviations / Cycles :: Describe below Major Deviations :: Describe below Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was:

Show participant written scale: "Very Difficult" (1) to "Very Easy" (5)

Administrator / Notetaker Comments:

Task 1c: Verify Change (5 Second)

Use UCD Medication patient

Verify the new drug is in the medical orders

Augmentin 500 mg-125 mg Tab  
Take 1 tablet by oral route every 8 hours

Success:

Task Time:

Optimal Path:

View the Medical Order Screen

Correct

Minor Deviations / Cycles :: Describe below Major Deviations :: Describe below Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was:

Show participant written scale: "Very Difficult" (1) to "Very Easy" (5)

Administrator / Notetaker Comments:

Task 2a: Add Laboratory Test (10 Seconds)

Log in as ecdsMD

Use UCD Laboratory Patient

Take the participant to medical orders screen for this task.

Have the user add this laboratory test

CBC Without Differential

Success:

Task Time:

Optimal Path: MD Add Order Screen ->Double click in blank row > Double click on cbc without diff in the common diagnostics box - Save and Close

Correct

Minor Deviations / Cycles :: Describe below Major Deviations :: Describe below Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was:

Show participant written scale: "Very Difficult" (1) to "Very Easy" (5)

Administrator / Notetaker Comments:

Task 2b: Change Lab test (30 Seconds)

Use UCD Laboratory Patient

Have the user change the lab order

Other medical orders - enter Cancel above medical order

Add diagnostic order

•Cardiac Monitor

Success:

Task Time:

Optimal Path:

Cancel the below medical order

Double click in blank row > Click in other medical orders and comments > Type in to DC CBC without Diff >

Click add another - order pop up remains open ready to insert next order

Add new medical order for cardiac monitoring

MD Add Order Screen -> Double click cardiac monitor in common diag box - Save and Close

Correct

Minor Deviations / Cycles :: Describe below Major Deviations :: Describe below Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was:

Show participant written scale: "Very Difficult" (1) to "Very Easy" (5)

Administrator / Notetaker Comments:

Task 2c: Verify Change (5 Second)

Use UCD Laboratory Patient

Verify the new lab test is in the medical orders  
**Cardiac Monitor**

Success:

Task Time:

Optimal Path:

View the Medical Order Screen

Correct

Minor Deviations / Cycles :: Describe below Major Deviations :: Describe below Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was:

Show participant written scale: "Very Difficult" (1) to "Very Easy" (5)

Administrator / Notetaker Comments:

Task 3a: Add Imaging Test (15 Seconds)

Use UCD Imaging Patient

Take the participant to medical orders screen for this task.

Have the user add this Imaging test

Chest PA and Lat X-Ray

Success:

Task Time:

Optimal Path: MD Add Order Screen -> Double click on Chest PA and Lat X-ray in the common diag box - Save and Close

Correct

Minor Deviations / Cycles :: Describe below Major Deviations :: Describe below Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was:

Show participant written scale: "Very Difficult" (1) to "Very Easy" (5)

Administrator / Notetaker Comments:



Task 3b: Change Imaging test (35 Seconds)

Use UCD Imaging Patient

Have the user change the imaging order

DC - Chest PA and Lat X-Ray t

**Add order**

Head CT w/o Contrast

Success:

Task Time:

Optimal Path:

Cancel the below medical order

Double click in blank row > Click in other medical orders and comments > Type in to DC Chest PA and lateral Xray  
> Click add another - order pop up remains open ready to insert next order

MD Add Order Screen -> Double click Head Ct s Contrast in common diag box > Add reason for exam = Headache  
> Save and Close

**Correct**

Minor Deviations / Cycles :: Describe below Major Deviations :: Describe below Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was:

Show participant written scale: "Very Difficult" (1) to "Very Easy" (5)

Administrator / Note taker Comments:

Task 3c: Verify Change (5 Second)

Use UCD Imaging Patient

Verify the new lab test is in the medical orders  
**Head CT s Contrast**

Success:

Task Time:

Optimal Path:

View the Medical Order Screen

Correct

Minor Deviations / Cycles :: Describe below Major Deviations :: Describe below Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was:

Show participant written scale: "Very Difficult" (1) to "Very Easy" (5)

Administrator / Notetaker Comments:

Task 4a: Trigger Drug Drug interaction (15 Seconds)

Use UCD DRUGALLERGY Patient

Take the participant to medical orders screen for this task.

Have the user add this Medication

Verapamil 120 mg Tab  
Default dosage

Success:

Task Time:

Optimal Path: MD Add Order Screen -> Choose verapamil 120mg from the pharmacy drop down - Save and Close

Correct

Minor Deviations / Cycles :: Describe below Major Deviations :: Describe below Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was:

Show participant written scale: "Very Difficult" (1) to "Very Easy" (5)

Administrator / Notetaker Comments:

Task 4b: Trigger Drug Allergy Interaction (20 Seconds)

Have the user order this medication

Augmentin 250 mg-125mg Tab  
Take 1 tablet by oral route every 8 hours

Success:

Task Time:

Optimal Path:

MD Add order Screen -> select augmentin from the pharmacy drop down -> double click on the dosage \_> save -> save and close

MD Add Order Screen -> Double click Head Ct s Contrast in common diag box - Save and Close

Correct

Minor Deviations / Cycles :: Describe below Major Deviations :: Describe below Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was:

Show participant written scale: "Very Difficult" (1) to "Very Easy" (5)

Administrator / Notetaker Comments:

Task 4c: Adjust severity level of drug drug interaction (20 Second)

Take the user to the CD Manager screen

Change the Drug to Drug Interaction Severity level from what it is currently to a level 1

Success:

Task Time:

Optimal Path:

CDS Manager screen -> use severity drop down to change severity -> save

Correct

Minor Deviations / Cycles :: Describe below Major Deviations :: Describe below Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was:

Show participant written scale: "Very Difficult" (1) to "Very Easy" (5)

Administrator / Notetaker Comments:

Task 5a: Record Demographics (94 Seconds)

Use UCD DEMOGRAPHICS Patient

Login as ecdsmd

Take the participant to the demographics screen for this task.

Have the user enter these values in appropriate fields

DOB = 05/10/1975  
Race = Native Hawaiian or Other Pacific Islander  
Sex = Male  
Language = English  
Ethnicity = LATIN AMERICAN  
Sexual Orientation = Straight or heterosexual  
Gender Identity = Identifies as Male  
Date of Death = 12/15/2017  
Preliminary Cause of Death = Ill-defined and unknown cause of mortality

Success:

Task Time:

Optimal Path: Demographics screen -> Edit all those fields - Save and Close

Correct

Minor Deviations / Cycles :: Describe below Major Deviations :: Describe below Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was:

Show participant written scale: "Very Difficult" (1) to "Very Easy" (5)

Administrator / Notetaker Comments:

Task 5b: Change Demographics (94 Seconds)

Use UCD DEMOGRAPHICS Patient

Login as ecdsmd

Take the participant to the demographics screen for this task.

Have the user change these values

DOB = 05/05/1976  
Race = White  
Sex = Female  
Language = Chinese  
Ethnicity = Declined to specify  
Sexual Orientation = Choose not to disclose  
Gender Identity = Identifies as Female  
Date of Death = 12/16/2017  
Preliminary Cause of Death = Patient deceased during stay (discharge status = dead) (finding)

Success:

Task Time:

Optimal Path: Demographics screen -> Edit all those fields - Save and Close

Correct

Minor Deviations / Cycles :: Describe below Major Deviations :: Describe below Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was:

Show participant written scale: "Very Difficult" (1) to "Very Easy" (5)

Administrator / Notetaker Comments:

Task 5c: Display Demographics (10 Second)

Demographics screen

Verify changes were made

Success:

Task Time:

Optimal Path:

Login screen -> select patient screen -> Demographics screen -> Patient information Tab

Correct

Minor Deviations / Cycles :: Describe below Major Deviations :: Describe below Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was:

Show participant written scale: "Very Difficult" (1) to "Very Easy" (5)

Administrator / Notetaker Comments:



Task 6a: Record Problem (20 Seconds)

Use UCD PROBLEMS Patient

Login as ecdsmd

Take the participant to the assessment screen for this task.

Have the user enter a new assessment

Fracture at wrist and hand level (disorder)

Success:

Task Time:

Optimal Path: assessment screen -> click on the blank row -> type in the assessment drop down - Save and Close

Correct

Minor Deviations / Cycles :: Describe below Major Deviations :: Describe below Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was:

Show participant written scale: "Very Difficult" (1) to "Very Easy" (5)

Administrator / Notetaker Comments:

Task 6b: Change Problem (25 Seconds)

Use UCD Problem Patient

Login as ecdsmd

Take the participant to the assessment screen for this task.

Have the user change the problem from  
Fracture at wrist and hand level(disorder)  
To  
Fracture dislocation of finger (disorder)

Success:

Task Time:

Optimal Path: assessment screen -> click on fracture at wrist and hand level -> choose fracture dislocation -> Save and Close

Correct

Minor Deviations / Cycles :: Describe below Major Deviations :: Describe below Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was:

Show participant written scale: "Very Difficult" (1) to "Very Easy" (5)

Administrator / Notetaker Comments:

Task 6c: Display Active Assessments, Display Resolved Assessments (20 Second)

On assessment screen

Filter only Active Assessments

Filter only Resolved Assessments

Success:

Task Time:

Optimal Path:

assessment screen -> change filter to show active -> change filter to show resolved

Correct

Minor Deviations / Cycles :: Describe below Major Deviations :: Describe below Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was:

Show participant written scale: "Very Difficult" (1) to "Very Easy" (5)

Administrator / Notetaker Comments:

Task 7a: Record Medication (20 Seconds)

Use UCD MEDICATIONLIST Patient

Login as ecdsmd

Take the participant to the home Medication List screen for this task.

Have the user enter a new home medication

Abilify 10 mg Tab

Take 1 tablet (10 mg) by oral route once daily

Success:

Task Time:

Optimal Path: medication list screen -> click on the blank row -> type in the medication drop down -> double click appropriate dosage -> Save and Close

Correct

Minor Deviations / Cycles :: Describe below Major Deviations :: Describe below Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was:

Show participant written scale: "Very Difficult" (1) to "Very Easy" (5)

Administrator / Notetaker Comments:

Task 7b: Change Medication (30 Seconds)

Use UCD MedicationList Patient

Login as ecdsmd

Take the participant to the medication list screen for this task.

Have the user change the medication from:

Abilify 10 mg Tab

Take 1 tablet (10 mg) by oral route once daily

Change to:

Abilify 20 mg Tab

Take 1 tablet (10 mg) by oral route once daily

Success:

Task Time:

Optimal Path: medication list screen -> click on abilify 10 mg tab -> delete the medication -> click on blank row -> select abilify 20mg tab in the drop down -> double click same dosage -> Save and Close

Correct

Minor Deviations / Cycles :: Describe below Major Deviations :: Describe below Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was:

Show participant written scale: "Very Difficult" (1) to "Very Easy" (5)

Administrator / Notetaker Comments:

Task 7c: Display Active medications, Display no longer active medications (20 Second)

On Medication List screen

Filter only Active Medications

Filter only No longer Active Medications

Success:

Task Time:

Optimal Path:

Medication List screen -> change filter to show active -> change filter to show no longer active

Correct

Minor Deviations / Cycles :: Describe below Major Deviations :: Describe below Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was:

Show participant written scale: "Very Difficult" (1) to "Very Easy" (5)

Administrator / Notetaker Comments:

Task 8a: Record Medication Allergy (32 Seconds)

Use UCD MEDALLERGY Patient

Login as ecdsmd

Take the participant to the Allergy List screen for this task.

Have the user enter a new allergy

Warfarin

Reaction - fever, severity - moderate, start date - 10/10/2015, status - Active,  
type - Drug Allergy

Success:

Task Time:

Optimal Path: allergy list screen -> click on the blank row -> type in the allergy drop down -> choose reaction -> choose severity -> enter start date -> choose status > save

Correct

Minor Deviations / Cycles :: Describe below Major Deviations :: Describe below Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was:

Show participant written scale: "Very Difficult" (1) to "Very Easy" (5)

Administrator / Notetaker Comments:

Task 8b: Change Allergy (18 Seconds)

Use UCD Medications Patient

Login as ecdsmd

Take the participant to the medication list screen for this task.

Have the user change the allergy from :  
Warfarin to Abilify

Have the user change the reaction and severity:  
Reaction - Hives, Severity - Severe

Success:

Task Time:

Optimal Path: allergy list screen -> click on warfarin -> change allergy to abilify -> reaction to hives -> severity to severe -> Save and Close

Correct

Minor Deviations / Cycles :: Describe below Major Deviations :: Describe below Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was:

Show participant written scale: "Very Difficult" (1) to "Very Easy" (5)

Administrator / Notetaker Comments:



Task 8c: Display Active allergies, Display no longer active allergies (20 Second)

On Allergy List screen

Filter only Active allergies  
Filter only No longer Active allergies

Success:

Task Time:

Optimal Path:

allergy List screen -> change filter to show active -> change filter to show no longer active

Correct

Minor Deviations / Cycles :: Describe below Major Deviations :: Describe below Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was:

Show participant written scale: "Very Difficult" (1) to "Very Easy" (5)

Administrator / Notetaker Comments:

Task 9a: Enable each CDS alert listed (77 Seconds)

Login as ecdsmd

Take the user to the CDS Manager

Have the user enable these CDS alerts

Combination(vitals and Problem)

Effective antimicrobial administration within the first hour of documented hypotension was associated with increased survival to hospital discharge in adult patients with septic shock

Laboratory Test

Moderate: Sodium > 135 mEq/L, Severe: Sodium < 125 mEq/L

Demographics

Screen for colorectal cancer using fecal occult blood testing, sigmoidoscopy, or colonoscopy, in adults, beginning at age 50 years and continuing until age 75 years.

Medication List

Review medication list for other anti-coagulants

Vital Signs

Normal pulse for children over 10 and adults (including seniors) is 60-100 beats per minute

Medication Allergy List

There is a four-fold increase in the risk of developing an allergic reaction to the cephalosporins when given to patients with a history of penicillin allergy.

Problem List

Diabetic Patient is due for a foot exam(recommended yearly)

Success:

Task Time:

Optimal Path: click on CDS Manager Button -> set the enabled column to true for each of the CDS alerts -> click on Save

Correct

Minor Deviations / Cycles :: Describe below Major Deviations :: Describe below Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was:

Show participant written scale: "Very Difficult" (1) to "Very Easy" (5)

Administrator / Notetaker Comments:

Task 9b: Trigger each CDS listed below (160 Seconds)

Login as ecdsmd

Have the user **select these patients** to trigger CDS alerts

**CDS, VitalsProblem** Combination(vitals and Problem)

Effective antimicrobial administration within the first hour of documented hypotension was associated with increased survival to hospital discharge in adult patients with septic shock

**CDS, Labs** Laboratory Test

Moderate: Sodium > 135 mEq/L, Sever:Sodium < 125 mEq/L

**CDS, Demographics** Demographics

Screen for colorectal cancer using fecal occult blood testing, sigmoidoscopy, or colonoscopy, in adults, beginning at age 50 years and continuing until age 75 years.

**Myra Jones** Medication List

Review medication list for other anti-coagulants

**CDS, Vitals** Vital Signs

Normal pulse for children over 10 and adults (including seniors) is 60-100 beats per minute

**CDS, Allergy** Medication Allergy List

There is a four-fold increase in the risk of developing an allergic reaction to the cephalosporins when given to patients with a history of penicillin allergy.

**CDS, Problems** Problem List

Diabetic Patient is due for a foot exam(recommended yearly)

Success:

Task Time:

Optimal Path: click on patient -> click ok on the alert -> click patient list to proceed to the next example

Correct

Minor Deviations / Cycles :: Describe below Major Deviations :: Describe below Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was:

Show participant written scale: "Very Difficult" (1) to "Very Easy" (5)

Administrator / Notetaker Comments:

Task 9c: Info Buttons (59 Seconds)

Login as ecdsmd

Have the user access info buttons for **these patients**  
**(CDS, Problems)** - Assessment List  
Look up Diabetes Mellitus(disorder)  
**(Jones, Myra)** - Medication List  
Look up Coumadin

Success:

Task Time:

Optimal Path: click on CDS, Problem Patient -> click assessment button -> click info button for Diabetes - > return to patient list -> click on Jones, Myra -> double click current home medications -> click info button for coumadin

Correct

Minor Deviations / Cycles :: Describe below Major Deviations :: Describe below Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was:

Show participant written scale: "Very Difficult" (1) to "Very Easy" (5)

Administrator / Notetaker Comments:

Task 9d: Trigger CDS Alerts after incoming CCDA (60 Seconds)

Login as ecdsmd

**Remember to run SQL queries 4/5**

Use Recon, Clinical Patient

Point out to the user that no CDS alerts were triggered.

Reconcile the allergies

Choose Penicillin V from the Referral List

Reconcile the medications

Choose Cefaclor 125 mg Chewable Tab once daily from the Referral List

Reconcile the Assessments

Choose Diabetes Mellitus type I without retinopathy (disorder)

Return to Patient List

Diabetic foot exam CDS Alert should trigger (Problem list)

Four fold increase in the risk of developing an allergic reaction to cephalosporins when given patients with history of penicillin allergy (medication and allergy)

Success:

Task Time:

Optimal Path: click on Recon, Clinical Patient -> click allergy recon button -> double click Penicillin V -> save -> click on medication recon button -> double click cefaclor 125 mg -> save -> click on assessment button -> click on assessment recon button -> double click Diabetes Mellitus type I -> save -> patient list

Correct

Minor Deviations / Cycles :: Describe below Major Deviations :: Describe below Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was:

Show participant written scale: "Very Difficult" (1) to "Very Easy" (5)

Administrator / Notetaker Comments:

Task 9e: check references for CDS Alerts (27 Seconds)

Login as ecdsmd

Have the user goto the CDS Manager to view the references for this CDS Alert

Diabetic Patient is due for a foot exam (recommended yearly)

Success:

Task Time:

Optimal Path: click on CDS Manager button -> scroll down to find Diabetic Patient is due for a foot exam (recommended yearly) -> scroll to the right for references.

Correct

Minor Deviations / Cycles :: Describe below Major Deviations :: Describe below Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was:

Show participant written scale: "Very Difficult" (1) to "Very Easy" (5)

Administrator / Notetaker Comments:

Task 10a: Record UDI (53 Seconds)

Use UCD UDIList Patient

Login as ecdsrn

Take the participant to the Implantable Device List screen for this task.

Have the user enter a new UDI

(01)10884521062856(11)141231(17)150707(10)A213B1(21)1234

Success:

Task Time:

Optimal Path: Implantable Device list screen -> click on the blank row -> enter the code in the UDI box -> save

Correct

Minor Deviations / Cycles :: Describe below Major Deviations :: Describe below Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was:

Show participant written scale: "Very Difficult" (1) to "Very Easy" (5)

Administrator / Notetaker Comments:

Task 10b: Change UDI Status (20 Seconds)

Use UCD UDIList Patient

Login as ecdsrn

Take the participant to the implantable device list screen for this task.

Have the user change the status of UDI from Active to not active

Success:

Task Time:

Optimal Path: Implantable list screen -> click on polyester suture -> uncheck active status -> Save

Correct

Minor Deviations / Cycles :: Describe below Major Deviations :: Describe below Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was:

Show participant written scale: "Very Difficult" (1) to "Very Easy" (5)



Task 10c: Access UDI, device description, identifiers, and attributes  
(10 Second)

Take user to Implantable Device List screen

Access the device description, identifiers, and attributes for listed UDI

Success:

Task Time:

Optimal Path:

Implantable Device List screen -> click on Polyester suture -> Save

Correct

Minor Deviations / Cycles :: Describe below Major Deviations :: Describe below Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was:

Show participant written scale: "Very Difficult" (1) to "Very Easy" (5)

Administrator / Notetaker Comments:

Task 11a: Reconcile Allergies (47 Seconds)

Use Recon Clinical Patient

Login as ecdsmd

Have the user click on the Recon Clinical Patient

From referral List  
Pick Penicillin V

From Empower list  
Pick cefaclor  
Pick Ibuprofen

Success:

Task Time:

Optimal Path: Click on the patient -> click on recon button for allergies -> double click Penicillin -> double click cefaclor -> double click Ibuprofen -> save

Correct

Minor Deviations / Cycles :: Describe below Major Deviations :: Describe below Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was:

Show participant written scale: "Very Difficult" (1) to "Very Easy" (5)

Administrator / Notetaker Commen

Task 11b: Reconcile Medications (47 Seconds)

Use Recon Clinical Patient

Login as ecdsmd

Have the user click on the Recon Clinical Patient if not there

Referral list

Pick simvastatin 20 mg tablet

Pick lorazepam 0.5 mg tablet

Empower List

Pick metoprolol tartrate 50 mg tablet

Pick warfarin 2.5 mg tablet

Success:

Task Time:

Optimal Path: click on the patient from the patient list -> click on the medication recon button -> double click simvastatin 20 mg -> double click lorazepam 0.5 mg tablet -> double click metoprolol tartrate 50 mg tablet -> double click warfarin 2.5 mg tablet -> save

Correct

Minor Deviations / Cycles :: Describe below Major Deviations :: Describe below Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was:

Show participant written scale: "Very Difficult" (1) to "Very Easy" (5)

Administrator / Notetaker Comments:

Task 11c: Reconcile Assessments (47 Second)

Login as ecdsmd  
Use Recon, Clinical Patient  
Take the user to the assessment screen

From Referral List  
Pick coronary arteriosclerosis  
Pick atrial fibrillation

From Empower list  
Pick persistent asthma

Success:

Task Time:  
Optimal Path:

Click on the recon box -> double click a fib -> double click coronary arteriosclerosis -> double click  
Diabetes mellitus type 1 -> double click persistent asthma -> save

Correct

Minor Deviations / Cycles :: Describe below Major Deviations :: Describe below Comments:

Observed Errors and Verbalizations:

Comments:

Rating:  
Overall, this task was:

Show participant written scale: "Very Difficult" (1) to "Very Easy" (5)

Administrator / Notetaker Comments:

Task 12a: Create new prescription (60 Seconds)

Use UCD ERX Patient

Login as ecdsmd

Take the participant to the eRx screen(dosespot screen) for this task.

Have the user enter a new prescription

Abilify 10 mg tablet  
Take 1 tablet daily  
Dispense 30, Days Supply 30, refills 2

Success:

Task Time:

Optimal Path: Click on add new prescription -> type abilify -> select strength -> type in dosage -> type in dispense -> refills -> type in Days Supply -> save prescription

Correct

Minor Deviations / Cycles :: Describe below Major Deviations :: Describe below Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was:

Show participant written scale: "Very Difficult" (1) to "Very Easy" (5)

Administrator / Notetaker Comments:

Task 12b: Change dosage on prescription (20 Seconds)

Use UCD ERX Patient - take the user to the dosespot screen.

Have user change dosage

Take 1 tablet a day daily

To

Take 2 tablets a day daily

Success:

Task Time:

Optimal Path: click on edit abilify -> change dose to 2 tablets -> click on edit prescription

Correct

Minor Deviations / Cycles :: Describe below Major Deviations :: Describe below Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was:

Show participant written scale: "Very Difficult" (1) to "Very Easy" (5)

Administrator / Notetaker Comments:

Task 12c: Cancel Prescription (10 Second)

Use UCD ERX Patient

Login as ecdsmd

Take the participant to the eRx screen(dosespot screen) for this task.

**Have user delete the Abilify prescription**

Success:

Task Time:

Optimal Path:

Click on the checkbox for abilify -> Delete

Correct

Minor Deviations / Cycles :: Describe below Major Deviations :: Describe below Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was:

Show participant written scale: "Very Difficult" (1) to "Very Easy" (5)

Task 12d: Request and Receive Medication History information (10 Second)

Use UCD ERX Patient

Login as ecdsmd

Take the participant to the eRx screen(dosespot screen) for this task.

**Have user request medication history**

Success:

Task Time:

Optimal Path:

Check the box patient consent to med history -> click on show medication history

Correct

Minor Deviations / Cycles :: Describe below Major Deviations :: Describe below Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was:

Show participant written scale: "Very Difficult" (1) to "Very Easy" (5)

Administrator / Notetaker Comments:



Task 12e: Refills and fill status check (2 tasks) (25 Seconds)

Use Yosemite, John Patient

Login as ecdsmd

Take the participant to the eRx screen(dosespot screen) for these tasks.

12e1 - Check the fill status of Tylenol 325 mg Tablet.

12e2 - Have user check the patient Notifications. Have the user approve the refill request for Lasix. Choose Fill(+5 refills) . Enter a comment of "test".

Success:

Task Time:

Optimal Path:

Click on the green CHECKMARK to check on the status of Tylenol 325mg tablet → click OK

Click on the plus sign next to Patient Notifications → Click on Accept on the refill request → Click Fill (+5 refills) → type "test" into comments box → click OK →

Correct

Minor Deviations / Cycles :: Describe below Major Deviations :: Describe below Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was:

Show participant written scale: "Very Difficult" (1) to "Very Easy" (5)

Administrator / Notetaker Comments:

## Appendix 10

**Summary Report – Double click on report body to get full excel report**

Measure /Task	N	Task Success		Path Deviation	Task Time (secs)	
Task	#	Mean	STDEV	Deviations observed /optimal	Mean	STDEV
1A	10	10	0	0.00%	21.5	5.08
1B	10	4	0.52	30.00%	57.5	33.04
1C	10	10	0	0.00%	5.4	1.78
2A	10	10	0	10.00%	13	6.36
2B	10	10	0	20.00%	39.1	28.08
2C	10	10	0	0.00%	5	3.97
3A	10	10	0	0.00%	18.4	13.05
3B	10	10	0	10.00%	36.1	12.65

**Task Success/Failure - Double click on report body to get full excel report**

9B	1	1	1	1	1	1
9C	0	1	1	1	1	1
10A	1	1	1	1	1	1
10B	0	1	1	1	1	1
10C	1	1	1	1	1	1
11A	1	1	1	1	1	1
11B	1	1	1	1	1	1
11C	1	1	1	1	1	1
11D	1	1	1	1	1	1
12A	1	1	1	1	1	1

Task Ratings - **Double click on report body to get full excel report**

Participant #	P1	P2	P3	P4	P5	P6
<b>Task</b>	Rating	Rating	Rating	Rating	Rating	Rating
1A	5	5	3	5	5	5
1B	3	1	1	4	4	4
1C	5	5	5	5	5	5
2A	4	5	5	5	5	5
2B	5	2	4	4	5	4
2C	5	5	5	5	5	5
3A	5	5	2	5	5	5
3B	5	5	3	5	5	5

Task Time Summary - **Double click on report body to get full excel report**

4B	5	5	5	5	5	5
4C	4	5	5	5	5	5
5A	4	4	5	5	5	5
5B	4	5	5	5	5	4
5C	5	5	5	5	5	4
6A	4	5	5	5	5	5
6B	4	5	5	5	5	5
6C	5	5	5	5	5	5
7A	5	5	5	5	5	5
7B	4	5	2	5	5	5

Deviations - **Double click on report body to get full excel report**

Participant #		P1	P2	P3	P4	P5
Task	Total user task deviation	Minor Deviation	Minor Deviation	Minor Deviation	Minor Deviation	Minor Deviation
1A	0	0	0	0	0	0
1B	3	1	1	1	0	0
1C	0	0	0	0	0	0
2A	1	0	0	0	0	0
2B	2	0	1	0	0	0
2C	0	0	0	0	0	0
3A	0	0	0	0	0	0
3B	1	0	0	1	0	0

Participant 1 - **Double click on report body to get full excel report**

Task #	Success	Time	Minor deviations	Major deviations	Observed errors
1A	1	18		0	
1B	1	25	Started in Pharmacy orders - had to cancel then found path	1	
1C	1	7		0	
2A	1	15		0	
2B	1	18		0	
2C	1	3		0	
3A	1	11		0	
3B	1	32		0	
3C	1	3		0	

Participant 2 - **Double click on report body to get full excel report**

Task #	Success	Time	Minor deviations	Major deviations	Observed errors
1A	1	25		0	
1B	0	109	Not able to find free text order entry box	1	
1C	1	9		0	
2A	1	17		0	
2B	1	113	added monitor order first	1	
2C	1	16		0	
3A	1	22		0	
3B	1	35		0	
3C	1	6		0	

Participant 3 - **Double click on report body to get full excel report**

Task #	Success	Time	Minor deviations		Major deviations	Observed errors
1A	1	29			0	
1B	0	84	Did not start in "other" order box - tried in diagnostic box to DC		1	
1C	1	5			0	
2A	1	8			0	
2B	1	35			0	
2C	1	3			0	
3A	1	53			0	
3B	1	67	Started to try to DC in DX box again then moved		1	
3C	1	3			0	

Participant 4 - **Double click on report body to get full excel report**

Task #	Success	Time	Minor deviations	Major deviations	Observed errors
1A	1	26		0	
1B	0	73		0	
1C	1	5		0	
2A	0	7		0	
2B	1	44		0	
2C	1	3		0	
3A	1	9		0	
3B	1	30		0	
3C	1	3		0	



Participant 5 - **Double click on report body to get full excel report**

Task #	Success	Time	Minor deviations	Major deviations	Observed errors
1A	1	23		0	
1B	0	91		0	
1C	1	6		0	
2A	1	12		0	
2B	1	50		0	
2C	1	3		0	
3A	1	19		0	
3B	1	33		0	
3C	1	3		0	

Participant 6 - **Double click on report body to get full excel report**

Task #	Success	Time	Minor deviations	Major deviations	Observed errors
1A	1	16		0	
1B	0	57		0	
1C	1	2		0	
2A	1	25	Picked wrong study but completed task same	1	
2B	1	37	First tried to free etx then ordered under diagnostic	1	
2C	1	4		0	
3A	1	10		0	
3B	1	26		0	
3C	1	2		0	

Participant 7 - **Double click on report body to get full excel report**

Task #	Success	Time	Minor deviations	Major deviations	Observed errors
1A	1	15		0	
1B	1	20		0	
1C	1	5		0	
2A	1	8		0	
2B	1	20		0	
2C	1	5		0	
3A	1	20		0	
3B	1	40		0	
3C	1	5		0	
4A	1	21		0	
4B	1	26		0	
4C	1	8		0	
5A	1	90		0	
5B	1	86	did not unhighlight the prior entry so had both	1	

Participant 8 - **Double click on report body to get full excel report**

Task #	Success	Time	Minor deviations	Major deviations	Observed errors
1A	1	25		0	
1B	1	20		0	
1C	1	5		0	
2A	1	20		0	
2B	1	26		0	
2C	1	5		0	
3A	1	15		0	
3B	1	31		0	
3C	1	3		0	

Participant 9 - **Double click on report body to get full excel report**

5C	1	15				5
6A	1	7				5
6B	1	20				5
6C	1	9				5
7A	1	17				5
7B	1	64				2
7C	1	5				5
8A	1	29				5
8B	1	24				5
8C	1	6				5

Participant 10 - **Double click on report body to get full excel report**

Task #	Success	Time	Minor deviations	Major deviations	Observed errors	Rating 1-5
1A	1	15				5
1B	0	71				5
1C	1	5				5
2A	1	5				5
2B	1	28				4
2C	1	3				5
3A	1	9				5
3B	1	45				4
3C	1	5				5