

EHR Usability Test Report of CloudMD365 version 1.0

*Report based on ISO/IEC 25062:2006 Common Industry Format
for Usability Test Reports and NISTIR 7742*

CloudMD365 version 1.0 (Ambulatory EHR)

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EXECUTIVE SUMMARY

A usability test of CloudMD365 version 1.0 (Ambulatory EHR) was conducted between October 8, 2019 and October 15, 2016 by Softbir, Inc.. The purpose of these tests 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.

- Task 1 (a.1): CPOE - Medications
- Task 2 (a.2): CPOE - Laboratory
- Task 3 (a.3): CPOE - Imaging
- Task 4 (a.4): Drug-Drug, Drug-Allergy Interaction
- Task 5 (a.5): Demographics
- Task 6 (a.6): Problem List
- Task 7 (a.7): Medication List
- Task 8 (a.8): Medication Allergy List
- Task 9 (a.9): Clinical Decision Support

During the 60 to 90 minute, one-on-one usability test, each participant was greeted by the administrator and asked to review and sign an informed consent/release form (included in Appendix 2); they were instructed that they could withdraw at any time. Participants did not have prior experience with the EHR. Some participants had minimal exposure to an EHR. The administrator introduced the test and instructed the 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 and 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 within the allotted time without assistance

- 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 were 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 system usability questionnaire (Appendix 6) and were thanked profusely for their time. 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.

Patient Safety Risk Category

We constructed the following representative tasks to exercise the EHR functionality for each feature specified by the ONC. These tasks were evaluated based on the potential risk for adverse events to the patient and assigned a risk category of *high*, *moderate*, or *low* risk. The risk category (Low, Medium or High) for each individual task, as well as an overall risk level for the EHR feature, can be found in the following table (Table 1).

Risk Category Analysis: During testing, there were two (2) risk-prone errors found for a High Risk task. The tasks are:

- **CPOE Laboratory:** Although users were able to complete the task, few of the participants reported confusion in displaying the recorded data as there is currently no option to view the full information of a specific record. Only the information displayed in the table can be viewed.
- **CPOE Radiology:** Same with the CPOE Laboratory, users reported confusion as the data displayed in the records table are only limited and no option available yet to view the full information of a specific record.

Module	Task	N	Risk Low Med High	Task Success		Path Deviation		Task Time (seconds)		Errors		Task Ratings (5=Easy)	
		#		Mean	SD	Observed	Optimal	Mean	SD	Mean	SD	Mean	SD
a.1	CPOE Medications	10	Low										
	Record CPOE Medication Order	10		100	0	20.00	18.7	123.80	27.79	0	0	5.00	0.00
	Change CPOE Medication Order	10		100	0	6.80	6.30	16.72	6.14	0	0	4.50	0.71
	Access CPOE Medication Order	10		100	0	6.00	6.00	20.56	15.28	0	0	4.60	0.52
a.2	CPOE Laboratory	10	High										
	Record Lab order via CPOE	10		100	0	29.8	26.40	90.20	2.60	0	0	4.10	0.74
	Change Lab order via CPOE	10		100	0	4.40	4.20	24.59	1.38	0	0	4.80	0.42
	Display changed CPOE Lab order	10		100	0	2.50	2.00	23.70	1.35	0	0	4.60	0.52
a.3	CPOE Radiology	10	High										
	Record CPOE Imaging Order	10		100	0	9.6	9.2	70.54	6.35	0	0	4.8	0.42
	Change CPOE Imaging Order	10		100	0	7.4	7.6	49.49	8.63	0	0	4.6	0.70
	Access CPOE Imaging Order	10		100	0	2.3	2.00	8.98	1.90	0	0	4.6	0.52

Module	Task	N	Risk Low Med High	Task Success		Path Deviation		Task Time (seconds)		Errors		Task Ratings (5=Easy)	
		#		Mean	SD	Observed	Optimal	Mean	SD	Mean	SD	Mean	SD
a.4	Drug-Drug, Drug-Allergy Interaction Checks	10	Med										
	Using CPOE, trigger a drug-drug interaction by entering a new medication order	10		100	0	22.70	21.9	142.41	25.39	0	0	4.1	0.74
	Using CPOE, trigger a drug-allergy interaction by entering a new medication order	10		100	0	21.8	19.7	151.38	18.81	0	0	4.2	0.63
	Adjust the severity level of a displayed drug-drug interaction	10		100	0	24.2	23.5	132.20	21.71	0	0	4.1	0.88
a.5	Demographics	10	Low										
	Record Patient's Demographic Data	10		100	0	18.80	15.60	134.1	12.18	0	0	4.2	0.79
	Change Patient's Demographic Data	10		100	0	6.40	6.10	51.03	3.00	0	0	4.3	0.68
	Display Patient's Demographic Data	10		100	0	1.30	1.00	4.91	0.65	0	0	5.00	0

Module	Task	N	Risk Low Med High	Task Success		Path Deviation		Task Time (seconds)		Errors		Task Ratings (5=Easy)	
		#		Mean	SD	Observed	Optimal	Mean	SD	Mean	SD	Mean	SD
a.6	Problem List	10	Med										
	Record a problem to the problem list	10		100	0	11.00	10.40	66.71	15.22	0	0	4.80	0.42
	Change a problem on the problem list	10		100	0	7.40	7.30	16.84	4.85	0	0	4.70	0.48
	Display the active problem list	10		100	0	6.50	6.00	18.47	14.36	0	0	4.50	0.71
	Display the historical problem list	10		100	0	5.20	6.00	17.31	12.56	0	0	4.50	0.71
a.7	Medication List	10	Med										
	Prescribe a new medication to the medication list	10		100	0	25.20	24.50	195.77	0.16	0	0	4.1	0.88
	Change a medication on the medication list	10		100	0	17.60	17.30	91.98	1.36	0	0	4.5	0.53
	Display the active medication list	10		100	0	3.00	3.00	37.85	1.01	0	0	4.7	0.48
	Display the historical medication list	10		100	0	2.80	2.40	25.10	1.16	0	0	3.2	0.79

Module	Task	N	Risk Low Med High	Task Success		Path Deviation		Task Time (seconds)		Errors		Task Ratings (5=Easy)	
		#		Mean	SD	Observed	Optimal	Mean	SD	Mean	SD	Mean	SD
a.8	Medication Allergy List	10	Med										
	Record a medication allergy	10		100	0	12.9	12.50	78.13	8.11	0	0	4.8	0.42
	Change a medication allergy	10		100	0	11.8	11.50	70.28	6.24	0	0	4.8	0.42
	Display the active medication allergy list	10		100	0	2.60	2.00	13.14	5.09	0	0	4.4	0.70
	Display the historical medication allergy list	10		100	0	1.20	1.00	5.66	1.11	0	0	4.7	0.48
a.9	Clinical Decision Support	10	Med										
	Add a CDS intervention and/or reference resource for the elements.	10		100	0	35.05	28.56	153.47	21.45	0	0	4.70	0.48
	Trigger the CDS interventions/resources added using the applicable data elements from each of the required elements	10		100	0	26.00	26.00	39.03	16.27	0	0	4.80	0.42

Module	Task	N	Risk Low Med High	Task Success		Path Deviation		Task Time (seconds)		Errors		Task Ratings (5=Easy)	
		#		Mean	SD	Observed	Optimal	Mean	SD	Mean	SD	Mean	SD
	View the intervention/resource information using the Infobutton standard for data elements in the problem list, medication list, and demographics	10		100	0	13.80	12.50	43.94	16.59	0	0	4.70	0.48
	Trigger the CDS interventions/resources based on data elements in the problem list, medication list, and medication allergy list by incorporating patient information from a transition of care/referral summary	10		100	0	15.10	15.00	52.17	16.27	0	0	4.80	0.42
	Access the following attributes for one of the triggered CDS interventions/resources: bibliographic citation, developer, funding source, release/revision date	10		100	0	16.23	14.00	57.45	16.27	0	0	4.50	0.42

Table 1 - Summary of Collected Performance and Rating Data

The results from the System Usability Scale scored the subjective satisfaction with the system based on performance with these tasks to be **89.2**.

In addition to the performance data, the following qualitative observations were made:

Major Findings

1. Overall, participants could perform tasks in CloudMD365 with no errors encountered.
2. The participants could easily navigate the system and determine the pattern for the same kind of tasks (e.g. Navigating through order modules, Accessing 3rd party application like rCopia)
3. Although there were confusion at first on some parts of the system, these tasks were easy to complete once it has been completed and learned.
4. Most users commended the combination of colors blue and white as it makes the application looked more clean and modern.
5. Icons used effectively depicts the action to be done.

Areas for improvement

1. Trigger a pop-up modal or any methods to display information of a certain record. (for Lab and Imaging Orders)
2. Consider adding a note to specific features (like Medication, Allergy and Problem) informing that records can be managed by clicking “e-prescribe” button above.
3. Consider combining the active and historical records list.
4. Display the common user choices on top of the dropdown selection to easily select an option.

INTRODUCTION

The EHRUT tested for this study was CloudMD365 v. 1.0 (Ambulatory EHR). Designed to present medical information to healthcare providers in ambulatory setting, the EHRUT consists of a browser-based, cloud hosted solution. 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 time to alter a medication list or ease of modifying radiology orders, were captured during the usability testing.

METHOD

Participants

A total of ten users were tested on the EHRUT(s). Participants in the test were from healthcare providers. Among them were Physicians, Nurses, Clinical Assistants and Administrators. Participants were recruited by Softbir, Inc. support staff by sending them emails followed by a call for a short interview once they showed interest in participating (email and interview template can be seen in Appendix 1).

Participants had no direct connection to the development of or organization producing the EHRUT(s). Participants were not from the testing or supplier organization. Participants were given the opportunity to have the same orientation and level of training as the actual end users would have received.

Recruited participants had a mix of backgrounds and demographic characteristics. The following is a table (see Table 2) 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.

ID	Gender	Age	Education	Occupation	Prof. Exp. (Months)	Comp. Exp. (Months)	Product Exp. (Months)	Assistive Tech?
ID01	Male	40 to 59	Bachelor's Degree	Clinical Assistant	120	96	53	No
ID02	Male	23 to 29	Bachelor's Degree	Clinical Assistant	27	120	27	No
ID03	Female	23 to 29	Trade/technical/vocational training	Clinical Assistant	53	120	53	No
ID04	Female	30 to 39	Bachelor's Degree	Registered Nurse	120	120	108	No
ID05	Male	40 to 59	Bachelor's Degree	Registered Nurse	120	120	89	No
ID06	Female	40 to 59	Trade/technical/vocational training	Clinical Assistant	120	120	93	No
ID07	Female	30 to 39	Trade/technical/vocational training	Clinical Assistant	67	84	48	No
ID08	Male	60 to 74	Doctoral Degree (e.g., MD, DNP, DMD, PhD)	Physician	120	120	93	No
ID09	Female	40 to 59	Doctoral Degree (e.g., MD, DNP, DMD, PhD)	Physician	120	120	96	No
ID10	Male	30 to 39	Bachelor's Degree	Administrative Staff	96	120	48	No

Table 2 - Participants Demographics

A total of ten participants (matching the demographics in the section on Participants) were recruited and participated in the usability test. No participant failed to show for the study.

The examination took two weeks, testing 1 to 3 users per day. Each participant was scheduled for sixty to ninety minutes, including the introduction and debriefing by the test moderator(s) at the start, and closing remarks at the end. A spreadsheet was used to keep track of the participants' schedule and included demographic components.

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, namely CloudMD365. Each participant used the system in similar settings, 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 within the allotted time 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

Tasks

Several tasks and scenarios were constructed using synthetic data. A realistic representation of the types of activities a clinical user performs in an EHR system was intended.

Test Order	Task ID	Task Description	Criteria
A.5 Demographics			

1	13	Record a patient's preferred language, date of birth, birth sex, race, ethnicity, sexual orientation, gender identity, preliminary cause of death (inpatient only), and preliminary date of death (inpatient only)	a.5
2	14	Change the patient's preferred language, date of birth, birth sex, race, ethnicity, sexual orientation, gender identity, preliminary cause of death (inpatient only), and preliminary date of death (inpatient only)	a.5
3	15	Display the patient's changed preferred language, date of birth, birth sex, race, ethnicity, sexual orientation, gender identity, preliminary cause of death (inpatient only), and preliminary date of death (inpatient only)	a.5
A.1 CPOE - Medications			
4	1	Record medication via CPOE	a.1
5	2	Change medication via CPOE	a.1
6	3	Access CPOE Medication Order	a.1
A.2 CPOE - Laboratory			
7	4	Record Lab order via CPOE	a.2
8	5	Change Lab order via CPOE	a.2
9	6	Display changed CPOE Lab order	a.2
A.3 CPOE - Imaging			
10	7	Record Imaging order via CPOE	a.3
11	8	Change Imaging order via CPOE	a.3
12	9	Display changed CPOE Imaging order	a.3
A.6 Problem List			
13	16	Record a problem to the problem list	a.6
14	17	Change a problem on the problem list	a.6
15	18	Display the active problem list	a.6

16	19	Display the historical problem list	a.6
A.7 Medication List			
17	20	Prescribe a new medication to the medication list	a.7
18	21	Change a medication on the medication list	a.7
19	22	Display the active medication list	a.7
20	23	Display the historical medication list	a.7
A.8 Medication Allergy List			
21	24	Record a medication allergy	a.8
22	25	Change a medication allergy	a.8
23	26	Display the active medication allergy list	a.8
24	27	Display the historical medication allergy list	a.8
A.9 Clinical Decision Support			
25	28	Add a CDS intervention and/or reference resource for each of the required elements: Problem List, Medication List, Medication Allergy List, at least one Demographic, Laboratory Test, Vital Signs, and a Combination of at least 2 of the elements above	a.9
26	29	Trigger the CDS interventions/resources added using the applicable data elements from each of the required elements	a.9
27	30	View the intervention/resource information using the Infobutton standard for data elements in the problem list, medication list, and demographics	a.9
28	31	Trigger the CDS interventions/resources based on data elements in the problem list, medication list, and medication allergy list by incorporating patient information from a transition of care/referral summary	a.9
29	32	Access the following attributes for one of the triggered CDS interventions/resources: bibliographic citation, developer, funding source, release/revision date	a.9

A.4 Drug-Drug, Drug-Allergy Interaction			
30	10	Using CPOE, trigger a drug-drug interaction by entering a new medication order	a.4
31	11	Using CPOE, trigger a drug-allergy interaction by entering a new medication order	a.4
32	12	Adjust the severity level of a displayed drug-drug interaction	a.4

Table 3 - Task List (in order)

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.

Procedures

Two test moderators were assigned to a specific participant—Administrator and Data Logger. Given that the testing was conducted remotely, the assigned test moderators reached the participant via Skype application. The testing session starts off with an introduction led by the test moderator where the overview of CloudMD365 application and the purpose and objectives of the study were introduced.

Participants were then given a pre-assigned participant ID. Each participant reviewed and signed an Non-Disclosure Agreement and Informed Consent Form (See Appendix 2) to ensure that the data that will be gathered from the participants remains confidential between the two parties; and that both parties agreed to protect confidential information shared with them by the other party. A representative from the test team witnessed the participant's signature.

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 no instructions on use;
- Without using a think aloud technique.

Before user testing, a document including task descriptions and survey questionnaire for all tasks were sent to the participant. The optimal path was discussed after doing the every task. Task timing began once the administrator finished reading the question. The task time was stopped once the participant indicated they had completed the task. Scoring is discussed below in Section 3.9.

After testing all tasks, the administrator gave the participant a system usability questionnaire (see Appendix 6). Each post-test usability questionnaire was not identified by participant in an effort to provide double-blind usability feedback. The test administrator gave closing remarks, and finally thanked each for their time.

Participants' demographic information, task success rate, time on task, errors, deviations, verbal responses, and post-test questionnaire were recorded into a spreadsheet.

Test Location

The tests were conducted remotely over a web conference technology specifically Skype application. The participant is expected to share his/her screen having both members of the testing team connected to the participant's screen and listen to the audio of the session. Participants were asked to join from a location that was relatively quiet, free from distractions, and with a stable network connection.

Test Environment

This usability testing was conducted remotely, with participants interacting with the CloudMD365 version 1.0. Using remote testing allowed the participants to use the EHRUT from their usual office location. Each participant was added to a conference call with two test moderators—Administrator and Data Logger— from the support team. Participants were given instructions on how to access the development environment instance of EHRUT.

Test Forms and Tools

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

1. Non-Disclosure Agreement Form
2. Informed Consent
3. Acknowledgment Form
4. Test Script (containing the task instructions and survey questionnaire)
5. Moderator's Guide
6. Post-test Questionnaire

Examples of these documents can be found in Appendices 2-5 respectively. The Moderator's Guide was devised so as to be able to capture required data.

The participant's interactions with the EHRUT was captured and recorded digitally with the built-in screen recorder of the video conference software used. Additionally, all verbalizations and observed reactions and path deviations were recorded by the administrator on as part of the Moderator's Guide. A video camera and microphone were used as part of the recording procedure.

Participant Instructions

The administrator reads the following instructions aloud to each participant (also see the full moderator's guide in Appendix 5). Following the procedural instructions, participants were shown and given access to CloudMD365 version 1.0. All participants were given a document containing all the task descriptions and survey questionnaire (see Appendix 5).

Participants were then given 32 tasks to complete. Tasks are listed in the moderator's guide in Appendix 5.

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 CloudMD365 by measuring participant success rates and errors
2. Efficiency of CloudMD365 by measuring the average task time and path deviations
3. Satisfaction with CloudMD365 by measuring ease of use ratings

DATA SCORING

The following table (Table 4) details how tasks were scored, errors evaluated, and the time data analyzed.

Measures	Rationale and Scoring
Effectiveness: Task Success	<p>A task was counted as a “Success” if the participant was able to achieve the correct outcome, without assistance, within the time allotted on a per task basis.</p> <p>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.</p> <p>Task times were recorded for successes. Observed task times divided by the optimal time for each task is a measure of optimal efficiency.</p> <p>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</p>

	<p>operationally defined by taking multiple measures of optimal performance and multiplying by some factor 1.25 that allows some time buffer because the participants are presumably not trained to expert performance. Thus, if expert, optimal performance on a task was 20 seconds then allotted task time performance was 25 seconds. This ratio should be aggregated across tasks and reported with mean and variance scores.</p>
<p>Effectiveness: Task Failures</p>	<p>If the participant abandoned the task, did not reach the correct answer or performed it incorrectly, or reached the end of the allotted time before successful completion, the task was counted as an “Failures.” No task times were taken for errors.</p> <p>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. This should also be expressed as the mean number of failed tasks per participant.</p> <p>On a qualitative level, an enumeration of errors and error types should be collected.</p>
<p>Efficiency: Task Deviations</p>	<p>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.</p> <p>It is strongly recommended that task deviations be reported. Optimal paths (i.e., procedural steps) should be recorded when constructing tasks.</p>
<p>Efficiency: Task Time</p>	<p>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. Only task times for tasks that were successfully completed were included in the average task time analysis. Average time per task was calculated for each task. Variance measures (standard deviation and standard error) were also calculated.</p>
<p>Satisfaction:</p>	<p>Participant’s subjective impression of the ease of use of the application</p>

<p>Task Rating</p>	<p>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.</p> <p>Common convention is that average ratings for systems judged easy to use should be 3.3 or below.</p> <p>To measure participants’ confidence in and likeability of CloudMD365 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 6.</p>
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Table 4 - Scoring Metrics

RESULTS

Data Analysis and Reporting

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. In these test sessions, all participants were present and no data were excluded.

The usability testing results for the EHRUT are detailed below (see Tables 5 to 14). The results should be seen in light of the objectives and goals outlined in [Study Design](#) section of this document. The data yielded actionable results that, if corrected, yield material, positive impact on user performance.

Module	Task	N	Task Success		Path Deviation		Task Time (seconds)		Errors		Task Ratings (5=Easy)	
			#	Mean	SD	Observed	Optimal	Mean	SD	Mean	SD	Mean
a.1	Record CPOE Medication Order	10	100	0	20.00	18.7	123.80	27.79	0	0	5.00	0.00
a.1	Change CPOE Medication Order	10	100	0	6.80	6.30	16.72	6.14	0	0	4.50	0.71
a.1	Access CPOE Medication Order	10	100	0	6.00	6.00	20.56	15.28	0	0	4.60	0.52

Table 5 - CPOE Medications

Module	Task	N	Task Success		Path Deviation		Task Time (seconds)		Errors		Task Ratings (5=Easy)	
			#	Mean	SD	Observed	Optimal	Mean	SD	Mean	SD	Mean
a.2	Record Lab order via CPOE	10	100	0	29.8	26.40	90.20	2.60	0	0	4.10	0.74
a.2	Change Lab order via CPOE	10	100	0	4.40	4.20	24.59	1.38	0	0	4.80	0.42
a.2	Display changed CPOE Lab order	10	100	0	2.50	2.00	23.70	1.35	0	0	4.60	0.52

Table 6 - CPOE Laboratory

Module	Task	N	Task Success		Path Deviation		Task Time (seconds)		Errors		Task Ratings (5=Easy)	
			#	Mean	SD	Observed	Optimal	Mean	SD	Mean	SD	Mean
a.3	Record Imaging order via CPOE	10	100	0	9.6	9.2	70.54	6.35	0	0	4.8	0.42
a.3	Change Imaging order via CPOE	10	100	0	7.4	7.6	49.49	8.63	0	0	4.6	0.70
a.3	Display changed CPOE Imaging order	10	100	0	2.3	2.00	8.98	1.90	0	0	4.6	0.52

Table 7 - CPOE Imaging

Module	Task	N	Task Success		Path Deviation		Task Time (seconds)		Errors		Task Ratings (5=Easy)	
			#	Mean	SD	Observed	Optimal	Mean	SD	Mean	SD	Mean
a.4	Using CPOE, trigger a drug-drug interaction by entering a new medication order	10	100	0	22.70	21.9	142.41	25.39	0	0	4.1	0.74
a.4	Using CPOE, trigger a drug-allergy interaction by entering a new medication order	10	100	0	21.8	19.7	151.38	18.81	0	0	4.2	0.63
a.4	Adjust the severity level of a displayed drug-drug interaction	10	100	0	24.2	23.5	132.20	21.71	0	0	4.1	0.88

Table 8 - Drug-Drug, Drug-Allergy Interaction

Module	Task	N	Task Success		Path Deviation		Task Time (seconds)		Errors		Task Ratings (5=Easy)	
			#	Mean	SD	Observed	Optimal	Mean	SD	Mean	SD	Mean
a.5	Record a patient's preferred language, date of birth, birth sex, race, ethnicity, sexual orientation, gender identity, preliminary cause of death (inpatient only), and preliminary date of death (inpatient only)	10	100	0	18.80	15.60	134.1	12.18	0	0	4.2	0.79
a.5	Change the patient's preferred language, date of birth, birth sex, race, ethnicity, sexual orientation, gender identity, preliminary cause	10	100	0	6.40	6.10	51.03	3.00	0	0	4.3	0.68

	of death (inpatient only), and preliminary date of death (inpatient only)											
a.5	Display the patient's changed preferred language, date of birth, birth sex, race, ethnicity, sexual orientation, gender identity, preliminary cause of death (inpatient only), and preliminary date of death (inpatient only)	10	100	0	1.30	1.00	4.91	0.65	0	0	5.00	0

Table 9 - Demographics

Module	Task	N	Task Success		Path Deviation		Task Time (seconds)		Errors		Task Ratings (5=Easy)	
			#	Mean	SD	Observed	Optimal	Mean	SD	Mean	SD	Mean
a.6	Record a problem to the problem list	10	100	0	11.00	10.40	66.71	15.22	0	0	4.80	0.42
a.6	Change a problem on the problem list	10	100	0	7.40	7.30	16.84	4.85	0	0	4.70	0.48
a.6	Display the active problem list	10	100	0	6.50	6.00	18.47	14.36	0	0	4.50	0.71
a.6	Display the historical problem list	10	100	0	5.20	6.00	17.31	12.56	0	0	4.50	0.71

Table 10 - Problem List

Module	Task	N	Task Success		Path Deviation		Task Time (seconds)		Errors		Task Ratings (5=Easy)	
			#	Mean	SD	Observed	Optimal	Mean	SD	Mean	SD	Mean
a.7	Prescribe a new medication to the medication list	10	100	0	25.20	24.50	195.77	0.16	0	0	4.1	0.88
a.7	Change a medication on the	10	100	0	17.60	17.30	91.98	1.36	0	0	4.5	0.53

	medication list											
a.7	Display the active medication list	10	100	0	3.00	3.00	37.85	1.01	0	0	4.7	0.48
a.7	Display the historical medication list	10	100	0	2.80	2.40	25.10	1.16	0	0	3.2	0.79

Table 11 - Medication List

Module	Task	N	Task Success		Path Deviation		Task Time (seconds)		Errors		Task Ratings (5=Easy)	
			#	Mean	SD	Observed	Optimal	Mean	SD	Mean	SD	Mean
a.8	Record a medication allergy	10	100	0	12.9	12.50	78.13	8.11	0	0	4.8	0.42
a.8	Change a medication allergy	10	100	0	11.8	11.50	70.28	6.24	0	0	4.8	0.42
a.8	Display the active medication allergy list	10	100	0	2.60	2.00	13.14	5.09	0	0	4.4	0.70
a.8	Display the historical medication allergy list	10	100	0	1.20	1.00	5.66	1.11	0	0	4.7	0.48

Table 12 - Medication Allergy List

Module	Task	N	Task Success		Path Deviation		Task Time (seconds)		Errors		Task Ratings (5=Easy)	
			#	Mean	SD	Observed	Optimal	Mean	SD	Mean	SD	Mean
a.9	Add a CDS intervention and/or reference resource for each of the required elements: Problem List, Medication List, Medication Allergy List, at least one Demographic, Laboratory Test, Vital Signs, and a Combination of at least 2 of the elements above	10	100	0	35.05	28.56	153.47	21.45	0	0	4.70	0.48

a.9	Trigger the CDS interventions/resources added using the applicable data elements from each of the required elements	10	100	0	26.00	26.00	39.03	16.27	0	0	4.80	0.42
a.9	View the intervention/resource information using the Infobutton standard for data elements in the problem list, medication list, and demographics	10	100	0	13.80	12.50	43.94	16.59	0	0	4.70	0.48
a.9	Trigger the CDS interventions/resources based on data elements in the problem list, medication list, and medication allergy list by incorporating patient information from a transition of care/referral summary	10	100	0	15.10	15.00	52.17	16.27	0	0	4.80	0.42
a.9	Access the following attributes for one of the triggered CDS interventions/resources: bibliographic citation, developer, funding source, release/revision date	10	100	0	16.23	14.00	57.45	16.27	0	0	4.50	0.42

Table 14 - Clinical Decision Support

The results from the SUS (System Usability Scale) scored the subjective satisfaction with the system based on performance with these tasks to be: 89.2. Broadly interpreted, scores under 60 represent systems with poor usability; scores over 80 would be considered above average.

Discussion of the Findings

The major areas of focus in the test had to deal with the tasks supporting the 2015 Edition CEHRT requirements. The tested areas overall revolved around Patient Demographics, Computerized physician order entry (CPOE), Electronic Prescribing, Drug-Drug/Drug-Allergy Interactions, and Clinical Decision Support (CDS).

- The tasks were completed successfully with little to no deviations.
- Most participants commented on a good color-combination of the EHR application and the usage of icon well-depicted the actions to be done.
- Most participants commented on the difficulty in navigating the E-Prescribe button in order to record and update medication, problems, and allergies, which took them more time in finishing the first task that involves the E-Prescribe button.
- Several participants commented on the lack of information displayed for CPOE Laboratory and Radiology records.

EFFECTIVENESS

1. Participants familiar with 3rd party application, which is rCopia, did not encounter any difficulty navigating on Medication, Problem and Allergy list features.

Participant Comment/s:

- a. "I know how to navigate this one."
 - b. "This seems familiar."
2. Some participants who were not familiar with the 3rd party application, rCopia, were a bit confused (at first) as to where medications can be ordered.
 3. Some participants were a bit confused with the medication order and medication list.
 4. Some participants thought that the medication history is included inside medication list and did not realize it was the rX History at first.
 5. Participants were impressed that they were able to complete all the given tasks. Even though they encounter minor blockers during testing, they were able to continue and finish the task but with just a longer duration of time.

EFFICIENCY

1. Younger participants were more experimental and curious, thus task time was longer than the older ones.
2. The 3rd party application, which is rCopia, became helpful to participants with longer product experience in navigating Medications, Problems, and Allergies list features as they have more likely encountered the product before.
3. Participants were able to familiarise themselves with the application's process quickly since they are all quite similar with the other tasks (recording/modifying medications, allergy medications, problem list, etc.)
4. The search bar and create patient button's visibility in most of the pages helped the users navigate easily to the patient information, which is often used by the users.

Participant Comment/s:

- a. "I like how accessible the patient information is."
- b. "This is nice. I could easily search for the patient the moment I need to."

SATISFACTION

- **Positive Comments (Subjective)**

"This seems familiar"

"The application is clean"

"Color of the application didn't bore me at all"

"I like how accessible the patient information is"

"This is nice. I could easily search for the patient the moment I need to."

"I know how to navigate this one"

- **Negative Comments (Subjective)**

"Where can I add problem record?" (Problem List)

"It's good I can search for my language but can you put English on top of the options?" (Demographics)

"I can't see more of the information of the record I just added" (Laboratory Record)

- **Objective**

The average usability rating of all completed tasks by the participants was 4.67 (5 = very easy).

As in appendix 5, each participant anonymously filled out the Likert usability score to judge overall system usability. The System Usability Score was 89.2 with a maximum of 100.

MAJOR FINDINGS

1. Overall, participants could perform tasks in CloudMD365 with no errors encountered.
2. The participants could easily navigate the system and determine the pattern for the same kind of tasks (e.g. Navigating through order modules, Accessing 3rd party application like rCopia)
3. Although there were confusion at first on some parts of the system, these tasks were easy to complete once it has been completed and learned.
4. Most users commended the combination of colors blue and white as it makes the application look more clean and modern.
5. Icons used effectively depicts the action to be done.

AREAS OF IMPROVEMENT

1. Trigger a pop-up modal or any methods to display information of a certain record. (for Lab and Imaging Orders)
2. Consider adding a note to specific features (like Medication, Allergy and Problem) informing that records can be managed by clicking “e-prescribe” button above.
3. Consider combining the active and historical records list.
4. Display the common user choices on top of the dropdown selection to easily select an option.

APPENDICES

The following appendices include supplemental data for this usability test report:

- Appendix 1 - Recruiting Screener Template
- Appendix 2 - Participant Demographics
- Appendix 3 - Non-Disclosure Agreement
- Appendix 4 - Informed Consent
- Appendix 5 - Acknowledgement of Receipt Form
- Appendix 6 - Moderator's Guide
- Appendix 7 - System Usability Scale Questionnaire

Appendix 1: Recruiting Screener Template

The purpose of a screener is to ensure that the participants selected represent the target user population as closely as possible. (Portions of this sample screener are taken from www.usability.gov/templates/index.html#Usability and adapted for use.)

Recruitment Email Template

I. Subject Line

SoftBir, Inc. invites you to participate in a website study

II. Body

Hello,

My name is _____, and I'm helping to run a usability study for CloudMD365, a website application developed by our company, SoftBir, Inc. In an effort to improve the website, we're looking for people who may be interested in trying out a website related to health care and giving feedback after using it. If you qualify, you will receive a confirmation email from us.

What will I be doing in a usability study?

You will be asked to do several short tasks using a website and answer a short survey after every task. Once all the given user tasks were done, you will be asked to answer a survey about your experience and perceptions of the website.

How long is a session?

Sixty to ninety minutes

When and where?

The study will be held October 8-16, 2019. You will be asked to participate by video call. No traveling is required as this is a remote study that will be performed online. You may participate using your office or home computer.

Interested in participating?

Please reply to this email with your contact information. I'll give you a call to ask you some questions to help us determine if you qualify for the study

If you have any questions, please contact me at _____.

Thank you for your interest,
[Name & Title]

Participant Questionnaire

1. Are you male or female? _____
2. Have you participated in a focus group or usability test in the past 3 months?

3. Do you, or does anyone in your home, work in marketing research, usability research, web health record software or consulting company? _____
4. Do you, or does anyone in your home, have a commercial or research interest in an electronic health record software or consulting company? _____
5. Which of the following best describes your age? _____
6. Which of the following best describes your race or ethnic group? _____
7. Do you require any assistive technologies to use a computer? If so, please describe. _____

Professional Demographics

8. Which of the following describes your highest level of education? _____
9. What is your current position and title? [RN, Physical, Resident, Administrative Staff, Other] _____; Specialty: _____
10. How long have you held this position? _____
11. Describe your work location (or affiliation) and environment? [e.g., private practice, health system, government clinic, etc.] _____

Computer Expertise

12. 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.] _____
13. About how many hours per week do you spend on the computer? _____
14. What computer platform do you usually use? _____
15. What Internet browser(s) do you usually use? _____
16. In the last month, how often have you used an electronic health record?

17. How many years have you used an electronic health record? _____
18. How many EHRs do you use or are you familiar with? _____
19. How does your work environment patient records? [On paper, Some paper, some electronic, All electronic] _____

Contact Information *(Ask this if the person is qualified)*

Those are all the questions I have for you. Your background matches the people we're looking for.

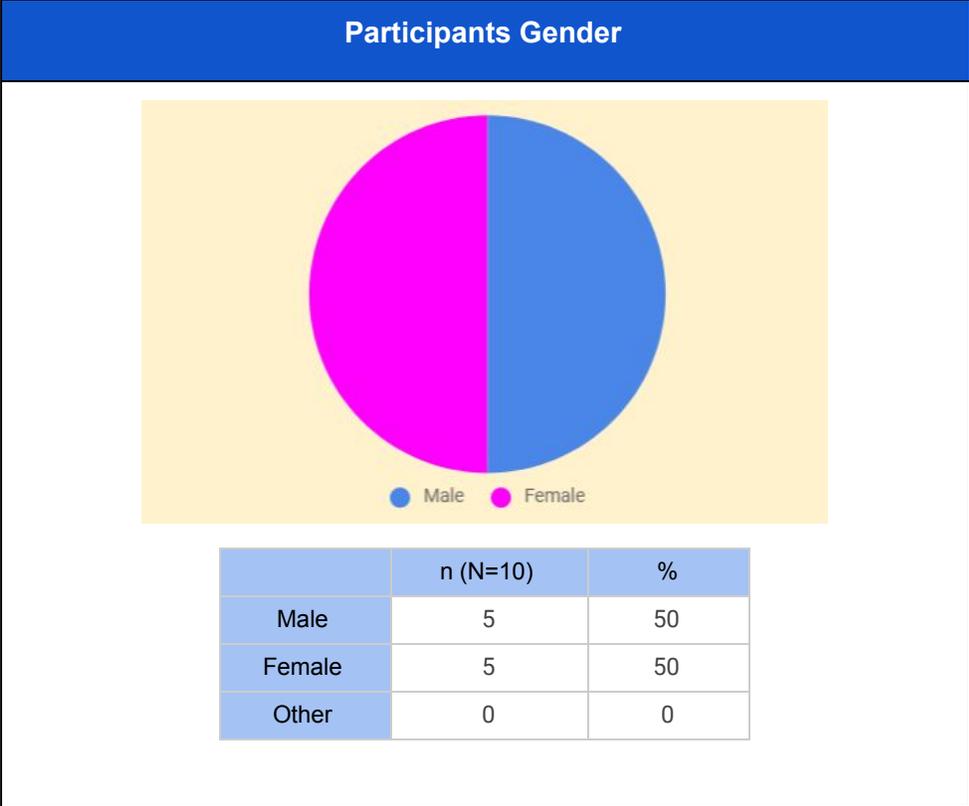
Would you be able to participate on *[Date & Time]*?

May I get your contact information?

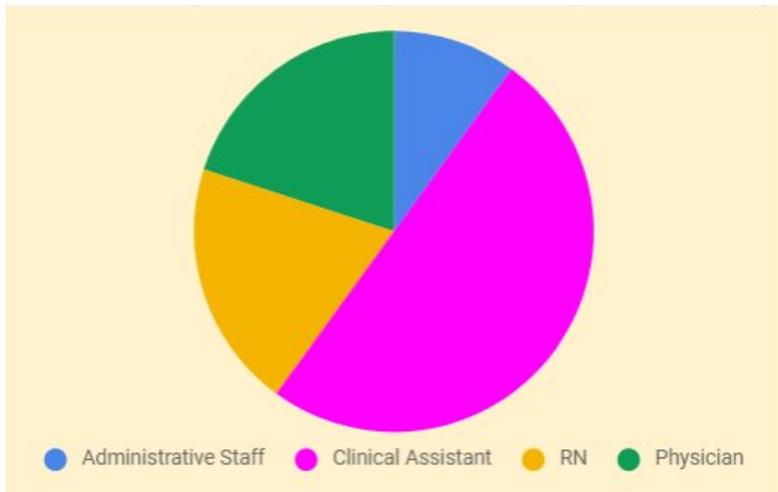
- Name of Participant
- Address
- City, State, Zip
- Daytime Phone Number
- Evening Phone Number
- Alternate Cell Phone Number
- Email Address

Appendix 2: Participant Demographics

Following is a high-level overview of the participants in this study.

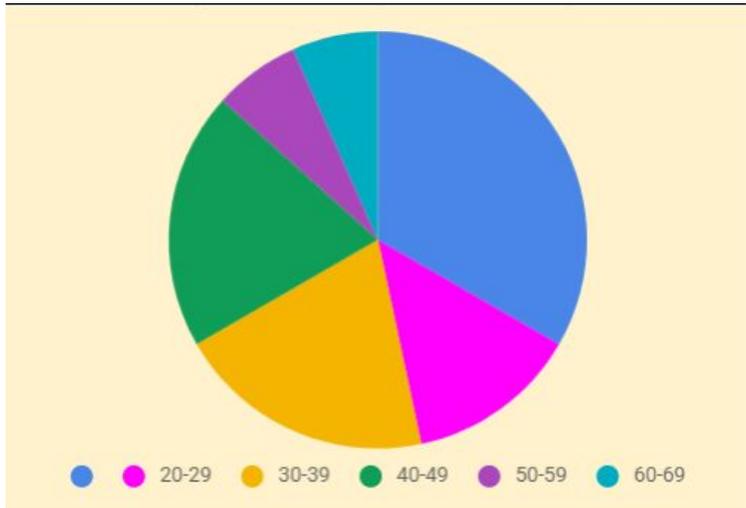


Participants Occupation/Role



	n (N=10)	%
Administrative Staff	1	10
Clinical Assistant	5	50
RN	2	20
Physician	2	20

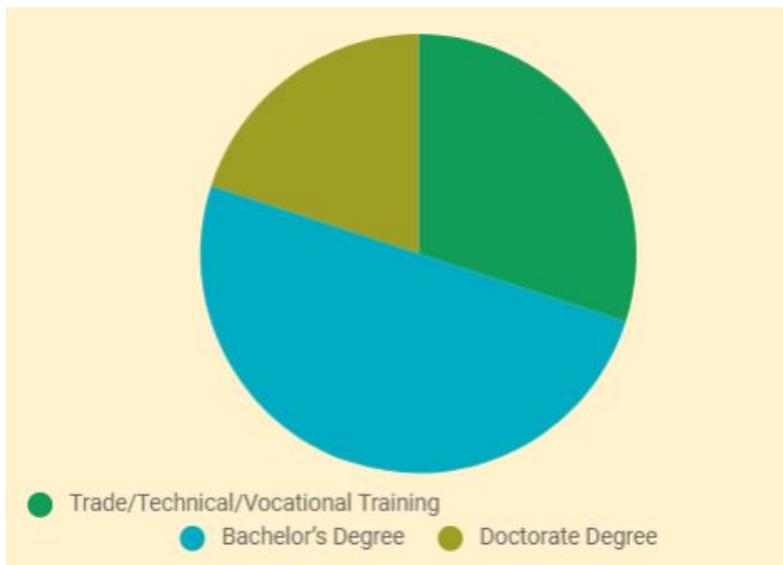
Participants Age



	n (N=10)	%
20-29	2	20

30-39	3	30
40-49	3	30
50-59	1	10
60-69	1	10
>= 70	0	0

Participants Education Level



	n (N=10)	%
No high school degree	0	0
High school graduate, diploma or equivalent	0	0
Some college credit; no degree	0	0
Trade/Technical/Vocational Training	3	30
Associate Degree	0	0
Bachelor's Degree	5	50
Master's Degree	0	0
Doctorate Degree	2	20

Participants Professional Experience				
	Months		Years	
Mean	96.3		8.025	
	Min	Max	Min	Max
Range	27	120	2.25	10

Participants Computing Experience				
	Months		Years	
Mean	114		9.5	
	Min	Max	Min	Max
Range	84	120	7	10

Participants Product (EHR) Experience				
	Months		Years	
Mean	70.8		5.9	
	Min	Max	Min	Max
Range	27	108	2.25	9

Appendix 3: Non-Disclosure Agreement and Informed Consent Form

Non-Disclosure Agreement

THIS AGREEMENT is entered into as of _____, 2019, between _____ (“the **Participant**”) and the testing organization **Softbir, Inc.**

The **Participant** acknowledges his or her voluntary participation in today’s usability study, which 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 **Softbir, Inc.**, 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 **Softbir, Inc.** 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 not disclose this confidential information obtained today to anyone else or any other organizations.

Participant’s printed name: _____

Signature: _____ **Date:** _____

Informed Consent

Softbir, Inc. 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.

Agreement

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

I understand and consent to the use and release of data gathered by Softbir, Inc.. I understand that the information gathered is for research purposes only and that my name and other personal information will not be used for any purpose other than research.

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 Softbir, Inc. and Softbir, Inc.'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 check 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:** _____

Appendix 4: Acknowledgement of Receipt Form

Acknowledgement of Receipt

I hereby acknowledge my participation in a research study run by Softbir, Inc. for CloudMD365 v1.0 software.

Printed Name: _____

Address: _____

Signature: _____

Date: _____

Usability Researcher: _____

Usability Researcher Signature: _____

Date: _____

Witness: _____

Witness' Signature: _____

Date: _____

Appendix 5: Moderator's Guide

EHRUT Usability Test Moderator's Guide

Administrator: _____

Date: _____ Time: _____

Participant #: _____

Location: _____

Prior to testing:

- Confirm schedule with participants
- Ensure EHRUT lab environment is running properly

Prior to each participant:

- Reset Application
- Begin study record

Prior to each task:

- Reset application to starting point for next task

After each participant:

- Finalize Study record

After all testing:

- Backup all study records

Orientation (5 minutes)

Thank you for participating in this study. Our session today will last 60 minutes. During that time, you will 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 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.

Please be honest with your opinions.

The product you will be using today is **CloudMD365 version 1.0**, populated with sample data. Some of the data may not make sense as it is placeholder data.

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 (1 minute)

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.

First Impressions (60 Seconds)

This is the application you will be working with. Have you heard of it? Yes No

If so, tell me what you know about it.

Show test participant the EHRUT.

Please don't click on anything just yet. What do you notice? What are you able to do here?

Please be specific.

Notes/comments

1. CPOE - Medications – Access

Access medication orders.

Success:

- Easily Completed Completed with Difficulty Not Completed

Comments:

Task Time: ____ Seconds

Optimal Path: (*accomplished task in most efficient and effective way*)

- Correct Minor Deviations Major Deviations

Comments:

Observed Errors and Verbalizations:

Rating -- *Very Easy (5) to Very Difficult (1)*:

Overall, this task was: ____

Administrator Comments:

2. CPOE – Medications – Record

Create any medication order.

Success:

- Easily Completed Completed with Difficulty Not Completed

Comments:

Task Time: ____ Seconds

Optimal Path: (*accomplished task in most efficient and effective way*)

- Correct Minor Deviations Major Deviations

Comments:

Observed Errors and Verbalizations:

Rating -- *Very Easy (5) to Very Difficult (1)*:

Overall, this task was: ____

Administrator Comments:

3. CPOE – Medications – Change

Change the dosage of the previous order.

Success:

Easily Completed Completed with Difficulty Not Completed

Comments:

Task Time: ____ Seconds

Optimal Path: (*accomplished task in most efficient and effective way*)

Correct Minor Deviations Major Deviations

Comments:

Observed Errors and Verbalizations:

Rating -- *Very Easy (5) to Very Difficult (1)*:

Overall, this task was: ____

Administrator Comments:

4. CPOE - Laboratory – Access

Access lab orders.

Success:

- Easily Completed Completed with Difficulty Not Completed
Comments:

Task Time: ____ Seconds

Optimal Path: *(accomplished task in most efficient and effective way)*

- Correct Minor Deviations Major Deviations
Comments:

Observed Errors and Verbalizations:

Rating -- Very Easy (5) to Very Difficult (1):

Overall, this task was: ____

Administrator Comments:

5. CPOE – Labs – Record

Create any lab order

Success:

- Easily Completed Completed with Difficulty Not Completed
Comments:

Task Time: ____ Seconds

Optimal Path: *(accomplished task in most efficient and effective way)*

- Correct Minor Deviations Major Deviations
Comments:

Observed Errors and Verbalizations:

Rating -- Very Easy (5) to Very Difficult (1):

Overall, this task was: ____

Administrator Comments:

6. CPOE – Labs – Change

Change the lab order added previously to a new lab order

Success:

Easily Completed Completed with Difficulty Not Completed

Comments:

Task Time: ____ Seconds

Optimal Path: *(accomplished task in most efficient and effective way)*

Correct Minor Deviations Major Deviations

Comments:

Observed Errors and Verbalizations:

Rating -- Very Easy (5) to Very Difficult (1):

Overall, this task was: ____

Administrator Comments:

7. CPOE - Imaging – Access

Access imaging orders

Success:

Easily Completed Completed with Difficulty Not Completed
Comments:

Task Time: ____ Seconds

Optimal Path: *(accomplished task in most efficient and effective way)*

Correct Minor Deviations Major Deviations
Comments:

Observed Errors and Verbalizations:

Rating -- Very Easy (5) to Very Difficult (1):

Overall, this task was: ____

Administrator Comments:

8. CPOE - Imaging – Record

Create an imaging order for any MRI test

Success:

Easily Completed Completed with Difficulty Not Completed
Comments:

Task Time: ____ Seconds

Optimal Path: *(accomplished task in most efficient and effective way)*

Correct Minor Deviations Major Deviations
Comments:

Observed Errors and Verbalizations:

Rating -- *Very Easy (5) to Very Difficult (1)*:

Overall, this task was: ____

Administrator Comments:

9. CPOE - Imaging – Change

Change the imaging order added previously to another MRI order

Success:

Easily Completed Completed with Difficulty Not Completed

Comments:

Task Time: ____ Seconds

Optimal Path: *(accomplished task in most efficient and effective way)*

Correct Minor Deviations Major Deviations

Comments:

Observed Errors and Verbalizations:

Rating -- *Very Easy (5) to Very Difficult (1)*:

Overall, this task was: ____

Administrator Comments:

10. CPOE - Drug-allergy interaction

The patient has an allergy to Benadryl. Attempt to order Benadryl. Adjust Severity Level. Check for alerts and/or restrictions.

Success:

Easily Completed Completed with Difficulty Not Completed
Comments:

Task Time: ____ Seconds

Optimal Path: *(accomplished task in most efficient and effective way)*

Correct Minor Deviations Major Deviations
Comments:

Observed Errors and Verbalizations:

Rating -- Very Easy (5) to Very Difficult (1):

Overall, this task was: ____

Administrator Comments:

11. Demographics – Access

Access Patient demographics

Success:

Easily Completed Completed with Difficulty Not Completed
Comments:

Task Time: ____ Seconds

Optimal Path: *(accomplished task in most efficient and effective way)*

Correct Minor Deviations Major Deviations
Comments:

Observed Errors and Verbalizations:

Rating -- *Very Easy (5) to Very Difficult (1)*:

Overall, this task was: ____

Administrator Comments:

12. Demographics – Record

Create a patient

Success:

Easily Completed Completed with Difficulty Not Completed

Comments:

Task Time: ____ Seconds

Optimal Path: *(accomplished task in most efficient and effective way)*

Correct Minor Deviations Major Deviations

Comments:

Observed Errors and Verbalizations:

Rating -- *Very Easy (5) to Very Difficult (1)*:

Overall, this task was: ____

Administrator Comments:

13. Demographics – Change

Change the Race field to any of the given in the dropdown

Success:

Easily Completed Completed with Difficulty Not Completed

Comments:

Task Time: _____ Seconds

Optimal Path: *(accomplished task in most efficient and effective way)*

Correct Minor Deviations Major Deviations

Comments:

Observed Errors and Verbalizations:

Rating -- Very Easy (5) to Very Difficult (1):

Overall, this task was: _____

Administrator Comments:

14. Problem List – Access

Access SNOMED problem list

Success:

Easily Completed Completed with Difficulty Not Completed

Comments:

Task Time: _____ Seconds

Optimal Path: *(accomplished task in most efficient and effective way)*

Correct Minor Deviations Major Deviations

Comments:

Observed Errors and Verbalizations:

Rating -- Very Easy (5) to Very Difficult (1):

Overall, this task was: ____

Administrator Comments:

15. Problem List – Record

Search for Atrial Flutter and add it to the patient's problem list

Success:

Easily Completed Completed with Difficulty Not Completed

Comments:

Task Time: ____ Seconds

Optimal Path: *(accomplished task in most efficient and effective way)*

Correct Minor Deviations Major Deviations

Comments:

Observed Errors and Verbalizations:

Rating -- Very Easy (5) to Very Difficult (1):

Overall, this task was: ____

Administrator Comments:

16. Problem List – Change

Select a problem list then click Make Inactive to change the status from Active to Inactive

Success:

Easily Completed Completed with Difficulty Not Completed

Comments:

Task Time: _____ Seconds

Optimal Path: *(accomplished task in most efficient and effective way)*

Correct Minor Deviations Major Deviations

Comments:

Observed Errors and Verbalizations:

Rating -- Very Easy (5) to Very Difficult (1):

Overall, this task was: _____

Administrator Comments:

17. Problem List – History

Access problem list history

Success:

Easily Completed Completed with Difficulty Not Completed

Comments:

Task Time: _____ Seconds

Optimal Path: *(accomplished task in most efficient and effective way)*

Correct Minor Deviations Major Deviations

Comments:

Observed Errors and Verbalizations:

Rating -- Very Easy (5) to Very Difficult (1):

Overall, this task was: ____

Administrator Comments:

18. Medication List – Access

Access the patient's Medication List

Success:

Easily Completed Completed with Difficulty Not Completed

Comments:

Task Time: ____ Seconds

Optimal Path: (*accomplished task in most efficient and effective way*)

Correct Minor Deviations Major Deviations

Comments:

Observed Errors and Verbalizations:

Rating -- Very Easy (5) to Very Difficult (1):

Overall, this task was: ____

Administrator Comments:

19. Medication List – Record

Record a new medication entry for Warfarin 1 MG Oral Tablet with instructions "Take 1 tablet by mouth once a day as directed"

Success:

Easily Completed Completed with Difficulty Not Completed

Comments:

Task Time: ____ Seconds

Optimal Path: *(accomplished task in most efficient and effective way)*

Correct Minor Deviations Major Deviations

Comments:

Observed Errors and Verbalizations:

Rating -- Very Easy (5) to Very Difficult (1):

Overall, this task was: ____

Administrator Comments:

20. Medication List – Change

Change the instructions for the previous medication entry to “Take 1 tablet once a day after meals”

Success:

Easily Completed Completed with Difficulty Not Completed

Comments:

Task Time: ____ Seconds

Optimal Path: *(accomplished task in most efficient and effective way)*

Correct Minor Deviations Major Deviations

Comments:

Observed Errors and Verbalizations:

Rating -- *Very Easy (5) to Very Difficult (1)*:

Overall, this task was: ____

Administrator Comments:

21. Medication List – History

Access medication list history

Success:

Easily Completed Completed with Difficulty Not Completed

Comments:

Task Time: ____ Seconds

Optimal Path: (*accomplished task in most efficient and effective way*)

Correct Minor Deviations Major Deviations

Comments:

Observed Errors and Verbalizations:

Rating -- *Very Easy (5) to Very Difficult (1)*:

Overall, this task was: ____

Administrator Comments:

22. Allergy List – Access

Access the patient's allergy list.

Success:

Easily Completed Completed with Difficulty Not Completed

Comments:

Task Time: _____ Seconds

Optimal Path: *(accomplished task in most efficient and effective way)*

Correct Minor Deviations Major Deviations

Comments:

Observed Errors and Verbalizations:

Rating -- Very Easy (5) to Very Difficult (1):

Overall, this task was: _____

Administrator Comments:

23. Allergy List – Record

Record a new allergy for the drug Benadryl with a reaction of “acne”.

Success:

Easily Completed Completed with Difficulty Not Completed

Comments:

Task Time: _____ Seconds

Optimal Path: *(accomplished task in most efficient and effective way)*

Correct Minor Deviations Major Deviations

Comments:

Observed Errors and Verbalizations:

Rating -- Very Easy (5) to Very Difficult (1):

Overall, this task was: ____

Administrator Comments:

24. Allergy List – Change

Change the previous allergy entry to have a reaction of “rash”.

Success:

Easily Completed Completed with Difficulty Not Completed

Comments:

Task Time: ____ Seconds

Optimal Path: *(accomplished task in most efficient and effective way)*

Correct Minor Deviations Major Deviations

Comments:

Observed Errors and Verbalizations:

Rating -- Very Easy (5) to Very Difficult (1):

Overall, this task was: ____

Administrator Comments:

25. Allergy List – History

Access allergy list history

Success:

Easily Completed Completed with Difficulty Not Completed

Comments:

Task Time: ____ Seconds

Optimal Path: *(accomplished task in most efficient and effective way)*

Correct Minor Deviations Major Deviations

Comments:

Observed Errors and Verbalizations:

Rating -- Very Easy (5) to Very Difficult (1):

Overall, this task was: ____

Administrator Comments:

26. Clinical Decision Support – Create

Navigate CDS Management on the Administrator Portal. Create a CDS intervention/resource information for the data elements in the problem list, medication list, and demographics.

Success:

Easily Completed Completed with Difficulty Not Completed

Comments:

Task Time: ____ Seconds

Optimal Path: *(accomplished task in most efficient and effective way)*

Correct Minor Deviations Major Deviations

Comments:

Observed Errors and Verbalizations:

Rating -- *Very Easy (5) to Very Difficult (1)*:

Overall, this task was: ____

Administrator Comments:

27. Clinical Decision Support – Access

Navigate CDS Management on the Administrator Portal. View the intervention/resource information using the Infobutton standard for data elements in the problem list, medication list, and demographics.

Success:

Easily Completed Completed with Difficulty Not Completed

Comments:

Task Time: ____ Seconds

Optimal Path: (*accomplished task in most efficient and effective way*)

Correct Minor Deviations Major Deviations

Comments:

Observed Errors and Verbalizations:

Rating -- *Very Easy (5) to Very Difficult (1)*:

Overall, this task was: ____

Administrator Comments:

28. Clinical Decision Support – Record

Trigger the CDS interventions/resources added using the applicable data elements from each of the required elements. View attributes for the triggered CDS Interventions.

Success:

- Easily Completed Completed with Difficulty Not Completed

Comments:

Task Time: ____ Seconds

Optimal Path: *(accomplished task in most efficient and effective way)*

- Correct Minor Deviations Major Deviations

Comments:

Observed Errors and Verbalizations:

Rating -- Very Easy (5) to Very Difficult (1):

Overall, this task was: ____

Administrator Comments:

29. Clinical Decision Support – Record via rCopia

Trigger the CDS interventions/resources based on data elements in the problem list, medication list, and medication allergy list by incorporating patient information from a transition of care/referral summary. View attributes for the triggered CDS Interventions.

Success:

- Easily Completed Completed with Difficulty Not Completed

Comments:

Task Time: ____ Seconds

Optimal Path: *(accomplished task in most efficient and effective way)*

Correct

Minor Deviations

Major Deviations

Comments:

Observed Errors and Verbalizations:

Rating -- Very Easy (5) to Very Difficult (1):

Overall, this task was: ____

Administrator Comments:

Final Questions (5 Minutes)

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: 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.¹ 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 Disagree					Strongly Agree
1. I think that I would like to use this system frequently	<input type="checkbox"/>					
	1	2	3	4	5	
2. I found the system unnecessarily complex	<input type="checkbox"/>					
	1	2	3	4	5	
3. I thought the system was easy to use	<input type="checkbox"/>					
	1	2	3	4	5	
4. I think that I would need the support of a technical person to be able to use this system	<input type="checkbox"/>					
	1	2	3	4	5	
5. I found the various functions in this system were well integrated	<input type="checkbox"/>					
	1	2	3	4	5	
6. I thought there was too much inconsistency in this system	<input type="checkbox"/>					
	1	2	3	4	5	

7. I would imagine that most people would learn to use this system very quickly

1	2	3	4	5

8. I found the system very cumbersome to use

1	2	3	4	5

9. I felt very confident using the system

1	2	3	4	5

10. I needed to learn a lot of things before I could get going with this system

1	2	3	4	5