EHR Usability Test Report of MedConnectHealth 3.0

Specialized for Meaningful Use 2015 Test Criteria 170.315.g.3

Date of Usability Test: August 29, 2017 - September 8, 2017

Date of Report: September 11, 2017

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10-Sep-17

<u>Declaration of Accuracy and Authenticity</u>

MedConnect was founded with the purpose of designing and developing a highly effective, easy-to-use, web-based application. I take great pride in the quality of the product that we provide to our users. Actually, we consider our users to be part of our team working together to continuously improve the overall user experience and more importantly the quality of patient care.

I hereby attest the information contained in this document is accurate.

Jimmy Chapman
President/CEO

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EXECUTIVE SUMMARY

A usability test of MedConnectHealth 3.0 was conducted between August 29, 2017 and September 8, 2017. The time range for the testing event was based on the participant availability. 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) in regards to Meaningful Use 2015 Test Criteria 170.315.g.3. During the usability test, 11 participants from the healthcare community (physicians, nurses, and administrative staff) matching the target end-user of the EHRUT participated in simulated tasks representing actual usage.

This study collected performance data on 25 tasks typically conducted on an EHR:

- Search for patient, create and office visit (encounter), and open the created encounter.
- Add a medication allergy to the patient's allergy list.
- Change the medication allergy added in task 2.
- Add a medication to the patient's current medication list.
- Change the medication added in task 4.
- Access the patient's medication and allergy list.
- Order a laboratory procedure for the patient.
- Order an X-Ray procedure for the patient.
- Delete both orders created during tasks 7 & 8.
- Order a different laboratory procedure for the patient.
- Order a different X-Ray procedure for the patient.
- Access the laboratory and X-Ray procedure ordered during tasks 10 & 11.
- Order a medication for the patient.
- Access the medication orders and change the medication order information from task 13.
- Electronically prescribe the medication.
- Access the EHRUT DIRECT section of the inbox and select a message with an attached patient CCDA.

- Import and reconcile a patient's record.

- Access the EHRUT's setting section.

- Adjust the drug to drug and drug to allergy intervention severity levels.

- Create a clinical decision intervention for the user.

- Search for patient, select patient's chart, select implantable devices tab and record UDI.

- Fill in the required demographics for patient.

- Change required data in task 22.

- Add the patient's problem in problem list.

- Change/update active problem list in task 24.

During the one-on-one usability test, each participant was greeted by the administrator and asked to review and sign an informed consent (included in Appendix 2); they were instructed that they could withdraw at any time. The usability test was scheduled to last no longer than 1 hours and 50 minutes. Participants did not have prior experience with this version of the EHR; however, the participants were all previous users of another internet based EHR provided by MedConnect. There similarities vary between the tested version and the version under 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 moderator and assistant timed the test and logged user performance data on paper and electronically. The moderator 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
- 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. 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.

Task\Measure	N	Task Success	Path Deviation	Task Time		Errors	Task Rating
	#	Mean (SD)	Deviation (Observed / Optimal)	Mean (SD)	Deviation (Observed / Optimal)	Mean (SD)	Mean (SD)
Create and open an encounter.	11	100	1	34.14	1.71	0	4.9
A8.1 - Add a medication allergy.	11	100	1	33.55	1.21	0	4.63
A8.2 - Change the medication allergy.	11	100	1	35.23	2.35	0	4.72
A7.1 - Add a current medication.	11	100	1	41.09	2.05	0	4.72
A7.2 - Change the current medication.	11	100	1	13.27	1.33	0	4.81
A7.3; A8.3 - Access medication and allergy list.	11	100	1	5.36	1.07	0	4.9
A2.1 - Order a lab procedure.	11	100	1	32.09	1.07	0	4.9
A3.1 - Order an X-Ray procedure.	11	100	1	21.64	1.08	0	4.9
A2.2; A3.2 - Delete lab and X-Ray orders.	11	100	1	5.73	1.15	0	4.9

A2.3 - Order a different lab procedure	11	100	1	16.45	1.15	0	5
A3.3 - Order a different X-Ray procedure	11	100	1	20.18	1.35	0	4.81
A2.4; A3.4 - Access lab and X-Ray orders.	11	100	1	21.55	1.44	0	4.81
A1.1 - Order a medication.	11	100	1	52.73	1.17	0	4.45
A1.2 - Access and change medication.	11	100	1	16.18	1.08	0	4.9
B3.1 - Prescribe medication.	11	100	1	23.45	1.17	0	4.81
B2.1 - Access DIRECT-sent CCDA.	11	45.5	0.45	8.18	0.82	0	2.18
B2.2 - Import and reconcile CCDA.	11	45.5	0.45	22.1	0.32	0	1.81
Access settings configuration.	11	100	1	2.27	1.14	0	4.9
A4.1 - Adjust drug-drug, drug-allergy intervention.	11	100	1	20.36	1.36	0	4.81
A9.1 - Create a clinical decision intervention rule.	11	100	1	95.81	1.06	0	3.77
A14.1 - Select implantable device tab in patient chart, input UDI and all required info	11	100	1	55.9	1.86	0	3.64
A5.1 - Select demographics tab, record all required info	11	100	1	32.27	2.15	0	4.55
A5.2 - Change required info for demographics	11	100	1	15.27	1.53	0	4.63
A6.1 - Select add problem to problem list within chart	11	100	1	28.27	1.13	0	4.81
A6.2 - Change/update problem listed in problem	11	100	1	8.32	1.66	0	4.9

list							

The results from the System Usability Scale scored the subjective satisfaction with the system based on performance with these tasks to be: 95.26.

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

- Major Findings
    - Four tasks seem to be more complicated compared to the others.
    - The tasks overall could be considered to be fairly easy.
    - Users did not take a long time to figure out what to do.
- Areas for Improvement
    - The amount of time each task takes to perform.
    - The amount of deviations made during each task.

INTRODUCTION

The EHRUT (EHR Under Test) tested for this study was MedConnectHealth 3.0. The EHRUT is designed to provide physicians, nurses, and other administrative staff members within the ambulatory setting the ability to electronically record, update, and access patient records. The EHRUT is an internet-based platform with accessibility from the major internet browsers, giving EHR users access to the healthcare records contained within the system from any location with internet access. The EHRUT is an existing EHR system upgrading to meet the Meaningful Use 2015 Ambulatory guidelines. In addition to this pre-existing version of the EHRUT, there is also an internet based EHR supplied by MedConnect in production that will be replace by the EHRUT.

The purpose of this study was to test and validate the usability of the EHRUT as a whole, while adhering to the requirements for usability demonstration outlined in Meaningful Use 2015 Test Criteria 170.315.g.3. To this end, measures were recorded to assess the effectiveness, efficiency, and user satisfaction while performing specific tasks listed later in this report. Metrics such as successful and unsuccessful completion of individual tasks, time needed to successfully complete tasks, comparisons between time collected and optimal performance time, and individual task / overall system satisfaction were recorded and analyzed.

METHOD

PARTICIPANTS

A total of 11 participants were tested on the EHRUT. Participants selected for the test were physicians, nurses, and administrative staff from an ambulatory setting (non-hospital location). The participants had no direct connection to the development or implementation of the EHRUT.

Participants for the test were chose from a population of physicians, nurses, and administrative staff who have previously used an internet based EHR supplied by MedConnect but have not had any interaction with the version of EHRUT. The EHRUT is slightly different from the internet based EHR. From the population, there were 8 administrative staff, 2 nurses, and 1 physician– totaling 11.

Participants in the test had a mix of backgrounds and demographic characteristics. The following is a table 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.

Part ID	Gender	Age	Education	Occupation Role	Professional Experience	Computer Experience	EHR Experience	Assistive Technology Needs
ID01	Female	35	BS	Administrative Staff	5 Years	Moderate	3 Years	None
ID02	Female	51	BS	Nurse	19 Years	Moderate	12 Years	None
ID03	Female	35	HS	Administrative Staff	15 Years	Experienced	11 Years	None
ID04	Female	43	HS	Administrative Staff	16 Years	Experienced	13 Years	None
ID05	Female	53	HS	Administrative Staff	17 Years	Advanced	12 Years	None
ID06	Female	41	BS	Administrative Staff	17 Years	Advanced	17 Years	None
ID07	Female	35	HS	Administrative Staff	12 Years	Moderate	12 Years	None
ID08	Female	53	DO	Physician	20+ Years	Experienced	10 Years	None
ID09	Female	50	BS	Nurse	20+ Years	Advanced	10 Years	None
ID10	Female	57	HS	Administrative Staff	20+ Years	Moderate	12 Years	None
ID11	Female	43	HS	Administrative Staff	19 Years	Experienced	12 Years	None

(Note: Computer experience was participant-reported according to questioning performed during selection)

Participants were scheduled for 25 tasks, ranging from one minute to three minutes per task. Each task was concluded with a two-minute debrief, leading into the next task. Any required system adjustments were performed during this two-minute

period by a member of the administrative staff. Participants were informed before the testing event that the event would span no more than 1 hours and 50 minutes.

STUDY DESIGN

Overall, the objective of this test was to assess the performance of those areas described in Meaningful Use 2015 Test Criteria 170.315.g.3. These required tasks represent a good cross-section of typical EHR usage. Performance was measured in regards to the effectiveness, efficiency, and user-satisfaction. In determining performance, areas that need improvement where also detected and recorded. The data from this test will serve as a baseline for future tests with updated versions of the same EHR. 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 solely with the EHRUT. Each participant was evaluated in the same location 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

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

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When the EHRUT is deployed a user for use in production, the user is presented with a series of support options to acclimate the user to the EHR. The support options include live assistance, user-level documentation available in electronic form, and online access to detailed instructions (including "How-to" videos).

TASKS

The specific goal of this usability test was to identify the overall usability of the EHRUT while specifically testing the requirements of measure 170.315.g.3 for Meaning Use 2015. Below is the list of tasks selected for this usability test.

1. Search for patient, create and office visit (encounter), and open the created encounter.
2. Add a medication allergy to the patient's allergy list.
3. Change the medication allergy added in task 2.
4. Add a medication to the patient's current medication list.
5. Change the medication added in task 4.
6. Access the patient's medication and allergy list.
7. Order a laboratory procedure for the patient.
8. Order an X-Ray procedure for the patient.
9. Delete both orders created during tasks 7 & 8.
10. Order a different laboratory procedure for the patient.
11. Order a different X-Ray procedure for the patient.
12. Access the laboratory and X-Ray procedure ordered during tasks 10 & 11.
13. Order a medication for the patient.
14. Access the medication orders and change the medication order information from task 13.
15. Electronically prescribe the medication.
16. Access the EHRUT DIRECT section of the inbox and select a message with an attached patient CCDA.
17. Import and reconcile a patient's record.

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18. Access the EHRUT's setting section.

19. Adjust the drug to drug and drug to allergy intervention severity levels.

20. Create a clinical decision intervention for the user.

21. Search for patient, select patient's chart, select implantable devices tab and record UDI.

22. Fill in the required demographics for patient.

23. Change required data in task 22.

24. Add the patient's problem in problem list.

25. Change/update active problem list in task 24.

This collection of tasks was selected to achieve the requirements of Test Criteria 170.315.g.3, while also representing a series of commonly performed activities of the typical user of the EHRUT.

PROCEDURES

Upon arrival, each participant was greeted and, after verifying identity, assigned a participant ID. Participants are instructed to sign an informed consent form (See Appendix 2). Participant were then given a general overview of the proceeding of the testing event.

The administration of the testing event was performed by members of the MedConnect support staff (non-development members of the MedConnect staff). A total of two administrative personnel was utilized during the testing event – one assigned as the administrator to oversee the event (Moderator) and one to log data and assist as needed (Assistant). The Moderator provided overall instructions, task-specific instructions, and controlled the overall flow of the testing event. The Assistant logged data, returned the application to the proper state in between tasks (as needed), and answered any questions that were not specific to the completion of a task.

Participants were instructed to perform the tasks:

• 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 task. Task timing began once the administrator finished reading the question and signaled the participant to "Begin". The task time was stopped once the participant indicated they had successfully completed the task or when the maximum allowed time for each event had been reached. To ensure participants performed without a feeling of being rushed, the maximum allowed time for each event was not announced to the participant beforehand.

During the tasks, the testing staff recorded task success rate, time on task, errors, deviations, and any verbal/physical clues indicating participant satisfaction. Scoring is discussed below in Section 3.9.

Upon completion of the test event, participants were given the post-test questionnaire (see Appendix 4). The event was concluded with each participant being thanked for his or her time. The results of the tasks data and post-test questionnaire were compiled and entered into a spreadsheet for later analysis.

TEST LOCATION

The test location consisted of a waiting area and a quiet testing room. The testing room included two computers, one for the Moderator and one for the participant. During the test, the participant, Moderator, and Assistant were present. Both the Moderator and Assistant were stationed at the Moderator's computer during each task. To ensure that the environment was comfortable for users, noise levels were kept to a minimum with the ambient temperature within a normal range.

TEST ENVIRONMENT

The EHRUT would be typically be used in a healthcare office or facility. In this instance, the testing was conducted in a neutral conference room located at an establishment conveniently located for the participant and administrative staff. For testing, a Dell XPS 8900 workstation running Microsoft® Windows 10 Home. The participant used standard mouse and keyboard input while interacting with the EHRUT.

The EHRUT used a 24" widescreen display with a resolution of 1920 x 1080 and standard color settings. The application was accessed using Google Chrome. The application itself was being run from a testing server running OS Windows 10 Home located within MedConnect's facility. Access to the testing server was established using a VPN connection. The computer and setup application was characteristic of the production implementation of the application. At the time of testing, participants were instructed not to modify the default computer setup.

TEST FORMS AND TOOLS

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

1. Moderator's Guide
2. Post-Test Questionnaire

Examples of these documents can be found in Appendices 3 and 4 respectively. The Moderator's Guide was devised so as to be able to capture required data.

The participant's interaction with the EHRUT was observed via the administrator's computer through a remote connection established between the two computers. The Moderator and Assistant were able to observe both the onscreen participant interaction and the physical cues provided by the participant.

PARTICIPANT INSTRUCTIONS

The administrator reads the following instructions aloud to each participant (see the full moderator's guide in Appendix 3):

Thank you for participating in this study. Your input is very important. As a potential user of the application being tested, you are presented with the unique opportunity to add direct input to guide the development of an application you may use in the future. Our session today will last no more than one hours and fifty minutes. During this time, you will use this application to complete a series of tasks. You should complete the tasks as quickly as possible making as few errors as possible. Please try to complete the tasks on your own following the instructions very closely. Please note that we are not testing you, we are testing the system; therefore, if you have difficulty, all this means is that something needs to be improved in the system. I will be here in case you need specific help, but I am not able to instruct you or provide help in how to use the application.

Overall, we are interested in determining the level of ease associated with using this system, what in it would be useful to you, and how we could improve it. Your input today will be used toward making the system better. Any and all input is valued so please be honest with anything you have to say. All of the information that you provide will be kept confidential and your name will not be associated with your comments at any time. Should you feel it necessary, you are able to withdraw at any time during the testing.

Following the procedural instructions, participants were shown the EHR and given up to ten minutes to explore the system, becoming familiar with the interface and giving any comment on their first impressions. After this 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 twenty-five tasks to complete. Tasks are listed in the moderator's guide in Appendix 3.

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

DATA SCORING

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

Measures	Rational and Scoring
Effectiveness: Task Success	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. 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.

Effectiveness: Task Failures	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 a "Failures." No task times were taken for errors. 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. 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.
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. 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.

RESULTS

DATA ANALYSIS AND REPORTING

The results of the usability test were calculated according to the methods specified in the Usability Metrics section above. All the participants followed the directions provided. There were no irregularities with testing. Each participant reported thoroughly reviewing the documentation packet provided and stated he or she understood the information presented within that document.

The usability testing results for the EHRUT are detailed in the table below. The results should be seen in light of the objectives and goals outlined in Section 3.2 Study Design. The data should yield actionable results that, if corrected, yield material, positive impact on user performance.

Task\Measure	N #	Task Success Mean (SD)	Path Deviation Deviation (Observed / Optimal)	Task Time Mean (SD)	Task Time Deviation (Observed / Optimal)	Errors Mean (SD)	Task Rating Mean (SD)
Create and open an encounter.	11	100	1	34.14	1.71	0	4.9
A8.1 - Add a medication allergy.	11	100	1	33.55	1.12	0	4.63
A8.2 - Change the medication allergy.	11	100	1	35.23	2.35	0	4.72
A7.1 - Add a current medication.	11	100	1	41.09	2.05	0	4.72
A7.2 - Change the current medication.	11	100	1	13.27	1.33	0	4.81
A7.3; A8.3 - Access medication and allergy list.	11	100	1	5.36	1.07	0	4.9
A2.1 - Order a lab procedure.	11	100	1	32.09	1.07	0	4.9
A3.1 - Order an X-Ray procedure.	11	100	1	21.64	1.08	0	4.9
A2.2; A3.2 - Delete lab and X-Ray orders.	11	100	1	5.73	1.15	0	4.9
A2.3 - Order a different lab procedure	11	100	1	16.45	1.09	0	5
A3.3 - Order a different X-Ray procedure	11	100	1	20.18	1.35	0	4.81
A2.4; A3.4 - Access lab and X-Ray orders.	11	100	1	21.55	1.44	0	4.81
A1.1 - Order a medication.	11	100	1	52.73	1.17	0	4.45
A1.2 - Access and change medication.	11	100	1	16.18	1.08	0	4.9
B3.1 - Prescribe medication.	11	100	1	23.45	1.17	0	4.81

B2.1 - Access DIRECT-sent CCDA.	11	45.5	0.45	8.18	0.82	0	2.18
B2.2 - Import and reconcile CCDA.	11	45.5	0.45	22.1	0.32	0	1.81
Access settings configuration.	11	100	1	2.27	1.14	0	4.9
A4.1 - Adjust drug-drug, drug-allergy intervention.	11	100	1	20.36	1.36	0	4.81
A9.1 - Create a clinical decision intervention rule.	11	100	1	95.81	1.06	0	3.77
A14.1 - Select implantable device tab in patient chart, input UDI and all required info	11	100	1	55.9	1.86	0	3.64
A5.1 - Select demographics tab, record all required info	11	100	1	32.27	2.15	0	4.55
A5.2 - Change required info for demographics	11	100	1	15.27	1.53	0	4.63
A6.1 - Select add problem to problem list within chart	11	100	1	28.27	1.13	0	4.81
A6.2 - Change/update problem listed in problem list	11	100	1	8.32	1.66	0	4.9

The results from the SUS (System Usability Scale) scored the subjective satisfaction with the system based on performance with these tasks to be: 95.26.

The results of the usability test were analyzed. In light of these findings, the following is an assessment of the EHRUT in regards effectiveness, efficiency, and satisfaction. The major finding and areas for improvement are also identified.

DISCUSSION OF THE FINDINGS

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EFFECTIVENESS

The major scoring method for determining the effectiveness with this usability test was success and failure rate. The EHRUT achieved a score of 100% for twenty-one of the twenty-three tasks. The other two tasks scored a 45.5%, and 45.5% for success, each with two participants failing to reach the objective within the allotted time. (It is worth noting that the participants were on the right path to completing the tasks but had path deviations early within the task that created difficulties with completing the task.)

Combining the success/failure rates, there was an overall 95.26 % success rate for all the tasks performed by all of the participants during the usability test.

A secondary measurement for scoring effectiveness is the ratio between optimal path and the actual path taken for each task. The optimal path represents the most effective steps to take to complete each task. For the EHRUT, the task deviation ranged from 0.45 to 1 (no deviation).

The overall deviation when all the tasks were averaged for the EHRUT was 0.9526. To give this number a more realistic meaning, consider the following: The total number of optimal steps for the entire usability test was 162 steps. The overall deviation of 0.9526 results in about 170.1 steps needs to complete the entire range of tasks. This is an additional 8 steps in all – or about 1.05 additional steps per task on average.

The number of steps and a description of the steps for each task are detailed within the Moderator's Guide in Appendix 3.

EFFICIENCY

The chief measure of efficiency during the usability test is the amount of time required to complete each task as it compares to the optimal amount of time to

complete the task. The range for the EHRUT was from 0.32 to 2.35 deviation from the optimal time.

Overall, the EHRUT deviating for timing was 1.2164. Applying the same logic as seen in the effectiveness measure, the total optimal time was added for all the task and then the deviation was applied. The total time to optimally complete all of the task for the usability measure is 530 seconds. The participants' average for completing all the task was about 624.99 seconds, which is an additional 94.99 seconds or about 4.13 seconds per task.

Details pertaining to the optimal times for each task can be found in the Moderator's Guide in Appendix 3.

SATISFACTION

Two measurements were gathered to score satisfaction during the usability test for the EHRUT: individual tasks ratings gathered after each task and overall satisfaction collected through the System Usability Scale at the conclusion of the usability test. These scores indicated an overall high level of satisfaction for most of the individual tasks as well as for the EHRUT in general. Two tasks showed satisfaction ratings of 1.81 and 2.18, indicating process that are less satisfying than the EHRUT average individual task satisfaction of 3.9636.

A score of 95.26 on the System Usability Scale indicates an overall high level of satisfaction from each participant recorded at the conclusion of the usability test.

A copy of the System Usability Scale can be found in Appendix 4.

MAJOR FINDINGS

The usability test for the EHRUT did report any finding that could be consider detrimental for the EHRUT. However, the usability test pinpoint four areas of concern – Direct-sent CCDA, Import and reconcile CCDA, Reconcile and decision

intervention, and Implantable Devices. The recommendation from this usability test would be that these four areas should be reworked to simplify the tasks.

Most of the tasks within the usability test were completed with little difficulty. The verbal and physical cues from the participants indicated that the overall experience was pleasant. Although outside of the scope of usability, many of the participants responded well to the design and color scheme of the EHRUT. On several occasions, participants remarked that the documentation packet they were provided with was ultimately responsible for the ease of use for many of the tasks.

AREAS FOR IMPROVEMENT

As stated previously, the four tasks that showed failures and lower satisfaction ratings are areas that require improvement. Efforts should be made to readdress the workflow associate with these tasks. In addition to these four areas, there is a concern with the optimal time versus actual task time. An overall time increase of 4.13 seconds per task may not seem significant but adds a considerable amount of time to the user's workday when considering the number of tasks, a user performs during the course of a day. Each task with a time deviation greater than 1.20 should be considered for improvement of either workflow or education of the user.

APPENDICES

The following appendices include supplemental data for this usability test report. Following is a list of the appendices provided:

1. Participant Demographics
2. Informed Consent Form
3. Moderator's Guide
4. System Usability Scale Questionnaire

Appendix 1: PARTICIPANT DEMOGRAPHICS

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

Gender	
Male:	0
Female:	11
Total:	**11**
Occupation/Role	
Physician:	1
Nurse:	2
Administrative Staff:	8
Total:	**11**
Education	
Doctorates:	1
Bachelor's Degree:	4
High School:	6
Total:	**11**
Professional Experience	
20 + years:	3
15 – 20 years:	6
10 – 14 years:	1
5 – 9 years:	1
1 – 4 years:	
Total:	**11**
Computer Experience	
Advanced:	2
Experienced:	4
Moderate:	5
Limited:	
Total:	**11**
EHR Experience	
5 + years	10
3 – 4 years	1
1 – 2 years	
Less than a year	
Total:	**11**

Appendix 2: INFORMED CONSENT FORM

Informed Consent

MedConnect 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 110 minutes.

Agreement

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

I understand that the information collected is for research purposes only and that my name will not be used or disclosed for any purpose other than research. I relinquish any rights to the data collected and understand that the data may by MedConnect 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 that the data collected from this will be part of a publicly available document but my name will not be released to anyone outside of MedConnect. 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: _____

10-Sep-17

Appendix 3: MODERATOR'S GUIDE

EHRUT Usability Test

Moderator's Guide

Administrator: _____

Assistant: _____

Date: _____   Time: _____

Participant # / ID: _____

Location   _____

Moderator's Checklist

Prior to testing

> Confirm schedule with each Participant.
> Verify testing environment is prepared.
> Ensure application is fully functional.

Prior to meeting with each participant

> Verify the application is at its starting state.

Prior to each task:

> Ensure application is in the proper starting location.

After each participant:

> Return the application to its starting state.

After testing is complete:

> Compile results and analyze data.

<u>Initial Orientation (3 minutes)</u>

Thank you for participating in this study. Your input is very important. As a potential user of the application being tested, you are presented with the unique opportunity to add direct input to guide the development of an application you may use in the future. Our session today will last about one hours and fifty minutes. During this time, you will use this application to complete a series of tasks. You should complete the tasks as quickly as possible making as few errors as possible. Please try to complete the tasks on your own following the instructions very closely. Please note that we are not testing you we are testing the system, therefore if you have difficulty all this means is that something needs to be improved in the system. I will be here in case you need specific help, but I am not able to instruct you or provide help in how to use the application.

Overall, we are interested in determining the level of ease associated with using this system, what in it would be useful to you, and how we could improve it. Your input today will be used toward making the system better. Any and all input is valued so please be honest with anything you have to say.   All of the information that you provide will be kept confidential and your name will not be associated with your comments at any time. Should you feel it necessary, you are able to withdraw at any time during the testing.

Preliminary Questions (10 minutes)

1. What is your job title / appointment?

2. How long have you been working in this role?

3. What are some of your main responsibilities?

4. How long did you review the documentation packet provided before today?

5. Tell me about your experience with electronic health records.

EHR Orientation (5 minutes)

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.
- Allow the participant to log into the application using the credentials for the test user and navigate between pages.
- After 10 minutes or the participant is no longer interacting with the system, question the first impression.

Notes / Comments:

Tasks (80 minutes):

Now that you have had a moment become familiar with the application, we will move into the tasks for this session.

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.

There will be a total of twenty-five tasks. Each task is designed so one task will flow into the next task. If there is any deviation from this, I will inform you ahead of time and make the required adjustments. The first task will begin immediately after login. Below is the information for the patient used throughout the tasks:

- First Name: Test
- Last Name: Usability
- Chart No: 1234u

The patient will be referred to as "the patient" for the remainder of the test.

Task 1: Search for a patient, create an office visit (encounter), and open the created encounter. (185 seconds – includes debriefing period)

Optimal Time: 20 seconds   Maximum Time: 65 seconds

Task Description: The patient has come into the office for a visit. Search for the patient. Create an encounter for the patient using the first location and first room for Provider Usability. Open (access) the encounter that is created.

Success:

> Easily completed
>
> Completed with difficulty or help (Describe below)
>
> Not completed Easily completed
>
> *Comments:*

Task Time: _____ Seconds

Optimal Path: Chart Textbox (Dashboard Page) ❼ Search Icon ❼ Encounter Icon (Patient Search Page) ❼ Visit Drop Down (Create Encounter Page) ❼ Provider Drop Down ❼ Location Drop Down ❼ Room Drop Down ❼ OK Button ❼ Click X ❼ Patient Flow Page ❼ Patient Encounter Line (Grid Click) ❼ OK Button (Change Status Page)

> 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 Easy" (1) to "Very Difficult" (5)

Administrator Comments:

Task 2: Add an allergy to the patient's allergy list. (195 seconds)

Optimal Time: 30 seconds   Maximum Time: 75 seconds

Task Description: The patient has indicated an allergy to penicillin that causes him to have a rash. From the "Constitutionals" page, add a medication allergy of **"Penicillins"** (476) with a reaction of **"(Rash) or (C/O a rash) (finding)"** (139684003).

Success:

 Easily completed

 Completed with difficulty or help (Describe below)

 Not completed Easily completed

 Comments:

Task Time: _____ Seconds

Optimal Path: Add Allergy Icon (Constitutionals Page) ❼ Allergy Search Textbox (Add
 Allergy Page) ❼ Search Button ❼ Select Allergy ❼ Search Reaction Textbox ❼ Search
 Button ❼ Select Reaction ❼ Assign Button ❼ Close Add Allergy Page

 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 Easy" (1) to "Very Difficult" (5)

Administrator Comments:

Task 3: Change the allergy added in task 2. (175 seconds)

Optimal Time: 15   Maximum Time: 55 seconds

Task Description: The patient has indicated that penicillin also causes him to cough. Edit current allergy of **"Penicillins"**. Add a reaction of **"Coughing (observable entity)"**.

Success:

      Easily completed

      Completed with difficulty or help (Describe below)

      Not completed Easily completed

      Comments:

Task Time: _____ Seconds

Optimal Path: Edit Allergy (Penicillins) (Constitutionals Page) ❼ Search Reaction Textbox

      (Edit Allergy Page) ❼ Search Button ❼ Reaction Line Click ❼ Assign Button ❼ Close

      Edit Allergy Page

      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 Easy" (1) to "Very Difficult" (5)

Administrator Comments:

Task 4: Add a medication to the patient's current medication list. (180 seconds)

Optimal Time: 20 seconds   Maximum Time: 60 seconds

Task Description: The patient indicates that he is taking the medication Folex, which was prescribed a week ago from another location with the instructions to administer as needed. From the "Constitutionals" page, add a current medication of **"Methotrexate Sodium 25 mg/mL injection solution"** with the how taken of **"Injection"** and a start date of a week ago. Indicate the medication was **Prescribed Elsewhere**.

Success:

    Easily completed

    Completed with difficulty or help (Describe below)

    Not completed Easily completed

    Comments:

Task Time: _____ Seconds

Optimal Path: Add Medication Icon (Constitutionals Page) ❼ Medication Search Textbox (Add
        Medication Page) ❼ Search Button ❼ Select Medication ❼ How Taken Textbox ❼
        Prescribed Elsewhere Checkbox ❼ Start Date Textbox ❼ Insert Button ❼ Close Button
         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 Easy" (1) to "Very Difficult" (5)

Administrator Comments:

Task 5: Change the medication added in Task 4. (175 seconds)

Optimal Time: 10 seconds   Maximum Time: 55 seconds

Task Description: The patient remembers that he started the medication a week and a half ago. Select the medication added in the previous step. Change the start day to a week and a half before current date.

Success:

Easily completed

Completed with difficulty or help (Describe below)

Not completed Easily completed

Comments:

Task Time: _____ Seconds

Optimal Path: Medication Edit Button (Constitutionals Page) ❼ Start Date (Edit Medication
Page) ❼ Update Button

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 Easy" (1) to "Very Difficult" (5)

Administrator Comments:

Task 6: Access the patient's medication and allergy list. (150 seconds)

Optimal Time: 5 seconds   Maximum Time: 30 seconds

Task Description: Verify the allergy and medication entered previously were successfully added to the patient's record. Navigate to the **"Exam"** page and then return to the **"Constitutionals"** page to gain access to the patient's allergy and medication lists.

Success:

>   Easily completed

>   Completed with difficulty or help (Describe below)

>   Not completed Easily completed

>   *Comments:*

Task Time: _____ Seconds

Optimal Path: Exam Tab Click ❼ Constitutionals Tab Click

>   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 Easy" (1) to "Very Difficult" (5)

Administrator Comments:

Task 7: Order a laboratory procedure for the patient. (220 seconds)

Optimal Time: 30 seconds   Maximum Time: 100 seconds

Task Description: The patient needs to have a lab ordered.   From the "Orders" page, search for and order an In-House **"LDL < or = 130 within 12 mos; PQRI"** laboratory test. Assign a diagnosis of **"250.00"** (DM w/o complication type II) for this and all other laboratory procedures.

Success:

      Easily completed

      Completed with difficulty or help (Describe below)

      Not completed Easily completed

      Comments:

Task Time: _____ Seconds

Optimal Path: Orders Tab Click ❼ Search Textbox (Orders Page) ❼ Search Button ❼
      Procedure Line Click ❼ Assign Diagnosis Button ❼ Search Diagnosis Textbox (Assign
      Diagnosis Page) ❼ Search Button ❼ Diagnosis Line Click (ICD 10) ❼ Assign
      Diagnosis & Close Button ❼ Assign Diagnosis Button
      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 Easy" (1) to "Very Difficult" (5)

Administrator Comments:

10-Sep-17

Task 8: Order an X-Ray procedure for the patient. (190 seconds)

Optimal Time: 20 seconds   Maximum Time: 70 seconds

Task Description: The patient is in need of an X-Ray. Search for and order **"XXRay"** for the patient. Assign a diagnosis of **"250.00"** (DM w/o complication type II) for this and all other X-Ray procedures.

Success:

> Easily completed
>
> Completed with difficulty or help (Describe below)
>
> Not completed Easily completed
>
> *Comments:*

Task Time: _____ Seconds

Optimal Path: Search Textbox (Orders Page) ❼ Search Button ❼ Procedure Line Click ❼

> Assign Diagnosis Button ❼ Search Diagnosis Textbox (Assign Diagnosis Page) ❼
>
> Search Button ❼ Diagnosis Line Click (ICD 10) ❼ Assign Diagnosis & Close Button ❼
>
> Assign Diagnosis Button
>
> 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 Easy" (1) to "Very Difficult" (5)

Administrator Comments:

Task 9: Delete both orders created during Tasks 7 & 8. (150 seconds)

Optimal Time: 5 seconds   Maximum Time: 30 seconds

Task Description: The lab and X-Ray selected weren't the proper procedure for the patient.

From the **"Orders"** page, delete both of the procedure added previously.

Success:

  Easily completed

  Completed with difficulty or help (Describe below)

  Not completed Easily completed

  Comments:

Task Time: _____ Seconds

Optimal Path: Delete Icon Click (Orders Page)

  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 Easy" (1) to "Very Difficult" (5)

Administrator Comments:

Task 10: Order another (different) laboratory procedure for the patient. (160 seconds)

Optimal Time: 15 seconds   Maximum Time: 40 seconds

Task Description: The proper laboratory procedure was an HDL. Search for and select an **"HDL"** LabCorp Test. Use the diagnosis identified previously.

Success:

    Easily completed

    Completed with difficulty or help (Describe below)

    Not completed Easily completed

    Comments:

Task Time: _____ Seconds

Optimal Path: Search Textbox (Orders Page) ❼ Search Button ❼ Procedure Line Click ❼

    Assign Diagnosis Button ❼ Search Diagnosis Textbox (Assign Diagnosis Page) ❼

    Search Button ❼ Diagnosis Line Click (ICD 10) ❼ Assign Diagnosis & Close Button ❼

    Assign Diagnosis Button

    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 Easy" (1) to "Very Difficult" (5)

Administrator Comments:

Task 11: Order another (different) X-Ray procedure for the patient. (180 seconds)

Optimal Time: 15 seconds   Maximum Time: 60 seconds

Task Description: The X-Ray needed for the patient was actually an Chest X-Ray 2 View.

Search for and select **"Chest X-Ray 2 View"**. Use the diagnosis identified previously.

Success:

   Easily completed

   Completed with difficulty or help (Describe below)

   Not completed Easily completed

   Comments:

Task Time: _____ Seconds

Optimal Path: Search Textbox (Orders Page) ❼ Search Button ❼ Procedure Line Click ❼

   Assign Diagnosis Button ❼ Search Diagnosis Textbox (Assign Diagnosis Page) ❼

   Search Button ❼ Diagnosis Line Click (ICD 10) ❼ Assign Diagnosis & Close Button ❼

   Assign Diagnosis Button

   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 Easy" (1) to "Very Difficult" (5)

Administrator Comments:

Task 12: Access the laboratory and X-Ray procedure ordered during Tasks 10 & 11. (160 seconds)

Optimal Time: 15 seconds   Maximum Time: 40 seconds

Task Description: With the proper procedures selected, complete and access the orders.

Success:

Easily completed

Completed with difficulty or help (Describe below)

Not completed Easily completed

Comments:

Task Time: _____ Seconds

Optimal Path: Complete Orders Button ❼ View Orders Button ❼ Close Icon (Input Order

Results Page)

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 Easy" (1) to "Very Difficult" (5)

Administrator Comments:

Task 13: Order a medication for the patient. (230 seconds)

Optimal Time: 45 seconds   Maximum Time: 110 seconds

Task Description: The patient is in need of a prescription. Search for and prescribe **"Penicillin G benzathine 2,400,000 unit/4 mL IM Syringe"**. For the details, select that one syringe is being order with one refill and a dosage of **"As Needed"**. Note the drug to allergy interaction and the drug to drug interaction identified on the details entry page.

Success:

    Easily completed

    Completed with difficulty or help (Describe below)

    Not completed Easily completed

    Comments:

Task Time: _____ Seconds

Optimal Path: Prescriptions Tab ❼ Medication Search Textbox ❼ Search Button ❼ Medication
       Line Click ❼ Qty Textbox (Prescriptions Details Page) ❼ Packaging Drop Down ❼
       Refills Textbox ❼ Dosage Textbox ❼ OK Button

     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 Easy" (1) to "Very Difficult" (5)

Administrator Comments:

Task 14: Access the medication orders and change the mediation order information from Task 13. (195 seconds)

Optimal Time: 15 seconds   Maximum Time: 75 seconds

Task Description: Verify the medication is ordered. Navigate to the **"Exam"** page and then return to the prescription. Upon returning, make a change to the current order to indicate 2 refills.

Success:

    Easily completed

    Completed with difficulty or help (Describe below)

    Not completed Easily completed

    Comments:

Task Time: _____ Seconds

Optimal Path: Exam Tab Click ❼ Prescriptions Tab Click ❼ Select Medication Line Click
    (Prescriptions Page) ❼ Refills Textbox ❼ OK Button

    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 Easy" (1) to "Very Difficult" (5)

Administrator Comments:

Task 15: Electronically prescribe the medication. (200 seconds)

Optimal Time: 20 seconds   Maximum Time: 80 seconds

Task Description: Electronically prescribe the adjust medication for the prior steps using SureScripts. Search for and select any Pharmacy. Review the summary and transmit the prescription (Note: the prescription will NOT be prescribed. An error will be displayed to indicate a communication issue with SureScripts. This is expected behavior from within the test environment.)

Success:

Easily completed

Completed with difficulty or help (Describe below)

Not completed Easily completed

Comments:

Task Time: _____ Seconds

Optimal Path: SureScript Button Click (Prescription Page) ❼ Zip Textbox (Pharmacy Search Page) ❼ Search Button ❼ Pharmacy Line Click ❼ View Summary Button ❼ Transmit Button (Summary Page) ❼ Close Button

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 Easy" (1) to "Very Difficult" (5)

Administrator Comments:

Task 16: Access the EHRUT DIRECT section of the inbox and select a message with an attached patient CCDA. (165 seconds)

Optimal Time: 10 seconds   Maximum Time: 45 seconds

Task Description: All encounter-based functions are now complete. Exit the encounter, navigate to the provider's inbox. Navigate further into the Direct inbox tab and select the pre-sent message with an attached CCDA.

Success:

  Easily completed

  Completed with difficulty or help (Describe below)

  Not completed Easily completed

  Comments:

Task Time: _____ Seconds

Optimal Path: Close Encounter Icon ❼ Inbox Tab Click (Main Page) ❼ Direct Tab Click

  (Inbox Page) ❼ Message Line Double Click (Direct Page) ❼ Message Attachment(s)

  Click

   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 Easy" (1) to "Very Difficult" (5)

Administrator Comments:

Task 17: Import and reconcile a patient's record. (330 seconds)

Optimal Time: 70 seconds   Maximum Time: 210 seconds

Task Description: Identify the CCDA as belonging to the patient and proceed with the reconciliation process. During reconciliation, select to add all of medications, problems, and allergies from the CCDA into the patient's record. Note the display of the clinical decision support rules at the completion of the reconciliation process. The patient was preconfigured to display Problem, Medication, Medication Allergy, Demographic, Lab Tests/Results, and Vital Sign Interventions. Select the checkbox for citations to view the reference information.

Success:

>   Easily completed

>   Completed with difficulty or help (Describe below)

>   Not completed Easily completed

>   *Comments:*

Task Time: _____ Seconds

Optimal Path: Import/Reconcile CCDA Button (Direct Page) ❼ Chart Textbox (Patient Assign Page) ❼ Search Button ❼ File Name Textbox ❼ Assign CCDA to Patient Button ❼ Reconcile Tab (reconcile Page) ❼ Add Selected Button – Allergy ❼ Add Selected button – Medication ❼ Add Selected Button – Problems ❼ Import Tab Click ❼ Citation Link ❼ Close Window Icon

>   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 Easy" (1) to "Very Difficult" (5)

Administrator Comments:

Task 18: Access the EHRUT's setting section. (145 seconds)

Optimal Time: 2 seconds   Maximum Time: 15 seconds

Task Description: The next few tasks will demonstrate certain configuration processes within the EHR. To begin, access the **"Settings"** page.

Success:

    Easily completed

    Completed with difficulty or help (Describe below)

    Not completed Easily completed

    Comments:

Task Time: _____ Seconds

Optimal Path: Settings Tab Click (Main Page)

    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 Easy" (1) to "Very Difficult" (5)

Administrator Comments:

Task 19: Adjust the drug to drug and drug to allergy intervention severity levels. (190 seconds)

Optimal Time: 15 seconds   Maximum Time: 70 seconds

Task Description: Enter into the **"Drug Severity Levels"** section and inspect the currently configure drug to drug and drug to allergy intervention severity levels. Unselect the display of **"Moderate"** or **"Undetermined"** drug to drug interactions. Also adjust the drug to allergy interactions to not display **"Cross-sensitive Allergen Group"**.

Success:

    Easily completed

    Completed with difficulty or help (Describe below)

    Not completed Easily completed

    Comments:

Task Time: _____ Seconds

Optimal Path: Drug Severity Levels Link Click (Settings Page) ❼ Provider Drop Down
    (Severity Page) ❼ Moderate Checkbox ❼ Undetermined Checkbox ❼ Cross-sensitive
    Checkbox ❼ Save Button

    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 Easy" (1) to "Very Difficult" (5)

Administrator Comments:

Task 20: Create a clinical decision intervention for the user. (320 seconds)

Optimal Time: 90 seconds   Maximum Time: 200 seconds

Task Description: As a provider, you want to be notified to add a prescription for aspirin whenever a patient's HDL is resulted to be lower than 40 mg/dl. Return to the "Settings" page and access the **"CDS Management"**. From this page, setup a clinical decision support rule to prompt the ordering of **"Adult Aspirin 81 MG Tab"** when a **"HDL"** returns with a value lower than **"40"** with a **60** day window.

Success:

> Easily completed
>
> Completed with difficulty or help (Describe below)
>
> Not completed Easily completed
>
> *Comments:*

Task Time: _____ Seconds

Optimal Path: CDS Management Link Click (Settings Page) ❼ Provider Drop Down (CDS Page) ❼ Rule Name Textbox ❼ Citation Button ❼ Citation Textbox (Citation Page) ❼ Close Button ❼ Result Textbox (CDS Page) ❼ Search Button ❼ Result Line Click ❼ Add Lab Result Button ❼ Value Textbox ❼ Procedures Textbox ❼ Search Button ❼ Procedure Click ❼ Value Dropdown ❼ Textbox ❼ Add Button ❼ Frequency Textbox ❼ Active Checkbox ❼ Add Button

> 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 Easy" (1) to "Very Difficult" (5)

Administrator Comments:

Task 21: Add an implantable device for the patient within the patient chart. (200 seconds)

Optimal Time: 30 seconds   Maximum Time: 80 seconds

Task Description: These final tasks will be demonstrated within a patient's chart. Search for the patient and click on the patient's chart. Once inside the patient's chart navigate to the **"Implantable Devices"** tab, record **"UDI"**.

Success:

      Easily completed

      Completed with difficulty or help (Describe below)

      Not completed Easily completed

      Comments:

Task Time: _____ Seconds

Optimal Path: Search Icon ❼ Chart Icon (Patient Search Page) ❼ Implantable Devices Tab
      (Chart Page) ❼ Add Icon ❼ Record UDI ❼ Add Button

      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 Easy" (1) to "Very Difficult" (5)

Administrator Comments:

Task 22: Add the patient's demographics within the demographics tab. (180 Seconds)

Optimal Time: 15 seconds   Maximum Time: 60 seconds

Task Description: To set every patient apart from one another we must know their demographics.

Enter in the patient's **"Demographics"**. Required information includes: Race, Ethnicity,

Preferred Language, Sex, Sexual Orientation and Gender Identity

Success:

    Easily completed

    Completed with difficulty or help (Describe below)

    Not completed Easily completed

    Comments:

Task Time: _____ Seconds

Optimal Path: Demographics Tab (Chart Page) ❼ Add Required Info ❼ Update Button

    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 Easy" (1) to "Very Difficult" (5)

Administrator Comments:

Task 23: Change data added in demographics. (175 Seconds)

Optimal Time: 10 seconds   Maximum Time: 55 seconds

Task Description: The patient identifies with more than one **"Race"** and more than one

"Ethnicity" please add them into the demographics.

Success:

    Easily completed

    Completed with difficulty or help (Describe below)

    Not completed Easily completed

    Comments:

Task Time: _____ Seconds

Optimal Path: Refresh Chart (Refresh Icon) ❼ Demographics Tab ❼ Race Drop Down ❼

    Ethnicity Drop Down ❼ Update Button

    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 Easy" (1) to "Very Difficult" (5)

Administrator Comments:

Task 24: Add a problem within the patient's problem list (185 Seconds)

Optimal Time: 25 seconds   Maximum Time: 65 seconds

Task Description: The patient states that he has a problem with migraines. Within the chart add a problem of **"Migraine"** Migraine type will be left blank, Intractability will be left blank, and status migrainosus presence will be left blank. Severity will be **"Acute"** and **"Status"** will be **"Active"**.

Success:

> Easily completed
>
> Completed with difficulty or help (Describe below)
>
> Not completed Easily completed
>
> *Comments:*

Task Time: _____ Seconds

Optimal Path: Patient Summary Tab (Bottom of Chart) ❼ Problem List Add Button ❼

> Diagnosis Textbox ❼ Search Button ❼ Diagnosis Select (Diagnosis Page) ❼ Assign
>
> Diagnosis & Close ❼ Select Onset Date ❼ Severity Drop Down ❼ Status Drop Down
>
> ❼ Add Button
>
> 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 Easy" (1) to "Very Difficult" (5)

Administrator Comments:

Task 25: Change/update problem added in problem list (145 Seconds)

Optimal Time: 5 seconds   Maximum Time: 25 seconds

Task Description: The patient concludes that the migraines have been gone for roughly a year.

Update the problem listed in the previous task to **"Resolved"**.

Success:

Easily completed

Completed with difficulty or help (Describe below)

Not completed Easily completed

Comments:

Task Time: _____ Seconds

Optimal Path: Refresh Chart (Refresh Icon) ❼ Problem List Grid Box ❼ Click Problem Listed

❼ Status Drop Down (Resolved) ❼ Update Button

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 Easy" (1) to "Very Difficult" (5)

Administrator Comments:

Final Questions (8 Minutes)

1. What was your overall impression of this system?

2. What aspects of the system did you like most?

3. What aspects of the system did you like least?

4. Were there any features that you were surprised to see?

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

6. Compare this system to other systems you have used.

7. Would you recommend this system to your colleagues?

Administer the SUS

Appendix 4: SYSTEM USABILITY SCALE QUESTIONNAIRE

	Strongly disagree				Strongly agree
1. I think that I would like to use this system frequently	1	2	3	4	5
2. I found the system unnecessarily complex	1	2	3	4	5
3. I thought the system was easy to use	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	1	2	3	4	5
5. I found the various functions in this system were well integrated	1	2	3	4	5
6. I thought there was too much inconsistency in this system	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

10-Sep-17