



EHR USABILITY REPORT OF MEDICAL OFFICE ONLINE, INC. Version 2.3.1

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

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Medical Office Online, Inc. used the following usability design NISTIR 7741 in developing and designing their health IT module, Professional EHR: NISTIR 7741

EXECUTIVE SUMMARY

A usability test of Medical Office Online, version 2.3.1 was conducted between 6/30/2018 - 8/30/2018 by Medical Office Online, Inc. The purpose of this test was to test and validate the usability of the current user interface and provide evidence of usability in the EHR Under Test (EHRUT). During the usability test, 2 healthcare providers, and 8 Clinical staff, matching the target demographic criteria served as participants and used Medical Office Online in simulated, but representative tasks. This study collected performance data on 11 tasks typically conducted on an EHR:

CPOE Record Medications §170.315(a)(1)

CPOE Laboratory §170.315(a)(2)

CPOE Diagnostic Imaging §170.315(a)(3)

Drug-Drug, Drug-Allergy Interactions Checks §170.315(a)(4)

Demographics §170.315(a)(5)

Problem List §170.315(a)(6)

Medication List §170.315(a)(7)

Medication Allergy §170.315(a)(8)

Clinical Decision Support §170.315(a)(9)

Implantable devices §170.315(a)(14)

Electronic Prescribing §170.315(b)(3)

During the 60-minute one-on-one usability test, each participant was greeted by the administrator and asked to review and sign an informed consent/release form (included in Appendix 3); they were instructed that they could withdraw at any time. All participants had prior experience with the EHR. Training material on newly designed functionality was distributed to participant prior to the test. The administrator introduced the test and instructed participants to complete a series of tasks (given one

at a time) using the EHRUT. During the testing, the administrator timed each task and, along with the data logger, recorded user performance data on paper and electronically. The administrator did not give the participant assistance in how to complete the task. Participant screens and audio were recorded for subsequent analysis. 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 was de-identified – no correspondence could be made from the identity of the participant to the data collected. Following the conclusion of the testing, participants were asked to complete a post-test questionnaire and were compensated for their time.

The UCD process used in the design and development of the above 2015 Edition certification criteria was based on NISTIR 7741. Various recommended metrics were used to evaluate the usability of the EHRUT. Use was in accordance with the examples set forth in the *NIST Guide to the Processes Approach for Improving the Usability of Electronic Health Records*.

INTRODUCTION

The EHRUT tested for this study was Medical Office Online Version 2.3.1, designed to present medical information to healthcare providers in ambulatory and various outpatient specialty settings. The EHRUT consists of a comprehensive software solution that allows practitioners to capture patient data with efficiency. The usability testing attempted to represent realistic exercises and conditions.

The purpose of this study was to test and validate the usability of the current user interface and provide evidence of usability in the EHR Under Test (EHRUT). To this end, measures of effectiveness, efficiency, and user satisfaction, such as the 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, and participant's satisfaction ratings of the system were captured during the usability testing.

METHOD

PARTICIPANTS

A total of 10 participants were tested on the EHRUT(s). Participants in the test were 2 physicians, 8 clinical staff. Participants were recruited by Medical Office Online. In addition, participants had no direct connection to the development of, or organization producing, the EHRUT(s). For the test purposes, end-user characteristics were de-identified and translated into a recruitment screener used to solicit potential participants; an example of a screener is provided in Appendix 1.

Recruited participants had a mix of backgrounds and demographic characteristics conforming to the recruitment screener. The following is a 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.

Table 1. Participants

Part ID	Gender	Age	Education	Occupation/ role	Professional Experience (Months)	Computer Experience (Months)	Product Experience (Months)	Assistive Technology Needs
001	M	60-69	Doctorate Degree	Physician	360	180	132	N/A
002	M	50-59	Doctorate Degree	Physician	264	240	240	N/A
003	W	20-29	Bachelors Degree	RN/Office Manager	96	120	96	N/A
004	W	20-29	Associates Degree	Medical Assistant	6	72	6	N/A
005	W	20-29	Associates Degree	Medical Assistant	12	72	2	N/A
006	W	30-39	Trade/Vocational	Medical Assistant	180	240	132	N/A
007	W	20-29	Trade/Vocational	CMS	60	120	60	N/A
008	W	30-39	Trade/Vocational	CMA	180	132	132	N/A
009	W	20-29	Trade/Vocational	CMA	60	84	24	N/A
010	W	20-29	Associates Degree	MA/Office Manager	120	120	96	N/A

15 participants (matching the demographics in the section on Participants) were recruited and 10 participated in the usability test. (0) participants failed to show for the study. Participants were scheduled for 60-minute sessions with 60 minutes between each session for debrief by the administrator(s) and data logger(s), and to reset systems to proper test conditions. A spreadsheet was used to keep track of the participant schedule and included each participant's demographic characteristics.

3.2 STUDY DESIGN

Overall, the objective of this test was to uncover areas where the application performed well – that is, effectively, efficiently, and with satisfaction – and areas where the application failed to meet the needs of the participants. The data from this test may serve as a baseline for future tests with an updated

version of the same EHR and/or comparison with other EHRs provided the same tasks are used. In short, this testing serves as both a means to record or benchmark current usability, but also to identify areas where improvements must be made.

During the usability test, participants interacted with the EHR. Each participant used the system over GoToMeeting in his/her location 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

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

TASKS

A number of tasks were constructed that would be realistic and representative of the kinds of activities a user might do with this HER. Tasks were selected based on the twelve ONC CEHRT2015 certification criteria. The Safety-Enhanced Design (SED) tasks for the twelve ONC CEHRT2015 certification criteria included:

Computerized Physician Order Entry (CPOE)	
CPOE Record Medications §170.315(a)(1)	Electronically record, change and access medication orders
CPOE Laboratory §170.315(a)(2)	Electronically record, change and access lab orders
CPOE Diagnostic Imaging §170.315(a)(3)	Electronically record, change and access diagnostic imaging orders

Electronic Prescribing	
Electronic Prescribing §170.315(b)(3)	Create a New Electronic Prescription
Electronic Prescribing §170.315(b)(3)	Change Electronic Prescription
Electronic Prescribing §170.315(b)(3)	Cancel Electronic Prescription
Electronic Prescribing §170.315(b)(3)	Refill an electronic prescription
Electronic Prescribing §170.315(b)(3)	Fill status of electronic prescription
Electronic Prescribing §170.315(b)(3)	Prescription history
Drug-drug, Drug-Allergy Checks for CPOE	
Drug-drug, drug-allergy checks §170.315(b)(3)	Identify interactions, view details of interaction of a drug-drug, drug-allergy interaction alert based on a patient's medication and allergy list.
Medication List	
Medication List §170.315(a)(7)	Electronically record, change and access an active medication list
Allergy List	
Medication Allergy §170.315(a)(8)	Electronically, record change and access an active allergy list and allergy history list
Problem List	
Problem List §170.315(a)(6)	Electronically, record change and access an active problem list
Implantable Device	
Implantable devices §170.315(a)(14)	Electronically, record change and access an active implantable device list
Demographics	
Demographics §170.315(a)(5)	Electronical record change and access patient demographics
Clinical Decision Support	
Clinical Decision Support §170.315(a)(9)	Address multiple CDS Interventions
Clinical Decision Support §170.315(a)(9)	Locate reference information on a CDS interventions
Clinical Decision Support §170.315(a)(9)	Address a CDS Intervention from a reconciled C-CDA

PROCEDURES

Upon arrival, participants were greeted; their identity was verified and matched with a name on the participant schedule. Participants were then assigned a participant ID. Each participant reviewed and signed an informed consent and release form (See Appendix 3).

To ensure that the test ran smoothly, two staff members participated in this test, the usability administrator, and the data logger. The usability testing staff conducting the test was an experienced user with 7 years working experience with Medical Office Online. The administrator moderated the session including administering instructions and tasks. The administrator also monitored task times, obtained post-task rating data, and took notes on participant comments. A second person served as the data logger and took notes on task success, path deviations, number and type of errors, and comments.

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

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

For each task, the participants were given the task instructions twice. Task timing began once the administrator finished reading the question. The task time was stopped once the participant indicated they had successfully completed the task. Scoring is discussed below in Section 3.9.

Following the session, the administrator gave the participant the post-test questionnaire (e.g., the System Usability Scale, see Appendix) compensated him or her for their time, and thanked each individual for their participation.

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

TEST LOCATAION

All sessions were conducted between June 30, 2018 - August 30, 2018 and were remote sessions. For these remote testing sessions, the moderator was at her personal office, the data logger documented the data from her personal office, and each participant was at his/her location.

TEST ENVIRONMENT

The EHRUT would typically be used in an ambulatory setting. Usability testing was conducted using a remote testing procedure. For the remote testing sessions, system data was not collected from participants. The participants used keyboard and mouse when interacting with the EHRUT. The remote sessions were conducted via GoToMeeting. Participants were instructed to call into an audio conference and login to a Go To Meeting session. Control of the moderator's computer was passed to the participant and sessions were moderated using the materials and methods as would be used in face-to-face sessions. All sessions were audio and video recorded.

For all sessions the study was run from an Acer ES1-512; screen resolution for the study was set at 1366 x 768; participants used their own machines with various screen sizes. Screen size for Acer is 15.5", OS: Windows 10 Professional. All participants interacted using a keyboard and a mouse when interacting with the application.

TEST FORMS AND TOOLS

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

1. Informed Consent
2. Moderator's Guides
3. Task Data Sheet

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

The participant's interaction with the EHRUT was captured and recorded using GoToMeeting recording.

PARTICIPANT INSTRUCTIONS

The administrator reads the following instructions aloud to each participant (also see the full moderator's guide in Appendix [4]):

Thank you for participating in this study. Your input is very important. Our session today will last about 60 minutes. During that time, you will use an instance of an electronic health record. I will ask you to complete a few tasks using this system and answer some questions. 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.

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

Overall, we are interested in how easy (or how difficult) this system is to use, what in it would be useful to you, and how we could improve it. Please be honest with your opinions. 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 as their first task, were given 10 minutes to explore the system and make comments. Once this task was complete, the administrator gave the following instructions:

For each task, I will read the description to you and say "Begin." At that point, please perform the task and say "Done" once you believe you have successfully completed the task. I would like to request that you not talk aloud or verbalize while you are doing the tasks. I will ask you your impressions about the task once you are done.

Participants were then given various tasks to complete. Tasks are listed in the moderator's guide in Appendix 4.

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 Medical Office Online by measuring participant success rates and errors.
2. Efficiency of Medical Office Online by measuring the average task time and path deviations.
3. Satisfaction with Medical Office Online by administering the System Usability Scale (SUS).

DATA SCORING

The following table (Table 3) details how tasks were scored, errors evaluated, and the time data analyzed.

Table 3. Details of how observed data were scored.

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>A task was counted as a “Completed with difficulty” if the participant received administrator help with navigation to the screen directly related to the certification criteria.</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>Optimal task performance time, as benchmarked by expert performance under realistic conditions, was recorded when constructing tasks. Target task times were derived by multiplying a benchmarked expert performance by a factor of 2.0, allowing some time buffer because the participants are not trained to</p>

	<p>expert performance. Thus, if expert, optimal performance on a task was 10 seconds then allotted task time performance was $10 * 2.0$ seconds. This ratio should be aggregated across tasks and reported</p> <p>with mean and variance scores.</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>
Effectiveness: Task Failures	<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>
Efficiency: Task Deviations	<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. Optimal paths (i.e., procedural steps) were recorded when constructing tasks.</p>
Efficiency: Task Time	<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>

Satisfaction: Task Rating	<p>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.</p> <p>To measure participants' confidence in and likeability of the EHR 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.</p>
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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 Analysis. No data was excluded from the results.

The usability testing results for Medical Office Online, Inc. EHER are detailed in the sections below. The results should be seen in light of the objectives and goals outlined in the Study Design section. The data should yield actionable results that, if corrected, yield material, positive impact on user performance.

Criteria 170.315(a)(1) CPOE - Medications

Data Analysis and Reporting

Table 4: CPOE Medications results

Task Description	Task Success - Mean (%)	Task Success - Standard Deviation (%)	Task Path Deviation - Observed #	Task Path Deviation - Optimal #	Task Time - Mean (seconds)	Task Time - Standard Deviation (seconds)	Task Time Deviation - Mean Observed Seconds	Task Time Deviation - Mean Optimal Seconds
CPOE Record Medications	100	0	3	3	38	0	40	40
CPOE Access and change Medications	100	0	4	3	36	4	32	25
Task Errors Mean(%)	Task Errors - Standard Deviation (%)	Task Rating - Scale Type	Task Rating	Task Rating - Standard Deviation				
0	0	Likert	5	0				
0	0	Likert	5	0				

Task Description	Task Success - Mean (%)	Task Success - Standard Deviation (%)	Task Path Deviation - Observed #	Task Path Deviation - Optimal #	Task Time - Mean (seconds)	Task Time - Standard Deviation (seconds)	Task Time Deviation - Mean Observed Seconds	Task Time Deviation - Mean Optimal Seconds	Task Errors Mean(%)	Task Errors - Standard Deviation (%)	Task Rating - Scale Type	Task Rating	Task Rating - Standard Deviation
CPOE Record Medications	100	0	3	3	38	0	40	40	0	0	Likert	5	0
CPOE Access and change Medications	100	0	4	3	36	4	32	25	0	0	Likert	5	0

Discussion of Findings

Participants were given the following CPOE-Medication tasks:

- Record a new medication order (A1.1)

- Change an existing medication order (A1.2)

EFFECTIVENESS

RECORD A NEW MEDICATION ORDER

The success for this task was 100%. Participants were easily able to order a medication.

CHANGE AN EXISTING MEDICATION ORDER

The success score for this task was 100%. All participants completed the task.

EFFICIENCY

RECORD A NEW MEDICATION ORDER

All participants completed the tasks within the optimal time and optimal steps.

CHANGE AN EXISTING MEDICATION ORDER

All participants completed the tasks within the optimal time. One participant did not use the optimal steps.

SATISFACTION

Satisfaction levels were rated at the system level and at a scenario level. Average satisfaction rating for CPOE medication was rated an average of 5 with 5 being easy and 1 being difficult.

MAJOR FINDINGS

Medication orders were completed quickly. There are multiple ways to complete a medication order, users were familiar and comfortable with the feature and workflow.

AREAS FOR IMPROVEMENT

Education for users on prescription favorites list is needed, which will optimize time and workflow. Consider adding instruction videos or helpful hints for the user.

[Criteria 170.315\(a\)\(2\) CPOE - Laboratory](#)

Data Analysis and Reporting

Table 5: CPOE Laboratory results

Task Description	Task Success - Mean (%)	Task Success - Standard Deviation (%)	Task Path Deviation - Observed #	Task Path Deviation - Optimal #	Task Time - Mean (seconds)	Task Time - Standard Deviation (seconds)	Task Time Deviation - Mean Observed Seconds	Task Time Deviation - Mean Optimal Seconds
CPOE Record Labs	90	0	3	3	52	3	35	30
CPOE Access and change Labs	90	0	3	3	58	2	32	25

Task Errors Mean(%)	Task Errors - Standard Deviation (%)	Task Rating - Scale Type	Task Rating	Task Rating - Standard Deviation
10	0	Likert	5	0
10	0	Likert	4.9	0

Discussion of Findings

Participants were given the following CPOE-Laboratory tasks:

- Create a new laboratory order (A2.1)
- Change an existing laboratory order (A2.2)

EFFECTIVENESS

RECORD A NEW LABORATORY ORDER

The success score for this task was 90%. All participants completed the task, but one participant had difficulty.

CHANGE AN EXISTING LABORATORY ORDER

The success score for this task was 90%. All participants completed the task, but one participant had difficulty.

EFFICIENCY

RECORD A NEW LABORATORY ORDER

All participants completed this task using the optimal steps. One participant did not complete the task in the optimal time.

CHANGE AN EXISTING LABORATORY ORDER

All participants completed this task using the optimal steps. One participant did not complete the task in the optimal time.

SATISFACTION

Satisfaction levels were rated at the system level and at a scenario level. Average satisfaction rating for CPOE laboratory was a 5 with 5 being easy and 1 being difficult. The average score for changing a laboratory order was 4.9 with 5 being very easy and 1 being difficult.

MAJOR FINDINGS

From the 10 participants, 1 participant expressed difficulty locating existing orders for patients due to the many links on the page. This participant also noted that they do not place laboratory orders in their practice.

AREAS FOR IMPROVEMENT

No significant areas of improvement were identified.

[Criteria 170.315\(a\)\(3\) CPOE – Diagnostic Imaging](#)

Data Analysis and Reporting

Table 6: CPOE Diagnostic Imaging results

Task Description	Task Success - Mean (%)	Task Success - Standard Deviation (%)	Task Path Deviation - Observed #	Task Path Deviation - Optimal #	Task Time - Mean (seconds)	Task Time - Standard Deviation (seconds)	Task Time Deviation - Mean Observed Seconds	Task Time Deviation - Mean Optimal Seconds
CPOE Record Diagnostic Imaging	100	0	3	3	36	4	32	25
CPOE Access and change Diagnostic Imaging	100	0	3	3	32	4	32	25
Task Errors Mean(%)	Task Errors - Standard Deviation (%)	Task Rating - Scale Type	Task Rating	Task Rating - Standard Deviation				
10	0	Likert	5	0				
10	0	Likert	4.7	0				

Discussion of Findings

Participants were given the following CPOE-Diagnostic Imaging tasks:

- Create a new diagnostic order (A3.1)
- Change an existing diagnostic order (A3.2)

EFFECTIVENESS

RECORD A NEW DIAGNOSTIC ORDER

The success score of this task was 100%. Participants found it easy to complete the task.

CHANGE AN DIAGNOSITC ORDER

The success score of this task was 100%. Participants found it easy to complete the task.

EFFICIENCY

RECORD A NEW DIAGNOSTIC ORDER

Participants completed the task within the optimal time and optimal steps.

CHANGE AN EXISTING DIAGNOSTIC ORDER

Participants completed the task within the optimal time and optimal steps.

SATISFACTION

Satisfaction levels were rated at the system level and at a scenario level. Overall system satisfaction for CPOE Diagnostic Imaging was 5. CPOE - change a diagnostic image order was 4.7.

MAJOR FINDINGS

Some participants were not familiar with the shortcuts available to edit or change an existing order.

AREAS FOR IMPROVEMENT

On screen education could help users that were unfamiliar with the process.

Criteria 170.315(a)(7) Medication List

Data Analysis and Reporting

Table 7: Medication List

Task Description	Task Success - Mean (%)	Task Success - Standard Deviation (%)	Task Path Deviation - Observed #	Task Path Deviation - Optimal #	Task Time - Mean (seconds)	Task Time - Standard Deviation (seconds)	Task Time Deviation - Mean Observed Seconds	Task Time Deviation - Mean Optimal Seconds
Access and record Medication List	90	0	3	3	36	3	36	25
Change Medication List	90	0	3	3	46	2	36	30
Task Errors Mean(%)	Task Errors - Standard Deviation (%)	Task Rating - Scale Type	Task Rating	Task Rating - Standard Deviation				
10	0	Likert	5	0				
10	0	Likert	5	0				

Discussion of Findings

Participants were given the following Medication List tasks:

- Access active Medication List and add new medication (A7.1)
- Change a Medication in the Medication List (A7.2)

EFFECTIVENESS

ACCESS AND ADD NEW MEDICATION TO ACTIVE MEDICATION LIST

The success for this task is 100%. All participants successfully accessed and added a new medication to the active medication list.

CHANGE AN EXISTING MEDICATION IN ACTIVE MEDICATION LIST

The success for this task was 90%. All participants completed the task, one participant did not take the optimal path.

EFFICIENCY

ACCESS AND ADD NEW MEDICATION TO ACTIVE MEDICATION LIST

All participants were able to complete the task within the optimal time and optimal path.

CHANGE AN EXISTING MEDICATION IN ACTIVE MEDICATION LIST

All patients completed the task, one patient did not take the optimal path but did complete the task within the optimal time.

SATISFACTION

Satisfaction levels were rated at the system level and at a scenario level. Overall system satisfaction for these tasks were an average 5.

MAJOR FINDINGS

There is more than one path to access, add and change a medication. Participants that did not use the optimal path used other paths to complete the tasks.

AREAS FOR IMPROVEMENT

No areas of improvement were identified

Criteria 170.315(a)(8) Medication Allergy

Data Analysis and Reporting

Table 8: Medication Allergy

Task Description	Task Success - Mean (%)	Task Success - Standard Deviation (%)	Task Path Deviation - Observed #	Task Path Deviation - Optimal #	Task Time - Mean (seconds)	Task Time - Standard Deviation (seconds)	Task Time Deviation - Mean Observed Seconds	Task Time Deviation - Mean Optimal Seconds
Access and add Medication Allergy	100	0	3	3	21	2	20	15
Change Medication Allergy List	100	0	3	3	23	0	20	20
Task Errors Mean(%)	Task Errors - Standard Deviation (%)	Task Rating - Scale Type	Task Rating	Task Rating - Standard Deviation				
0	0	Likert	5	0				

0 0 Likert 5 0

Discussion of Findings

Participants were given the following Medication Allergy tasks:

- Access active Medication Allergy List and add a new allergy (A8.1)
- Change existing Medication Allergy List (A8.2)

EFFECTIVENESS

ACCESS AND ADD NEW MEDICATION ALLERGY TO ACTIVE MEDICATION ALLERGY LIST

The task success score was 100%. Participants were easily able to access and add a patient's active medication allergies.

CHANGE AN EXISTING MEDICATION ALLERGY

The task success score was 100%. Participants were easily able to change a patients existing medication allergy list.

EFFICIENCY

ACCESS AND ADD NEW MEDICATION ALLERGY TO ACTIVE MEDICATION ALLERGY LIST

All participants completed this task within the optimal number of steps and within the optimal time.

CHANGE AN EXISTING MEDICATION ALLERGY

All participants completed this task within the optimal number of steps and within the optimal time.

SATISFACTION

Satisfaction levels were rated at the system level and at a scenario level. Overall system satisfaction for these tasks were an average 5.

MAJOR FINDINGS

No major usability issues were found while testing the usability of this function.

AREAS FOR IMPROVEMENT

No areas of improvement were identified

[Criteria 170.315\(b\)\(3\) Electronic Prescribing](#)

Data Analysis and Reporting

Table 9: Electronic Prescribing

Task Description	Task Success - Mean (%)	Task Success - Standard Deviation (%)	Task Path Deviation - Observed #	Task Path Deviation - Optimal #	Task Time - Mean (seconds)	Task Time - Standard Deviation (seconds)	Task Time - Mean Deviation - Observed Seconds	Task Time - Mean Deviation - Optimal Seconds

Create a New Electronic Prescription	100	0	4	4	32	0	35	35
Send an electronic prescription cancellation	70	0	3	3	53	4	45	45
Check the fill status and process refill request electronically	90	0	3	3	38	2	32	30
Process electronic prescription change request	90	0	4	3	49	4	45	45
Request/Receive prescription history electronically	90	0	3	3	45	6	36	20
Task Errors Mean(%)	Task Errors - Standard Deviation (%)	Task Rating - Scale Type	Task Rating	Task Rating - Standard Deviation				
0	0	Likert	5	0				
30	0	Likert	4.7	0				
10	0	Likert	4.9	0				
10	0	Likert	4.2	0				
10	0	Likert	4.7	0				

Discussion of Findings

Participants were given the following electronic prescribing tasks:

- Create a New Electronic Prescription (B3.1)
- Send an electronic prescription cancellation (B3.2)
- Check the fill status and process refill request electronically (B3.3)
- Process electronic prescription change request (B3.4)
- Request/Receive prescription history electronically (B.5)

EFFECTIVENESS

CREATE AND SEND NEW ELECTRONIC PRESCRIPTION

The success score for this task was 100%. All participants were able to create a new electronic prescription successfully.

SEND AN ELECTRONIC PRESCRIPTION CANCELLATION TO THE PHARMACY

The success for this task was 70%. Three of the participants that did not use e-prescribe functions frequently therefore they were unsure how to complete this task. Those three participants completed the task with difficulty.

CHECK FILL STATUS AND PROCESS REFILL REQUEST ELECTRONICALLY

The success score for this task was 90%. One participant was not familiar with the refill process.

PROCESS AN ELECTRONIC PRESCRIPTION CHANGE REQUEST

The success score for this task was 90%. One participant that did not use e-prescribe functions frequently.

REQUEST/RECEIVE PRESCRIPTION HISTORY ELECTRONICALLY

The success score for this task was 90%. One participant was not familiar with this functionality.

EFFICIENCY

CREATE AND SEND A NEW ELECTRONIC PRESCRIPTION

All participants completed this task in the optimal time and within the optimal number of steps.

SEND AN ELECTRONIC PRESCRIPTION CANCELLATION TO THE PHARMACY

All participants completed this task in the optimal time. Three participants did not complete the task using the optimal path.

CHECK FILL STATUS AND PROCESS REFILL REQUEST ELECTRONICALLY

Three participants did not complete this task in the optimal time, however they did complete the task using the optimal number of steps.

PROCESS AN ELECTRONIC PRESCRIPTION CHANGE REQUEST

All participants completed this task in the optimal time. Three participants did not complete the task using the optimal path.

REQUEST/RECEIVE PRESCRIPTION HISTORY ELECTRONICALLY

One participant did not complete this task using the optimal time. All participants completed the task using the optimal path.

SATISFACTION

Satisfaction levels were rated at the system level and at a scenario level. Overall system satisfaction for each E-prescribe task was 4.7. Some features were new and unfamiliar to some users.

MAJOR FINDINGS

- Some participants were unaware of the availability to retrieve patient's prescription history.
- Participants were unsure of the change request feature.
- Most participants were aware of the short cut to refill a prescription

AREAS FOR IMPROVEMENT

- Ensure clinicians and their clinical staff have accessible training for new e-prescribe features within the software.

- Ensure clinicians and their clinical staff are aware of existing features available to them.

Criteria 170.315(a)(4) Drug-Drug, Drug-Allergy Interactions Checks

Data Analysis and Reporting

Table 10: Drug-drug, drug-allergy interaction checks

Task Description	Task Success - Mean (%)	Task Success - Standard Deviation (%)	Task Path Deviation - Observed #	Task Path Deviation - Optimal #	Task Time - Mean (seconds)	Task Time - Standard Deviation (seconds)	Task Time Deviation - Mean Observed Seconds	Task Time Deviation - Mean Optimal Seconds
Drug-drug interaction alert check	90	0	5	3	46	3	40	35
Drug – Allergy interaction alert check	100	0	4	4	45	3	45	40
Task Errors Mean(%)	Task Errors - Standard Deviation (%)	Task Rating - Scale Type	Task Rating	Task Rating - Standard Deviation				
10	0	Likert	5	0				
0	0	Likert	4.9	0				

Discussion of Findings

Participants were given the following drug-drug/drug-allergy tasks:

- Identify a high drug-drug interaction alert (A4.1)
- Identify a drug-allergy interaction alert (A4.2)

EFFECTIVENESS

IDENTIFY A HIGH DRUG-DRUG ALERT

The success score for this task was 90%. Participants were able to identify and process the interaction alert.

IDENTIFY A DRUG-ALLERGY ALERT

The success score for this task was 100%. Participants were able to identify and process the interaction alert.

EFFICIENCY

IDENTIFY A HIGH DRUG-DRUG ALERT

All participants completed the task within the optimal time. Two participants did not complete the task using the optimal steps.

IDENTIFY A DRUG-ALLERGY ALERT

All participants completed the task in the optimal time and using the optimal steps.

SATISFACTION

Satisfaction levels were rated at the system level and at a scenario level. Overall for both drug-drug and drug-allergy tasks were 5.

MAJOR FINDINGS

Users that do not use this part of the software often completed the task with difficulty they switched screens to location the warning or alert, which was not needed.

AREAS FOR IMPROVEMENT

Education is needed on the different on-screen alerts that are available.

Criteria 170.315(a)(9) Clinical Decision Support

Data Analysis and Reporting

Table 11: Clinical Decision Support

Task Description	Task Success - Mean (%)	Task Success - Standard Deviation (%)	Task Path Deviation - Observed #	Task Path Deviation - Optimal #	Task Time - Mean (seconds)	Task Time - Standard Deviation (seconds)	Task Time Deviation - Mean Observed Seconds	Task Time Deviation - Mean Optimal Seconds
Access, Identify and Process CDS Interventions	100	0	3	3	51	3	36	30
Access, Identify and Process CDS interventions with reference information	90	0	3	3	51	4	40	35
Access, Identify and Process CDS interventions generated by a reconciled C-CDA	90		3	3	51	4	45	40
Task Errors Mean(%)	Task Errors - Standard Deviation (%)	Task Rating - Scale Type	Task Rating	Task Rating - Standard Deviation				

0	0	Likert	4.7	0
10	0	Likert	4.7	0
10	0	Likert	4.7	0

Discussion of Findings

Participants were given the following CDS tasks:

- Access, Identify and Process CDS Interventions (A9.1)
- Access, Identify and Process CDS interventions with reference information (A9.2)
- Access, Identify and Process CDS interventions generated by a reconciled C-CDA (A9.3)

EFFECTIVENESS

ACCESS, IDENTIFY AND PROCESS CDS INTERVENTIONS

The success score for this task was 100%.

ACCESS, IDENTIFY AND PROCESS CDS INTERVENTIONS WITH REFERENCE INFORMATION

The success score for this task was 80%. Two participants had difficulty locating the reference information on the CDS Intervention.

ACCESS, IDENTIFY AND PROCESS CDS INTERVENTION FROM A RECONCILED C-CDA

The success score for this task was 90%. One participant had difficulty identifying a CDS intervention from a reconciled CDA.

EFFICIENCY

ACCESS, IDENTIFY AND PROCESS CDS INTERVENTIONS

All participants completed this task within the optimal time and using the optimal path.

ACCESS, IDENTIFY AND PROCESS CDS INTERVENTIONS WITH REFERENCE INFORMATION

All participants completed this task within the optimal time. Two participants did not use the optimal path to complete this task.

ACCESS, IDENTIFY AND PROCESS CDS INTERVENTION FROM A RECONCILED C-CDA

All participants completed this task within the optimal time. One participant did not use the optimal path to complete this task.

SATISFACTION

Satisfaction levels were rated at the system level and at a scenario level. Overall satisfaction for these tasks was an average of 4.7. Participants were satisfied at the ease of locating and processing an active intervention, although some participants were not confident in locating the reference information, this is a new feature and users were excited to see the new features added to the CDS intervention.

MAJOR FINDINGS

- Consider enlarging reference information on CDS.
- Consider highlighting CDA information from a reconciled CCD.

Criteria 170.315(a)(5) Demographics

Data Analysis and Reporting

Table 12: Demographics

Task Description	Task Success - Mean (%)	Task Success - Standard Deviation (%)	Task Path Deviation - Observed #	Task Path Deviation - Optimal #	Task Time - Mean (seconds)	Task Time - Standard Deviation (seconds)	Task Time Deviation - Mean Observed Seconds	Task Time Deviation - Mean Optimal Seconds
Access and record demographics	100	0	4	3	24	0	30	30
Change demographics	100	0	4	3	26	0	30	30
Task Errors Mean(%)	Task Errors - Standard Deviation (%)	Task Rating - Scale Type	Task Rating	Task Rating - Standard Deviation				
0	0	Likert	5	0				
0	0	Likert	5	0				

Discussion of Findings

Participants were given the following demographic tasks:

- Access and record demographics (A5.1)
- Change Demographics (A5.2)

EFFECTIVENESS

ACCESS AND RECORD DEMOGRAPHICS

Success score for this task was 100%. All participants were able to access and record demographics.

CHANGE DEMOGRAPHICS

Success score for this task was 100%. All participants were able to access previous entered demographics and change the data.

EFFICIENCY

ACCESS AND RECORD DEMOGRAPHICS

All participants completed the tasks within the optimal time and part two participants did not use the optimal path.

CHANGE DEMOGRAPHICS

All participants completed the tasks within the optimal time, two participants did not use the optimal path.

SATISFACTION

Satisfaction levels were rated at the system level and at a scenario level. Overall satisfaction for these tasks was 5. Participants accessed the new features without difficulty. Participants were excited to see new fields to record specifics like sexual orientation.

MAJOR FINDINGS

No areas of improvement were identified.

Criteria 170.315(a)(6) Problem List

Data Analysis and Reporting

Table 13: Problem List

Task Description	Task Success - Mean (%)	Task Success - Standard Deviation (%)	Task Path Deviation - Observed #	Task Path Deviation - Optimal #	Task Time - Mean (seconds)	Task Time - Standard Deviation (seconds)	Task Time Deviation - Mean Observed Seconds	Task Time Deviation - Mean Optimal Seconds
Access and record Problem List	90	0	4	3	63	3	45	35
Change Problem List	90	0	4	3	68	2	50	35
Task Errors Mean(%)	Task Errors - Standard Deviation (%)	Task Rating - Scale Type	Task Rating	Task Rating - Standard Deviation				
10	0	Likert	4.7	0				
10	0	Likert	4	0				

Discussion of Findings

Participants were given the following problem list tasks:

- Access and record a new problem (A6.1)
- Change a problem on the existing problem list (A6.2)

EFFECTIVENESS

ACCESS AND RECORD A NEW PROBLEM

The success score for this task was 90%. Participants were able to locate and record a new problem.

CHANGE PROBLEM LIST

The success score for this task was 900%. Participants were able to locate and change a problem.

EFFICIENCY

ACCESS AND RECORD PROBLEM LIST

All participants completed this task within the optimal time. One participant did not complete the task within the optimal steps.

CHANGE PROBLEM LIST

All participants completed this task within the optimal time. One participant did not complete the task within the optimal steps.

SATISFACTION

Satisfaction levels were rated at the system level and at a scenario level. Overall satisfaction for these tasks were rated at a 4.4

MAJOR FINDINGS

- Participants were not aware they could click on link and access the problem list quickly.
- Participants were not familiar with SNOMED codes but curious to what they will be used for.
- Participants expressed frustration with the ability to search for problems quickly.

AREAS FOR IMPROVEMENT

- Create a search field to allow clinicians and their staff to quickly search for problems.
- Education on the use of SNOMED codes.

[Criteria 170.315\(a\)\(14\) Implantable Devices](#)

Data Analysis and Reporting

Table 13: Implantable Devices

Task Description	Task Success - Mean (%)	Task Success - Standard Deviation (%)	Task Path Deviation - Observed #	Task Path Deviation - Optimal #	Task Time - Mean (seconds)	Task Time - Standard Deviation (seconds)	Task Time Deviation - Mean Observed Seconds	Task Time Deviation - Mean Optimal Seconds
Access and record implantable device	100	0	4	3	33	4	40	40
Change Implantable device	100	0	4	3	36	2	32	30

Task Errors Mean(%)	Task Errors - Standard Deviation (%)	Task Rating - Scale Type	Task Rating	Task Rating - Standard Deviation
0	0	Likert	4.9	0
0	0	Likert	4.9	0

Discussion of Findings

Participants were given the following implantable device list tasks:

- Access and record an implantable device (A14.1)
- Change an existing implantable device (A14.2)

EFFECTIVENESS

ACCESS AND RECORD AN IMPLANTABLE DEVICE

The success score for this task was 100%. Although this is a new feature, participants were easily able to access and record a new implantable device.

CHANGE AN EXISTING IMPLANTABLE DEVICE

The success score for this task was 100%. Some participants had no experience in how to change a status, but all participants completed the task.

EFFICIENCY

ACCESS AND RECORD AN IMPLANTABLE DEVICE

All participants completed the task within the optimal time. Two participants did not complete the task using the optimal steps, this was not counted as an error.

CHANGE AN EXISTING IMPLANTABLE DEVICE

All participants completed the task within the optimal time.

SATISFACTION

Satisfaction levels were rated at the system level and at a scenario level. Overall satisfaction for these tasks was a 5.

MAJOR FINDINGS

No major findings were found while testing this function.

AREAS FOR IMPROVEMENT

Training is needed to familiarize users with the new implantable device feature.

Overall Results

Overall areas for improvement recurred throughout the usability study. These were in addition to the specific findings in features above.

There was a lack of awareness for existing functionality that could improve clinical work flow. This was an indication that updated training manuals need to be accessible within the workflow. This area of improvement could reduce click counts and enhance efficiency for clinicians.

The user-centered design and usability testing process identified opportunities to enhance user experience. Some instructional features have been implemented. These new instructional features include on-screen instructions for the new process. We have refined data entry processes for clinical work flow by creating on screen notifications in many areas. We are continually revisiting new and existing features and looking for ways to improve user experience.

APPENDICES

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

- 1: Recruiting screener
- 2: Participant demographics
- 3: Informed Consent Form
- 4: Moderator's Guide/Task Reports
- 5: System Usability Scale Questionnaire

Appendix 1: RECRUITING SCREENER

Recruiting Script

Hello, my name is _____, calling from *Medical Office Online*. We are recruiting individuals to participate in a usability study for an electronic health record. We would like to ask you a few questions to see if you qualify and if you would like to participate. This should only take a few minutes of your time. This is strictly for research purposes.

Can I ask you a few questions?

1. Have you participated in a focus group or usability test in the past 12 months? [If yes, Terminate]
2. Do you, or does anyone in your home, work in marketing research, usability research, web design [...etc.]? [If yes, Terminate]
3. Do you, or does anyone in your home, have a commercial or research interest in an electronic health record software or consulting company? [If yes, Terminate]
4. Which of the following best describes your age? [23 to 39; 40 to 59; 60 - to 74; 75 and older] [Recruit Mix]
5. Which of the following best describes your race or ethnic group? [e.g., Caucasian, Asian, Black/African-American, Latino/a or Hispanic, etc.]
6. Do you require any assistive technologies to use a computer? [if so, please describe]

Professional Demographics

7. What is your current position and title? (Must be healthcare provider)
 - ☐ RN: Specialty ____
 - ☐ Physician: Specialty ____
 - ☐ Resident: Specialty ____
 - ☐ Administrative Staff
 - ☐ Other [Terminate]
8. How long have you held this position?

9. Describe your work location (or affiliation) and environment? (Recruit according to the intended users of the application) [e.g., private practice, health system, government clinic, etc.]
10. Which of the following describes your highest level of education? [e.g., high school graduate/GED, some college, college graduate (RN, BSN), postgraduate (MD/PhD), other (explain)]

Computer Expertise

11. Besides reading email, what professional activities do you do on the computer? [e.g., access EHR, research; reading news; shopping/banking; digital pictures; programming/word processing, etc.] [If no computer uses at all, Terminate]
12. About how many hours per week do you spend on the computer? [Recruit according to the demographics of the intended users, e.g., 0 to 10, 11 to 25, 26+ hours per week]
13. What computer platform do you usually use? [e.g., Mac, Windows, etc.]
14. What Internet browser(s) do you usually use? [e.g., Firefox, IE, AOL, etc.]
15. In the last month, how often have you used an electronic health record?
16. How many years have you used an electronic health record?
17. How many EHRs do you use or are you familiar with?

Contact Information *If the person matches your qualifications, ask*

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

Would you be able to participate during 6/29/2018 – 7/30/2018? If so collect contact information]

May I get your contact information?

- Name of participant:
- Address:
- City, State, Zip:
- Daytime phone number:
- Email Address

Before your session starts, we will ask you to sign a release form allowing us to record your session via GoToMeeting. The recording will only be used internally for further study if needed.

Will you consent to be recorded?

This study will take place remotely. I will confirm your appointment a couple of days before your session and provide you with directions to access the web/ex conference. What time is the best time to reach you?

Appendix 2: PARTICIPANT DEMOGRAPHICS

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

Gender

Men	[2]
Women	[8]
Total (participants)	[10]

Occupation/Role

RN/BSN	[1]
Physician	[2]
Staff	[7]
Total (participants)	[10]

Years of Experience

Years' experience (Facility Use of EHR)	Range	1-11
All paper	0	
Some paper, some electronic	2	
All electronic	8	
Total (participants)	10	

Appendix 3: INFORMED CONSENT FORM

Informed Consent

Medical Office Online 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 40 minutes.

Agreement

I understand and agree that as a voluntary participant in the present study conducted by *Medical Office Online* I am free to withdraw consent or discontinue participation at any time. I understand and agree to participate in the usability study conducted and recorded using Web/Ex.

I understand and consent to the use and release of the recording by Medical Office Online. I understand that the information and recordings are for research purposes only and that my name and image will not be used for any purpose other than research. I relinquish any rights to the recording and understand the recording may be copied and used by Medical Office Online without further permission.

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

I understand and agree that the data collected from this study may be shared outside of *Medical Office Online*. 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: Example MODERATOR'S GUIDE

Thank you for participating in this study. Your feedback will help us to continue to improve the efficiency and usability of our software. Our session today will last approximately 40 minutes. During this time, you will look at portions of our electronic health record system highlighted by the requirements for ONC certification.

Before we begin, I want to make it clear that we are testing the *system*, not you. You can't do anything wrong here. In fact, this is probably the one place where you don't have to worry about making mistakes.

I will ask you to complete a few tasks using this system and answer some questions. You will be asked to complete these tasks on your own trying to do them as quickly as possible with the fewest possible deviations. Do not do anything more than asked. We strive to learn how easy (or how difficult) our system is to use and how we could improve it.

We are interested in how you use the system without assistance, so if you get lost or have difficulty, I cannot help you during the session. However, I will clarify any confusion you may have with the tasks themselves, and I will try to answer any questions you still have when we're done.

Please save your detailed comments until the end of a task or the end of the session when we can discuss freely. What you think is very important to us, whether good or bad, so please be honest with your opinions.

The version of the product you will be using today is a pre-release version. Some of the data may not make sense as it is placeholder data.

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

Do you have any questions or concerns?

TASK ORIENTATION

Moderator reads the below aloud:

We will now begin the tasks. After the instructions have been read, I will say “please begin”. At that time please attempt to complete the task. Once you have completed the task (or attempted to complete the task) please say “done”. Remember, we are testing the usability of the system so don’t worry if you are unable to complete the task.

Are you ready to begin?

Tasks

Moderator reads, and data logger scores the tasks.

Final Questions

Moderator reads the below aloud:

That was the last task, we would now like you to answer some questions about the system.

System Usability Scale (SUS)

Moderator reads the below aloud:

We would now like you to complete a system usability scale questionnaire to help us assess the system’s overall usability. I’m emailing you the questionnaire. Please forward it back to us upon completion.

Incentive Distribution

Moderator reads the below aloud:

We will now be sending the incentive payment to your address.

Conclusion

Moderator reads the below aloud:

That concludes our session, thank you for participating.

Moderator terminates GoToMeeting session.

Task Sheets

Clinical task (CPOE) Labs (A2.1)

Order a lab test for patient David Brown, using CPT 83036, with any diabetes ICD10 diagnosis code. Submit order/Save order

Success:

- Easily completed.
- Completed with difficulty.
- Not completed.

Comments:

Expected paths:

1. Successfully generate new lab test.
2. Successfully locate the correct codes from the list.
3. Successfully save and submit order.

Moderator observations/comments:

Tasks/questions:

On a scale of 1 to 5, with 5 being very easy and 1 being very difficult, how would you rate the ease of difficulty of this task. Do you find this feature helpful for your practice? Do you have any suggestions to make this task more user friendly?

Task

Clinical task (CPOE) Edit labs (A2.2)

Retrieve past lab test order for Sally Pal. Change the diagnosis code from 250.00 to 250.01. Save the changes and reprint order.

Success:

- Easily completed.
- Completed with difficulty.
- Not completed.

Comments:

Expected paths:

1. Successfully retrieve a past lab.
2. Successfully change the ICD code.
3. Successfully save and close.

Moderator observations/comments:

Tasks/questions:

On a scale of 1 to 5, with 5 being very easy and 1 being very difficult, how would you rate the ease of difficulty of this task. Do you find this feature helpful for your practice? Do you have any suggestions to make this task more user friendly?

Task**Clinical task (CPOE) Diagnostic Imaging (A3.1)**

Create a new special test order for patient David Brown, select CPT 77066 use any diagnosis code of your choice. Save the order.

Success:

- Easily completed.
- Completed with difficulty.
- Not completed.

Comments:**Expected path:**

1. Successfully open the order.
2. Successfully complete required fields.
3. Successfully save and close.

Moderator observations/comments:**Task/questions:**

On a scale of 1 to 5, with 5 being very easy and 1 being very difficult, how would you rate the ease of difficulty of this task. Do you find this feature helpful for your practice? Do you have any suggestions to make this task more user friendly?

Task**Clinical task (CPOE) Edit Diagnostic Imaging order (A3.2)**

Retrieve Special test order for David Brown, change the CPT from 73620 to 73610. Save and close the order.

Success:

- Easily completed.
- Completed with difficulty.
- Not completed.

Comments:

Expected Path:

1. Successfully locate previous lab order.
2. Successfully change the CPT code.
3. Successfully save the order.

Moderator observations/comments:

Tasks/Questions:

On a scale of 1 to 5, with 5 being very easy and 1 being very difficult, how would you rate the ease of difficulty of this task. Do you find this feature helpful for your practice? Do you have any suggestions to make this task more user friendly?

Task

Clinical Task (CPOE) Medication (A1.1)

Using patient David Brown, retrieve and access patient's medication list and add order for Lisinopril 10 mg, once a day.

Success:

- Easily completed.
- Completed with difficulty.
- Not completed.

Comments:

Expected Path:

1. Successfully access patient's medication list.
2. Successfully locate medication.
3. Successfully add medication order.

Moderator observations/comments:

Tasks/questions:

On a scale of 1 to 5, with 5 being very easy and 1 being very difficult, how would you rate the ease of difficulty of this task. Do you find this feature helpful for your practice? Do you have any suggestions to make this task more user friendly?

Task

Clinical Task (CPOE) Edit Medication (A1.2)

Using patient David Brown, retrieve and access patient's medication order and change Lisinopril 10 mg, once a day to Lisinopril 20 mg once a day.

Success:

- Easily completed.
- Completed with difficulty.
- Not completed.

Comments:

Expected Path:

1. Successfully access patient's medication list.
2. Successfully locate medication order
3. Successfully edit medication order.

Moderator observations/comments:

Tasks/questions:

On a scale of 1 to 5, with 5 being very easy and 1 being very difficult, how would you rate the ease of difficulty of this task. Do you find this feature helpful for your practice? Do you have any suggestions to make this task more user friendly?

Task**Clinical Task Medication List (A7.1)**

Using patient David Brown, retrieve patient's medication list add Metformin 500 mg daily to his medication list.

Success:

- Easily completed.
- Completed with difficulty.
- Not completed.

Comments:

Expected Path:

1. Successfully access patient's medication list.
2. Successfully locate medication.
3. Successfully add medication to medication list.

Moderator observations/comments:

Tasks/questions:

On a scale of 1 to 5, with 5 being very easy and 1 being very difficult, how would you rate the ease of difficulty of this task. Do you find this feature helpful for your practice? Do you have any suggestions to make this task more user friendly?

Task

Clinical Task Edit Medication List (A7.2)

Using patient David Brown, retrieve patient's medication list change the Metformin 500 mg daily in his medication list to Metformin 1000 mg daily.

Success:

- Easily completed.
- Completed with difficulty.
- Not completed.

Comments:

Expected Path:

1. Successfully access patient's medication list.
2. Successfully removed Metformin 500 mg.
3. Successfully add Metformin 1000mg to medication list.

Moderator observations/comments:

Tasks/questions:

On a scale of 1 to 5, with 5 being very easy and 1 being very difficult, how would you rate the ease of difficulty of this task. Do you find this feature helpful for your practice? Do you have any suggestions to make this task more user friendly?

Task**Clinical Task Electronic Prescribing (Order and transmit) (B3.1)**

Using patient David Brown, order a new prescription for Lisinopril 10 mg once a day, attempt to send electronic prescription to pharmacy on file.

Success:

- Easily completed.
- Completed with difficulty.
- Not completed.

Comments:**Expected Path:**

1. Successfully access Eprescribe.
2. Successfully locate medication in drug search.
3. Successfully enter and complete required fields.
4. Attempt to transmit order to pharmacy.

Moderator observations/questions:**Tasks/questions:**

On a scale of 1 to 5, with 5 being very easy and 1 being very difficult, how would you rate the ease of difficulty of this task. Do you find this feature helpful for your practice? Do you have any suggestions to make this task more user friendly?

Task**Clinical task Electronic Prescribing (Change Rx) (B3.4)**

Using patient David Brown, review a pharmacy change request and change prescription to Lisinopril 20 mg once a day.

Success:

- Easily completed.
- Completed with difficulty.
- Not completed.

Comments:**Expected Path:**

1. Successfully locate change request.
2. Successfully locate new medication in drug search.
3. Successfully enter and complete required fields.

Moderator observations/questions:**Tasks/questions:**

On a scale of 1 to 5, with 5 being very easy and 1 being very difficult, how would you rate the ease of difficulty of this task. Do you find this feature helpful for your practice? Do you have any suggestions to make this task more user friendly?

Task**Clinical Task Electronic Prescribing (Cancel Rx) (B3.2)**

Using patient David Brown, order Lisinopril 20 mg once a day and transmit. After prescription has been sent cancel Rx.

Success:

- Easily completed.
- Completed with difficulty.
- Not completed.

Comments:**Expected Path:**

1. Successfully locate medication in drug search.
2. Successfully enter and complete required fields to transmit.
3. Successfully cancel prescription.

Moderator observations/questions:

Tasks/questions: On a scale of 1 to 5, with 5 being very easy and 1 being very difficult, how would you rate the ease of difficulty of this task. Do you find this feature helpful for your practice? Do you have any suggestions to make this task more user friendly?

Task

Clinical Task Electronic Prescribing (Refill, review refill status) (B3.3)

Please review refill status notifications. Please refill Simvastatin 20 mg for Patient David Brown.

Success:

- Easily completed.
- Completed with difficulty.
- Not completed.

Comments:

Expected Path:

1. Successfully access Eprescribe.
2. Successfully locate Refills status notifications.
3. Successfully refill medication.

Moderator observations/questions:

Tasks/questions:

On a scale of 1 to 5, with 5 being very easy and 1 being very difficult, how would you rate the ease of difficulty of this task. Do you find this feature helpful for your practice? Do you have any suggestions to make this task more user friendly?

Task

Clinical Task Electronic Prescribing (Review Medication History) (B3.5)

Please review the medication history for Patient David Brown.

Success:

- Easily completed.
- Completed with difficulty.
- Not completed.

Comments:

Expected Path:

1. Successfully access Eprescribe.
2. Successfully locate medication history for patient.

Moderator observations/questions:

Tasks/questions:

On a scale of 1 to 5, with 5 being very easy and 1 being very difficult, how would you rate the ease of difficulty of this task. Do you find this feature helpful for your practice? Do you have any suggestions to make this task more user friendly?

Task

Medication Allergy List (A8.1)

Using patient Sally Pal, enter Codeine into the patient allergy list. Save the Allergy.

Success:

- Easily completed.
- Completed with difficulty.
- Not completed.

Comments:

Expected path:

1. Successfully load patient's information.
2. Successfully add patient allergy.
3. Successfully save allergy to patient's medication allergy list.

Moderator observation/comments:

On a scale of 1 to 5, with 5 being very easy and 1 being very difficult, how would you rate the ease of difficulty of this task. Do you find this feature helpful for your practice? Do you have any suggestions to make this task more user friendly?

Task**Clinical task (Access and edit medication allergy) (A8.2)**

Using patient Sally Pal, retrieve patient allergy list, and change the patient's allergy from Sulfa to Penicillin.

Success:

- Easily completed.
- Completed with difficulty.
- Not completed.

Comments:

Expected path:

1. Successfully open eprescribe to retrieve patient's medication allergy list.
2. Successfully delete sulfa allergy.
3. Successfully add and save new allergy.

Moderator observations/comments:

On a scale of 1 to 5, with 5 being very easy and 1 being very difficult, how would you rate the ease of difficulty of this task. Do you find this feature helpful for your practice? Do you have any suggestions to make this task more user friendly?

Task

Clinical task Address a drug to drug interaction warning (A4.1)

Using patient David Brown, enter Lanoxin 125 mcg, one daily, with no refills. Address a drug – drug allergy warning.

Success:

- Easily completed.
- Completed with difficulty.
- Not completed.

Comments:

Expected path:

1. Retrieve patient David Brown in Eprescribe.
2. Locate Lanoxin from the medication list.
3. Complete required fields.
4. Review drug/drug interaction (Lanoxin/Simvastatin).

Moderator observations/questions:

Tasks/questions:

On a scale of 1 to 5, with 5 being very easy and 1 being very difficult, how would you rate the ease of difficulty of this task. Do you find this feature helpful for your practice? Do you have any suggestions to make this task more user friendly?

Task**Clinical Task Address a drug allergy warning (A4.2)**

Using patient David Brown, enter Amoxicillin 500 mg capsule. Attempt to transmit prescription, locate allergy warning.

Success:

- Successfully completed.
- Completed with difficulty.
- Not completed.

Comments:**Expected path:**

1. Successfully retrieve patient in Eprescribe.
2. Successfully load medication.
3. Successfully display the allergy warning.

Moderator observations/questions:**Tasks/questions:**

On a scale of 1 to 5, with 5 being very easy and 1 being very difficult, how would you rate the ease of difficulty of this task. Do you find this feature helpful for your practice? Do you have any suggestions to make this task more user friendly?

Clinical Task Demographics (A5.1, A5.2)

Retrieve patient Steve Brown. Add the following demographics, sex, language, ethnicity, race, sexual orientation, and gender identity, save and close. Now access the demographics you entered for Steve Brown and edit the sex, language, ethnicity, race, sexual orientation, and gender identity. Save and close.

Success:

- Easily completed.
- Completed with difficulty.
- Not completed.

Comments:

Expected paths:

1. Successfully locate patient.
2. Successfully add demographics.
3. Successfully access and change options.

Moderator observations/comments:

Task/questions:

On a scale of 1 to 5, with 5 being very easy and 1 being very difficult, how would you rate the ease of difficulty of this task. Do you find this feature helpful for your practice? Do you have any suggestions to make this task more user friendly?

Clinical task Problem list (Record, change and access) (A6.1, A6.2)

Retrieve patient David Brown's Clinical Summary add an active problem to his problem list, save and close. Now access the problem list and change the active problem to inactive and save and close.

Success:

- Easily completed.
- Completed with difficulty.
- Not completed.

Comments:

Expected paths:

- 1 Successfully open Clinical Summary for correct patient
- 2 Successfully add Problem and status
- 3 Successfully access problem list and change status

Moderator observations/comments:

Task/questions:

On a scale of 1 to 5, with 5 being very easy and 1 being very difficult, how would you rate the ease of difficulty of this task. Do you find this feature helpful for your practice? Do you have any suggestions to make this task more user friendly?

Clinical Task Implantable Devices (Record, access and change) (A14.1, 14.2)

Retrieve patient Sally Pal's Clinical Summary and add an active implantable device to her record, save and close. Now access the implantable device and change the implantable device to inactive, save and close.

Success:

- Easily completed.
- Completed with difficulty.
- Not completed.

Comments:

Expected paths:

- 1 Successfully open Clinical Summary for correct patient
- 2 Successfully add active implantable device to record.
- 3 Successfully access and change status of implantable device.

Moderator observations/comments:

Task/questions:

On a scale of 1 to 5, with 5 being very easy and 1 being very difficult, how would you rate the ease of difficulty of this task. Do you find this feature helpful for your practice? Do you have any suggestions to make this task more user friendly?

Clinical Task Address a clinical decision support intervention for problem list, medication list, medication allergy list, demographics, laboratory test, vital signs, combined demographics/problem, CDS from a reconciliation (A9.1, A9.2, A9.3)

Retrieve patient Amanda Moo, accept responsibility for the following Clinical Decision support interventions:

Problem list

Medication list

Medication allergy List

One demographic

Laboratory test

Vital signs

Problem and Demographic

Medication Allergy, Medication, and Problem from an incorporated CDA

Also review the developer citation, Developer of the intervention, Funding source for the Laboratory test CDS

Success:

- Easily completed.
- Completed with difficulty.
- Not completed.

Comments:

Expected Path:

1. Successfully retrieve patient.
2. Successfully load reminder(s).
3. Successfully accept responsibility/address every reminder(s).

Moderator observations/questions:

Tasks/questions:

On a scale of 1 to 5, with 5 being very easy and 1 being very difficult, how would you rate the ease of difficulty of this task. Do you find this feature helpful for your practice? Do you have any suggestions to make this task more user friendly?

Appendix 5: SYSTEM USABILITY SCALE QUESTIONNAIRE

	Strongly Agree	Strongly disagree agree
1. I think that I would like to use this system frequently	<div style="display: flex; justify-content: space-between; border: 1px solid black; height: 25px; margin-bottom: 5px;"></div> <div style="display: flex; justify-content: space-between; width: 100%; margin-top: 5px;"> 12345 </div>	
2. I found the system unnecessarily complex	<div style="display: flex; justify-content: space-between; border: 1px solid black; height: 25px; margin-bottom: 5px;"></div> <div style="display: flex; justify-content: space-between; width: 100%; margin-top: 5px;"> 12345 </div>	
3. I thought the system was easy to use	<div style="display: flex; justify-content: space-between; border: 1px solid black; height: 25px; margin-bottom: 5px;"></div> <div style="display: flex; justify-content: space-between; width: 100%; margin-top: 5px;"> 12345 </div>	
4. I think that I would need the support of a technical person to be able to use this system	<div style="display: flex; justify-content: space-between; border: 1px solid black; height: 25px; margin-bottom: 5px;"></div> <div style="display: flex; justify-content: space-between; width: 100%; margin-top: 5px;"> 12345 </div>	
5. I found the various functions in this system was well integrated	<div style="display: flex; justify-content: space-between; border: 1px solid black; height: 25px; margin-bottom: 5px;"></div> <div style="display: flex; justify-content: space-between; width: 100%; margin-top: 5px;"> 12345 </div>	
6. I thought there was too much inconsistency in this system	<div style="display: flex; justify-content: space-between; border: 1px solid black; height: 25px; margin-bottom: 5px;"></div> <div style="display: flex; justify-content: space-between; width: 100%; margin-top: 5px;"> 12345 </div>	
7. I would imagine that most people would learn to use this system very quickly	<div style="display: flex; justify-content: space-between; border: 1px solid black; height: 25px; margin-bottom: 5px;"></div> <div style="display: flex; justify-content: space-between; width: 100%; margin-top: 5px;"> 12345 </div>	
8. I found the system very cumbersome to use	<div style="display: flex; justify-content: space-between; border: 1px solid black; height: 25px; margin-bottom: 5px;"></div> <div style="display: flex; justify-content: space-between; width: 100%; margin-top: 5px;"> 12345 </div>	
9. I felt very confident using the system	<div style="display: flex; justify-content: space-between; border: 1px solid black; height: 25px; margin-bottom: 5px;"></div> <div style="display: flex; justify-content: space-between; width: 100%; margin-top: 5px;"> 12345 </div>	

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

1	2	3	4	5