

# EHR Usability Test Report of PI EMR version 2.0

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## EXECUTIVE SUMMARY

A usability test of PI EMR version 2.0, an EHR module, was conducted on October 10 through 15 in Olympia, WA and various remote locations by our self-development personnel and users. The purpose of this test was to test and validate the usability of the current user interface, and provide evidence of usability in the EHR Under Test (EHRUT).

During the usability test, 10 healthcare providers matching the target demographic criteria served as participants and used the EHRUT in simulated, but representative tasks. This study collected performance data on 10 tasks typically conducted on an EHR:

- Enter a medication order.
- Enter a lab and an imaging order.
- Enter a drug allergy then attempt to enter a medication order for that drug .
- Update and enter demographics information
- Enter two problems in the problem list for two different time frames.
- Attempt to enter medication orders for drugs with a drug/drug interaction.
- Enter two medications in the medication list for two different time frames.
- Enter two medications allergies in the medication allergy list for two different time frames.
- Reconcile imported lists for the problem list, medication list and medication allergy list.
- Edit a clinical decision support alert, enter information to trigger clinical decision support interventions and view reference information.

During the forty minute one-on-one usability test, each participant was greeted by the administrator and advised of the structure and process of the testing. They were instructed that they could withdraw at any time. As the EHRUT is self-developed, participants were clinicians currently working in our practice. They not only had prior experience with the EHRUT but also experience participating in the continuous improvement the EHR. 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 recorded user performance data on paper and electronically. The electronic record consisted of synchronized participant screen activity, audio and video of the participant. The recording was made via the Webex teleconference application. After the test, the administrator performed data logging by reviewing the recordings to gather the necessary information on task time, deviations, errors, etc. The administrator did not give the participant assistance in how to complete the task.

The following types of data were collected for each participant:

- Number of tasks successfully completed within the allotted time without assistance
- Time to complete the tasks
- Number and types of errors
- Path deviations
- Participant's verbalizations

- Participant's satisfaction ratings of the system

All participant data 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 at their normal rate for their time. Various metrics were used to evaluate the usability of the EHRUT. Following is a summary of the performance and rating data collected on the EHRUT.

Task	# of Partic	Task Success	Path Dev. Ratio	Task Time Opt-Avg-#Dev	Errors	Task Rating
1-Enter med order	10	70%	7/220 - 0.032	50 - 50.8 - 3	2	1.1
2-Enter lab/img order	10	50%	5/180 - 0.028	70 - 70.8 - 5	2	1.1
3-Enter drug allergy	10	60%	9/190 - 0.047	60 - 62.9 - 4	1	1.1
4-Enter demographics	10	80%	3/210 - 0.014	80 - 78.8 - 2	3	1.1
5-Enter 2 problems	10	100%	6/150 - 0.040	65 - 61.3 - 0	1	1
6-Trigger drug/drug int	10	70%	6/210 - 0.029	55 - 54.8 - 3	3	1.2
7-Enter 2 meds on list	10	80%	5/110 - 0.045	70 - 67.8 - 2	0	1
8-Enter 2 med allergies	10	100%	4/110 - 0.036	65 - 59.8 - 0	2	1.1
9-Reconcile clinical info	10	70%	4/220 - 0.018	155 - 154.4 - 3	1	1.1
10-Edit/trigger CDS alerts	10	80%	5/410 - 0.012	165 - 163.8 - 2	1	1.1

The results from the System Usability Scale scored the subjective satisfaction with the system based on performance with these tasks to be 97.75. Broadly interpreted, scores under 60 represent systems with poor usability; scores over 80 are considered above average.

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

#### MAJOR FINDINGS

The qualitative findings show the EHRUT, despite being quite familiar and easy to use by the participants, is not fully optimized as of this test. That said, the improvement opportunities do not reflect a poor level of performance by the EHRUT. Rather, they show that the evolution of an EHR is a continuous endeavor.

They clearly indicate that the improvements to be made are incremental and include not only changes to the EHRUT, but perhaps also changes to how we train people to use it. Observing the participants has shown how users interact with any computer application will vary depending on the user. This was evident in the variation of how the participants approached and executed each step.

#### AREAS FOR IMPROVEMENT

The opportunities to optimize the EHRUT include not only changes to the application, but also how we train users to interact with it. Specific action items include:

- Further upgrade the layout of the database dialog windows more intuitive to improve efficiency.
- Optimize font sizing change options to ensure maximum flexibility for the range of user display preferences
- Evaluate redundancies in file saving to optimize efficiency without sacrificing the totally secure capture of data.
- Evaluate current training procedures for optimization opportunities including how experienced users interact with the EHR.

## INTRODUCTION

The EHRUT tested for this study was PI EMR version 2.0, an EHR module. This is a self-developed application designed by and updated exclusively for the personnel of Professional Imaging, LLC. Thus, from its inception, the users of this EHR have been directly and intimately involved in its continuous improvement.

Designed to present and collect medical information for healthcare providers in ambulatory dysphagia clinics, the EHRUT consists of the functionality required for certification to the 2015 edition requirements as they pertain to the dysphasia clinic environment. It is utilized by physicians and speech language pathologists in the evaluation of patients with dysphagia to provide their primary care team with information essential to the safe feeding of the patient. 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 EHRUT. To this end, measures of effectiveness, efficiency and user satisfaction, such as time on task, number of errors, deviations from optimal path, were captured during the usability testing.

## METHOD

### PARTICIPANTS

A total of ten participants were tested on the EHRUT. Participants in the test were Physicians. They were recruited from within Professional Imaging, LLC and were compensated at their normal rate for their time. Participants were actual end users of the EHRUT and have participated in the continuous improvement of it.

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	Product Experience	Assistive Technology Needs
001	F	68	M.D.	Physician	41 years	20 years	7 years	N/A
002	M	69	M.D.	Physician	41 years	20 years	7 years	N/A
003	F	61	M.D.	Physician	36 years	15 years	7 years	N/A
004	M	42	M.D.	Physician	17 years	11 years	7 years	N/A
005	M	65	M.D.	Physician	39 years	18 years	7 years	N/A
006	M	60	M.D.	Physician	36 years	20 years	2 years	N/A
007	F	47	M.D.	Physician	23 years	19 years	3 years	N/A
008	M	66	M.D.	Physician	39 years	20 years	5 years	N/A
009	M	68	M.D.	Physician	41 years	20 years	7 years	N/A
010	M	76	M.D.	Physician	51 years	29 years	7 years	N/A

10 participants were recruited and all of them participated in the usability test.

Participants were scheduled for a 40 minute session with 5 minutes for orientation, 25 for testing and 10 for debrief by the administrator/data logger.

## 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 only the EHRUT. Due to the structure of our practice, each participant used the system on the same server but from differing locations. They were all 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 on 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 EHR and those criteria required for usability testing, including:

- Enter a medication order.
- Enter a lab and an imaging order.
- Enter a drug allergy then attempt to enter a medication order for that drug .
- Update and enter demographics information
- Enter two problems in the problem list for two different time frames.
- Attempt to enter medication orders for drugs with a drug/drug interaction.
- Enter two medications in the medication list for two different time frames.
- Enter two medications allergies in the medication allergy list for two different time frames.
- Reconcile imported lists for the problem list, medication list and medication allergy list.
- Edit a clinical decision support alert, enter information to trigger clinical decision support interventions and view reference information.

## PROCEDURES

Upon arrival, participants were greeted and their identity was verified. Participants were then assigned a participant ID.

The usability testing was conducted by the administrator who also acted as data logger during testing and during the analysis of the teleconference recording. The EHR Project Implementation Manager for Professional Imaging, LLC was the administrator. His qualifications include 20 years of Process and Quality Management under ISO standards.

The administrator moderated the session including administering instructions and tasks. The administrator also obtained post-task rating data and took notes on participant comments. He also acted as data logger during analysis of the test recordings and took notes on task success, path deviations, number and type of errors, and comments during the analysis of the teleconference recording.

Participants were instructed to perform the tasks:

- As quickly as possible making as few errors and deviations as possible.
- Without assistance; the administrator was 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. 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, 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 on their test records. Their task success rate, time on task, errors, deviations, and post-test questionnaire results were recorded into a spreadsheet.

## TEST LOCATION

The test environment was designed such that testing could be conducted using the current personnel of Professional Imaging, LLC. As these participants are in separate regions of the country, they performed the test at the best available location for them. They were guided, monitored and recorded remotely by the administrator using a teleconferencing application. 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. For testing, the computers were running the Windows 7 through Windows 10 operating systems. The computers used by the participants were of varying configuration based on availability. The specifications for the computers were logged as part of the test data. The participants used a keyboard and mouse or touchpad when interacting with the EHRUT.

The EHRUT was used on display monitors of various size and resolution. The application was set up by the practice IT Manager according to our normal procedure. The application itself was running on a remote server and was accessed using a Microsoft Remote Desktop Connection to the participant's computer. Technically, the system performance (i.e., response time) was representative to what actual users would experience in a field implementation. Additionally, participants were instructed not to change any of the default system settings (such as control of font size).

## TEST FORMS AND TOOLS

During the usability test, various documents and instruments were used including the Moderator's Guide and Post-test Questionnaire. Examples of these documents can be found in Appendices 2 and 3 respectively. The Moderator's Guide was designed so as to be able to capture required data during recording analysis.

The participant's interaction with the EHRUT was captured and recorded digitally with the recording capability of the Webex teleconference application. All participant computers were equipped with video cameras and recorded each participant's facial expressions synchronized with the screen capture. Verbal comments were recorded with a microphone. The recordings of the tests were saved for analysis at the location of the administrator.

## PARTICIPANT INSTRUCTIONS

The administrator reads the following instructions aloud to the each participant (also see the full moderator's guide in Appendix 2):

*Thank you for participating in this study. Your input is very important. Our session today will last about 40 minutes. During that time you will use our 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 this only 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 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 as you have been*



*throughout the development of our EHR. 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 as their first task, were given approximately 5 minutes to examine 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 say, “starting.” 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 ten tasks to complete. Tasks are listed in the moderator’s guide in Appendix 2.

## USABILITY METRICS

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

## DATA SCORING

The following table (Table 1) details how tasks were scored, errors evaluated, and the time data analyzed.

Measures	Rationale and Scoring
<b>Effectiveness:</b>  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.

<b>Effectiveness:</b> 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 an "Failures." Not all deviations were counted as errors.
<b>Efficiency:</b> Task Deviations	The participant's path through the tasks 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.
<b>Efficiency:</b> Task Time	Each task was timed from when the administrator advised the participant to start until the participant indicated they were finished. If he or she failed to indicate they were done, the time was stopped when the participant stopped performing the task. Average time per task was calculated for each task.
<b>Satisfaction:</b> 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). This data was averaged across participants.  To measure participants' confidence in and likeability of the EHRUT overall, the testing team administered the System Usability Scale 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 3

**Table 1. Details of how observed data were scored.**

## RESULTS

### DATA ANALYSIS AND REPORTING

The results of the usability test were calculated according to the methods specified in the Usability Metrics section above. The usability testing results for the EHRUT are detailed below. (Table 2). The results should be seen in light of the objectives and goals outlined in Section 3.2 Study Design.

Task	# of Partic	Task Success	Path Dev. Ratio	Task Time Opt-Avg-#Dev	Errors	Task Rating
1-Enter med order	10	70%	7/220 - 0.032	50 - 50.8 - 3	2	1.1
2-Enter lab/img order	10	50%	5/180 - 0.028	70 - 70.8 - 5	4	1.1

3-Enter drug allergy	10	60%	9/190 - 0.047	60 - 62.9 - 4	1	1.1
4-Enter demographics	10	80%	3/210 - 0.014	80 - 78.8 - 2	3	1.1
5-Enter 2 problems	10	100%	6/150 - 0.040	65 - 61.3 - 0	1	1
6-Trigger drug/drug int	10	70%	6/210 - 0.029	55 - 54.8 - 3	3	1.2
7-Enter 2 meds on list	10	80%	5/110 - 0.045	70 - 67.8 - 2	0	1
8-Enter 2 med allergies	10	100%	4/110 - 0.036	65 - 59.8 - 0	2	1.1
9-Reconcile clinical info	10	70%	4/220 - 0.018	155 - 154.4 - 3	1	1.1
10-Edit/trigger CDS alerts	10	80%	5/410 - 0.012	165 - 163.8 - 2	1	1.1

**Table 2. Summary of Usability Testing Results.**

The results from the SUS (System Usability Scale) scored the subjective satisfaction with the system based on performance with these tasks. The following results show the individual usability score for each participant and the average for the group.

Participant	Score
001	92.5
002	100
003	87.5
004	100
005	97.5
006	100
007	97.5
008	95
009	97.5
010	100
Group Avg	97.75

## DISCUSSION OF THE FINDINGS

As self-developers, this testing has provided some valuable insights into our process for improvement of our EHR. One might expect for a participant field with ongoing direct experience and feedback on the EHR, there could be no issues regarding the effectiveness and efficiency of it. This was not quite the case.

### EFFECTIVENESS

As regards effectiveness, the testing showed an overall task success percentage of 76%. Despite the familiarity the participants have with the EHRUT, this result definitely shows they encountered a level of difficulty performing the overall tests that requires further action.

### EFFICIENCY

Overall efficiency as measured by the percentage of deviation from the optimum path averaged approximately 3% with a low of zero and a high of 4.5%. This is a not a drastic range of path deviation, task to task, but it does show further study on exactly why this occurred is warranted.

## **SATISFACTION**

The results of the System Usability Scale indicate a high level of satisfaction by the users with the EHRUT. The post-task ease of use ratings also reflect that the participants found the tasks relatively easy to perform and the application set up well for use. This may be at least somewhat in conflict with the efficiency and effectiveness findings. Again, those findings do not indicate the EHRUT is not suited to the task but do show that there are opportunities for refinement that could yield improved overall performance.

## **MAJOR FINDINGS**

The qualitative findings show the EHRUT, despite being quite familiar and easy to use by the participants, is not fully optimized as of this test. That said, the improvement opportunities do not reflect a poor level of performance by the EHRUT. Rather, they show that the evolution of an EHR is a continuous endeavor.

They clearly indicate that the improvements to be made are incremental and include not only changes to the EHRUT, but perhaps also changes to how we train people to use it. Observing the participants has shown how users interact with any computer application will vary depending on the user. This was evident in the variation of how the participants approached and executed each step.

## **AREAS FOR IMPROVEMENT**

The opportunities to optimize the EHRUT include not only changes to the application, but also how we train users to interact with it. Specific action items include:

- Further upgrade the layout of the database dialog windows more intuitive to improve efficiency.
- Optimize font sizing change options to ensure maximum flexibility for the range of user display preferences
- Evaluate redundancies in file saving to optimize efficiency without sacrificing the totally secure capture of data.
- Evaluate current training procedures for optimization opportunities including how experienced users interact with the EHR.

## **APPENDICES**

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

1: Participant demographics

2: Example Moderator's Guide

3: System Usability Scale Questionnaire

## Appendix 1: **PARTICIPANT DEMOGRAPHICS**

Following is an overview of the participants in this study. All participants were active personnel on staff with Professional Imaging, LLC

### **Gender**

Men	7
Women	3
Total	10

### **Occupation/Role**

Physician	10
Total	10

### **Years of Experience**

Years Experience	364
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### **Use of EHR**

All Paper	182
Paper/Electronic	77
All Electronic	105
Total Participants	10

## Appendix 2: **EXAMPLE MODERATOR'S GUIDE**

### ***EHRUT Usability Test*** **Moderator's Guide**

**Administrator** \_\_\_\_\_

**Data Logger** \_\_

**Date** \_\_

**Time** \_\_

**Participant #** \_

**Location** \_\_\_\_\_

#### Prior to testing

- ☐ Confirm schedule with Participants
- ☐ Ensure EHRUT lab environment is running properly
- ☐ Ensure data recording environment and equipment is set up and running properly
- ☐ Confirm participant PC
  - PC type:
  - OS:
  - Screen type:
  - Pointer:

#### Prior to each participant:

- ☐ Reset application
- ☐ Start session recordings with Webex when actual test begins.

#### Prior to each task:

- ☐ Reset application to starting point for next task

#### After each participant:

- ☐ End session recordings with Webex.

#### After all testing

- ☐ Back up all data files.

**Orientation - 5 minutes**

Thank you for participating in this study. Our session today will last approximately 30 minutes. During that time you will take a look at the electronic health record system.

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

The product you will be using today is the PI EMR. Some of the data may not make sense as it is placeholder data.

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

Please start the task when I say go and when you're done, please verbally confirm you're finished with the task.

Do you have any questions or concerns?

**Preliminary Questions – 2 minutes**

What is your job title

How long have you been working in this role?

Tell me about your experience with electronic health records.



**Task1:**  
**CPOE – Enter a medication order. (50 Seconds)**

*Take the participant to the starting point for the task.*

**Select the patient Joe Test then enter a medication order.**

**Success:**

- ☐ Easily completed
- ☐ Completed with difficulty or help
- ☐ Not completed

*Comments:*

**Task Time:** \_\_\_\_Seconds

**Optimal Path:**

- On the Patient Information tab, click 'Find Patient' and select Joe Test
- Click Tools > Meaningful Use Commands > Write Prescription or Medication Order
- Click 'Add New Order/Prescription'
- Select a prescriber and click 'Save'
- Open the Drug Lookup Dialog and begin writing a medication name.
- Click the selected medication on the list then click 'OK'
- Open the Pharmacy Lookup Dialog, select a pharmacy and click 'Save'
- Enter appropriate amounts in the 'Quantity,' 'Days Supply,' 'Refills' fields, add information in 'Directions' and click 'Save'

- ☐ Correct
- ☐ Minor Deviations
- ☐ Major Deviations

*Comments:*

**Observed Errors and Verbalizations:**

*Comments:*

**Rating:**

Overall, this task was: \_\_\_\_\_

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

**Administrator / Notetaker Comments:**

**Task 2:****CPOE - Enter a lab and an imaging order (70 Seconds)**

*Take the participant to the starting point for the task.*

**Using the patient that is currently selected, enter a lab and an imaging order.**

**Success:**

- ☐ Easily completed
- ☐ Completed with difficulty or help
- ☐ Not completed

*Comments:*

**Task Time:** \_\_\_\_Seconds

**Optimal Path:**

- Click Tools > Meaningful Use Commands > Write Lab, Radiology or Other Order
- Click 'Add New Order'
- Open the Provider Lookup Dialog, select a provider and click 'Save'
- Open the Description Lookup Dialog and select a lab or imaging order and click 'Save'.
- Click Tools > Meaningful Use Commands > Write Lab, Radiology or Other Order
- Click 'Add New Order'
- Open the Provider Lookup Dialog Select a provider and click 'Save'
- Open the Description Lookup Dialog and select an imaging order and click 'Save'.
- ☐ Correct
- ☐ Minor Deviations / Cycles
- ☐ Major Deviations

*Comments:*

**Observed Errors and Verbalizations:**

*Comments:*

**Rating:**

Overall, this task was: \_\_\_\_\_

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

**Administrator / Notetaker Comments:**

**Task 3:**

**Drug allergy interaction checks - Enter a drug allergy then a medication order for that drug. An alert should be activated. (60 Seconds)**

*Take the participant to the starting point for the task.*

**Using the patient that is currently selected, enter a drug allergy then a medication order for that drug.**

**Success:**

- ☐ Easily completed
- ☐ Completed with difficulty or help
- ☐ Not completed

*Comments:*

**Task Time:** \_\_\_\_Seconds

**Optimal Path:**

- In the 'Medical History' tab under the 'Medication Allergies' section, add an allergy.
- Select Tools > Meaningful Use Commands > Write Prescription or Medication Order
- Click 'Add New Order/Prescription'
- Select a prescriber and click 'Save'
- Open the Drug Lookup Dialog and begin writing the drug name.
- Click the drug on the list then click 'OK' and the Drug Allergy alert is displayed.
- Click 'OK' on the alert, delete the drug order and click 'Save'

- ☐ Correct
- ☐ Minor Deviations / Cycles
- ☐ Major Deviations

*Comments:*

**Observed Errors and Verbalizations:**

*Comments:*

**Rating:**

Overall, this task was: \_\_\_\_\_

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

**Administrator / Notetaker Comments:**

**Task 4:**

**Demographics - Update birth date and birth sex and enter preferred language, race and ethnicity. (80 seconds)**

*Take the participant to the starting point for the task*

**Using the patient that is currently selected, update their birth date and birth sex and enter their preferred language, race and ethnicity.**

**Success:**

- ☐ Easily completed
- ☐ Completed with difficulty or help
- ☐ Not completed

*Comments:*

**Task Time:** \_\_\_\_Seconds

**Optimal Path:**

- In the 'Patient Information' tab, change the patient's birth date and birth sex.
- Click 'Edit' and add their preferred language, race and ethnicity.
- Click 'Close' then click the 'File Save' button.
- Click 'Find Patient' and select the same patient.
- Confirm the patient's birth date and birth sex is as revised.
- Click Edit and confirm the demographics info is as it was entered previously and click 'Close'

- ☐ Correct
- ☐ Minor Deviations / Cycles
- ☐ Major Deviations

*Comments:*

**Observed Errors and Verbalizations:**

*Comments:*

**Rating:**

Overall, this task was: \_\_\_\_\_

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

**Administrator / Notetaker Comments:**

**Task 5:**

**Problem List - Enter two problems in Medical History for different time frames. (65 seconds)**

*Take the participant to the starting point for the task*

**Using the patient that is currently selected, enter two problems in their Medical History for different time frames.**

**Success:**

- ☐ Easily completed
- ☐ Completed with difficulty or help
- ☐ Not completed

*Comments:*

**Task Time:** \_\_\_\_Seconds

**Optimal Path:**

- In the 'Medical History' tab under the 'Problem List' section and add a problem using the Problems Database Lookup.
- Select any 'Date Started' and 'End Date' prior to the current date and click 'OK'
- Add another problem and use the current date as the 'Date Started' and click 'OK'

- ☐ Correct
- ☐ Minor Deviations / Cycles
- ☐ Major Deviations

*Comments:*

**Observed Errors and Verbalizations:**

*Comments:*

**Rating:**

Overall, this task was: \_\_\_\_\_

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

**Administrator / Notetaker Comments:**

**Task 6:**

**Drug/drug interaction checks** Enter medication orders for drugs with a drug-drug interaction.  
**An alert should be activated. (55 Seconds)**

*Take the participant to the starting point for the task*

**Using the patient that is currently selected, enter medication orders for drugs with a drug-drug interaction**

**Success:**

- ☐ Easily completed
- ☐ Completed with difficulty or help
- ☐ Not completed

*Comments:*

**Task Time:** \_\_\_\_Seconds

**Optimal Path:**

- Return to the 'Medication Allergies' section in the 'Medical History' tab and remove the allergy.
- Return to Tools > Meaningful Use Commands > Write Prescription or Medication Order and enter orders for a Drug-Drug Interaction and the alert is displayed.
- Click 'OK' to close the alert, delete the medication orders and click 'Save.'

- ☐ Correct
- ☐ Minor Deviations / Cycles
- ☐ Major Deviations

*Comments:*

**Observed Errors and Verbalizations:**

*Comments:*

**Rating:**

Overall, this task was: \_\_\_\_\_

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

**Administrator / Notetaker Comments:**

**Task 7:**

**Medication List - Enter two medications for different time frames. (70 Seconds)**

*Take the participant to the starting point for the task*

**Using the patient that is currently selected, enter two medications on the medication list for different time frames.**

**Success:**

- ☐ Easily completed
- ☐ Completed with difficulty or help
- ☐ Not completed

*Comments:*

**Task Time:** \_\_\_\_Seconds

**Optimal Path:**

- In the 'Medical History' tab under the 'Medication' section, add any medication using the Medication Database Lookup.
- Select any 'Date Started' and 'End Date' prior to the current date.
- Select another medication and use the current date as the 'Date Started'
- Click 'OK'

- ☐ Correct
- ☐ Minor Deviations / Cycles
- ☐ Major Deviations

*Comments:*

**Observed Errors and Verbalizations:**

*Comments:*

**Rating:**

Overall, this task was: \_\_\_\_\_

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

**Administrator / Notetaker Comments:**

**Task 8:**  
**Medication allergy list - Enter two medication allergies using different time frames. (65 Seconds)**

*Take the participant to the starting point for the task.*

**Using the selected patient, enter two medication allergies on the medication allergy list for different time frames**

**Success:**

- ☐ Easily completed
- ☐ Completed with difficulty or help
- ☐ Not completed

*Comments:*

**Task Time:** \_\_\_\_Seconds

**Optimal Path:**

- In the 'Medical History' tab under the 'Medication Allergies' section, add any allergy.
- Select any 'Start Date' and 'End Date' prior to the current date.
- Add another medication allergy and use the current date as the 'Date Started'
- Click 'OK'

- ☐ Correct
- ☐ Minor Deviations / Cycles
- ☐ Major Deviations

*Comments:*

**Observed Errors and Verbalizations:**

*Comments:*

**Rating:**

Overall, this task was: \_\_\_\_\_

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

**Administrator / Notetaker Comments:**



**Task 9:**

**Clinical information reconciliation – Select a patient with entries in the problem list, medication list and medication allergy list. Import, merge and consolidate the respective lists. (155 Seconds)**

*Take the participant to the starting point for the task.*

**Using patient Myra Jones, import, merge and consolidate the lists in the Problem List, Medication List and Medication Allergy list.**

**Success:**

- ☐ Easily completed
- ☐ Completed with difficulty or help
- ☐ Not completed

*Comments:*

**Task Time:** \_\_\_\_Seconds

**Optimal Path:**

- On the Patient Information tab, click 'Find Patient' and select Myra Jones.
- Click Tools > Meaningful Use Commands > Import HL7, CCD, CCD or C32 pt summary record.
- Click 'Browse' and select the file 'Myra Jones (new meds, problems and drug allergies)' Then select 'Save to Pt Record'
- Click 'Yes' in the 'Matching Patient?' dialog box to start the process of reconciliation.
- Click 'No' in the 'Completely Replace Patient Record?' dialog to reconcile the patient data.
- Click 'Copy to Patient List' in the 'Medications Edit' dialog box to add the imported medication to the patient file.
- Click 'Yes' in the 'Duplicate Item' dialog box to include a duplicate entry.
- Review the list to ensure the imported medication is included and the older duplicate entry is deleted.
- Slide the scroll bar down and click 'OK.'
- Click 'Copy to Patient List' in the 'Problems Edit' dialog box to add the imported medication to the patient file.
- Review the list to ensure the imported problem is included.
- Slide the scroll bar down and click 'OK.'
- Click 'Copy to Patient List' in the 'Alert Edit' dialog box to add the imported drug allergy alert to the patient file.
- Review the list to ensure the imported drug allergy is included.
- Slide the scroll bar down and click 'OK.'

- ☐ Correct
- ☐ Minor Deviations / Cycles
- ☐ Major Deviations

*Comments:*

**Observed Errors and Verbalizations:**

*Comments:*

**Rating:**

Overall, this task was: \_\_\_\_\_

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

**Administrator / Notetaker Comments:**

**Task 10:**

**Clinical Decision Support – Edit an existing CDS alert. Trigger CDS alerts using data elements in the problem list, medication list and demographics. Review the reference information from those alerts. (165 Seconds)**

*Take the participant to the starting point for the task.*

**Using the patient Joe Test, edit an existing CDS alert. Trigger CDS alerts using data elements in the problem list, medication list and demographics. Review the reference information from those alerts.**

**Success:**

- ☐ Easily completed
- ☐ Completed with difficulty or help
- ☐ Not completed

*Comments:*

**Task Time:** \_\_\_\_Seconds

**Optimal Path:**

- On the Patient Information tab, click 'Find Patient' and select a patient.
- Click Tools > Meaningful Use Commands > CDS, Drug/Drug and Drug Allergy Notifications.
- Select a CDS intervention and add a comment to the Description. Click 'Save.'
- Click Tools > Meaningful Use Commands > CDS, Drug/Drug and Drug Allergy Notifications .
- Select the same CDS intervention and confirm the comment in the description was saved.
- Click the Infobutton next to the resource field to view the embedded link. Close the browser window.
- Delete the comment and click 'Save.'
- Click 'Edit' in the Patient information tab and enter a history of smoking. Click 'close'
- A CDS alert for Aortic Aneurysm Screening will appear. Click 'Show Complete CDS Report' and 'Save' to view the intervention reference. Close the reference.
- In the 'Objective Exam' tab under the 'Vital Signs' section, enter a height and weight that will trigger an overweight BMI alert.
- A CDS intervention will appear for the BMI alert. Click 'Show Complete CDS Report' and 'Save' to view the intervention reference. Close the reference
- In the 'Medical History' tab under the 'Medication' section, add any NSAID using the Medication Database Lookup. Click 'OK.'
- A CDS intervention will appear for an NSAID warning alert. Click 'Show Complete CDS Report' and 'Save' to view the intervention reference. Close the reference.

- ☐ Correct
- ☐ Minor Deviations / Cycles
- ☐ Major Deviations

*Comments:*

**Observed Errors and Verbalizations:**

*Comments:*

**Rating:**

Overall, this task was: \_\_\_\_\_

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

**Administrator / Notetaker Comments:**

**Final Questions** (5 minutes)

What was your overall impression of this system?

What aspects of the system did you like most?

What aspects of the system did you like least?

Were there any features that you were surprised to see?

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

Administer the SUS

### Appendix 3: **SYSTEM USABILITY SCALE QUESTIONNAIRE**

After each task, the participant was asked the following questions. Their responses were to be stated in terms of a 1 to 5 scale where 1 is strongly agree and 5 is strongly disagree.

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