EHR Usability Test Report of EHRez Ver. 5.0

Report based on NISTIR 7741 Guide to the Processes Approach for Improving the Usability of Electronic Health Records

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Criteria tested:

- 170.315(a)(1) CPOE – Medications
- 170.315(a)(2) CPOE – Laboratory
- 170.315(a)(3) CPOE – Diagnostic Imaging
- 170.315(a)(4) Drug-drug, Drug-allergy Interaction Checks
- 170.315(a)(5) Demographics
- 170.315(a)(6) Problem List
- 170.315(a)(7) Medication List
- 170.315(a)(8) Medication Allergy List
- 170.315(a)(9) Clinical Decision Support
- 170.315(a)(14) Implantable Device List
- 170.315(b)(2) Clinical Information Reconciliation and Incorporation
- 170.315(b)(3) Electronic Prescribing

Table of Contents

Executive Summary

A usability test of EHRez v5.0 was conducted on October 13, 2017 in San Juan, PR by the Quality Assurance Department at E-Health Partners, 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, 10 healthcare providers [Physicians, Nurses and other Medical Assistants] matching the target demographic criteria served as participants and used the EHRUT in simulated, but representative tasks.

This study collected performance data on **39** tasks typically conducted on an EHR by clinical users for the following functionality:

170.315(a)(1), (a)(2), (a)(3) Computerized provider order entry

1. Record Medication Order
2. Change Medication Order
3. Access Medication Order
4. Record Laboratory Order
5. Change Laboratory Order
6. Access Laboratory Order
7. Record Radiology/imaging Order
8. Change Radiology/imaging Order
9. Access Radiology/imaging Order

170.315(a)(4) Drug-drug, drug-allergy interaction checks

1. Create drug-drug and drug-allergy interventions prior to CPOE completion
2. Adjustment of severity level of drug-drug interventions (may be an admin type function)

170.315(a)(5) Demographics

1. Record Demographics
2. Change Demographics
3. Access Demographics

170.315(a)(6) Problem list

1. Record Problem List
2. Change Problem List
3. Access Problem List

170.315(a)(7) Medication list

4. Record Medication List
5. Change Medication List
6. Access Medication List

170.315(a)(8) Medication allergy list

1. Record Medication Allergy List
2. Change Medication Allergy List
3. Access Medication Allergy List

170.315(a)(9) Clinical decision support

1. Problem List Interventions
2. Medication List Interventions
3. Medication Allergy List Interventions
4. Demographics Interventions
5. Lab Tests and Results Interventions
6. Vital Signs Interventions
7. Identify User Diagnostic and Therapeutic Reference Information
8. Configuration of CDS interventions by user (may be an admin type function)

170.315(a)(14) Implantable Device List

1. Record UDI
2. Parse Identifiers from a UDI – Verify Attributes
3. Obtain and Associate UDI
4. Display UDI
5. Change status for UDI
6. Access Implantable device list

170.315(b)(2) Clinical information reconciliation and Incorporation

1. Reconcile patient's active medication list with another source
2. Reconcile patient's active problem list with another source
3. Reconcile patient's active medication allergy list with another source

170.315(b)(3) Electronic prescribing

1. Create New Prescription
2. Manage change request
3. Cancel prescription
4. Check Fill Status
5. Manage refill request

During the total time of 6.2 hours of the usability test, each participant was greeted by the administrator and asked to review and sign an informed consent/release form (included in Appendix C); they were instructed that they could withdraw at any time. All participants had prior experience with 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 timed the test and, along with the data logger(s) recorded user performance data on paper and electronically. The administrator did not give the participant assistance in how to complete the task.

The following types of data were collected for each participant:

• Number of tasks successfully completed within the allotted time without assistance
• Time to complete the tasks
• Number of errors
• Path deviations
• Participant's comments
• 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 with $200.00 each for their time. Various recommended metrics, in accordance with the examples set forth in the *NIST Guide to the Processes Approach for Improving the Usability of Electronic Health Records*, were used to evaluate the usability of the EHRUT.

INTRODUCTION

The EHRUT(s) tested for this study was EHRez v.5.0. Designed to present medical information to healthcare providers in individual or group practices, the EHRUT consists of six areas: Appointments, Patient Details, Clinical File, Reports, Maintenance and Billing. The usability testing attempted to represent realistic exercises and conditions.

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

METHOD

Participants

A total of 10 participants were tested on the EHRUT(s). Participants in the test were doctors, nurses and other clinical staff members (These are the type of users that the EHRUT is designed for). Participants were recruited by e-Health partners, Inc. and were compensated $200.00 for their time. In addition, participants had no direct connection to the development of or organization producing the EHRUT(s). Participants were not from the testing or supplier organization. Participants were given the opportunity to have the same orientation and level of training as the actual end users would have received.

For the test purposes, end-user characteristics were identified and translated into a recruitment screener used to solicit potential participants; an example of a screener is provided in Appendix B.

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.

ID	Gender	Age	Education	Occupation	Professional Experience	Computer Experience	Product Experience	Assistive Technology Needs
1	Male	44	MD	MD	18 years	High	3 year	N/A
2	Male	41	College Graduate	Clinical Support	14 years	High	5 years	N/A
3	Female	54	MD	MD	26 years	Some	5 years	N/A
4	Female	38	College Graduate	Nurse	8 years	High	6 years	N/A
5	Female	26	College Graduate	Nurse	3 years	High	2 years	N/A
6	Female	31	College Graduate	Nurse	5 years	High	2 years	N/A
7	Male	27	College Graduate	Clinical Support	2 years	High	1 year	N/A
8	Female	29	College Graduate	Nurse	6 years	High	5 years	N/A
9	Male	63	MD	MD	30 years	Some	4 years	N/A
10	Female	35	College Graduate	Nurse	13 years	High	6 years	N/A

10 participants were recruited and 10 participated in the usability test. 0 participants failed to show for the study.

Participants were scheduled for 4 sessions with 10 minutes in 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.

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 one EHR. Each participant used the system in the same 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 of errors
- Path deviations
- Participant's comments
- Participant's satisfaction ratings of the system

Tasks

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

1. Computerized provider order entry
2. Drug-drug, drug-allergy interaction checks
3. Demographics
4. Problem List
5. Medication list
6. Medication allergy list
7. Clinical decision support
8. Implantable Device List
9. Clinical information reconciliation
10. Electronic prescribing

The tasks for each of the measures above are based on a realistic use of the functionalities of this EHR. Tasks were selected based on their frequency of use, criticality of function, and those that may be most troublesome for users.

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 C). A representative from the test team witnessed the participant's signature.

To ensure that the test ran smoothly, both QA Specialists employed by e-Health Partners, Inc. are highly talented usability practitioners with more than 5 years of experience with software design and extremely knowledgeable with the EHRUT.

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 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 Data Scoring.

Following the session, the administrator gave the participant the post-test questionnaire (e.g., the System Usability Scale, see Appendix E), compensated them 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.

Participants were thanked for their time and compensated. Participants signed a receipt and acknowledgement form (See Appendix F) indicating that they had received the compensation.

Test Location

The test facility included a waiting area and a quiet testing room with a table, computer for the participant, and recording computer for the administrator. Only the participant and administrator were in the test room.

To ensure that the environment was comfortable for users, noise levels were kept to a minimum with the ambient temperature within a normal range. All of the safety instruction and evacuation procedures were valid, in place, and visible to the participants.

Test Environment

The EHRUT would be typically be used in a healthcare office or facility. In this instance, the testing was conducted in a conference room at e-Health Partners, Inc. For testing, the computers used were running Windows 10. The participants used a mouse and keyboard when interacting with the EHRUT.

The EHRUT displayed on 15 inch monitors with standard full color resolution. No printing was required to complete the test. The application was set up by the vendor according to the vendor's documentation describing the system set-up and preparation. The application itself was running on a remote server using a test database on a LAN connection. Technically, the system performance (i.e., response time) was representative to what actual users would experience in a field implementation. Additionally, participants were instructed not to change any of the default system settings (such as control of font size).

Test Forms and Tools

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

1. Participant Demographics Form
2. Informed Consent Form
3. Moderator's Guide
4. System Usability Scale Questionnaire
5. Incentive Receipt and Acknowledgement Form

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

<u>Participant Instructions</u>

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

Thank you for participating in this study. Your input is very important. Our session today will last between 6 and 8 hours. 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.

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. I did not have any involvement in its creation, so please be honest with your opinions. 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 time (30 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 **<u>39</u>** tasks to complete. Tasks are listed in the moderator's guide in Appendix D.

<u>Usability Metrics</u>

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

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

DATA SCORING

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

Measures	Rationale and Scoring
Effectiveness: Task Success	A task was counted as a "Success" if the participant was able to achieve the correct outcome, without assistance, within the time allotted on a per task basis. The total number of successes were calculated for each task and then divided by the total number of times that task was attempted. The results are provided as a percentage. Task times were recorded for successes. Observed task times divided by the optimal time for each task is a measure of optimal efficiency. Optimal task performance time, as benchmarked by expert performance under realistic conditions, is recorded when constructing tasks. Target task times used for task times in the Moderator's Guide must be operationally defined by taking multiple measures of optimal performance and multiplying by a factor of 2 that allows some time buffer because the participants are presumably not trained to expert performance. Thus, if expert, optimal performance on a task was 30 seconds then allotted task time performance was 60 seconds. This ratio should be aggregated across tasks and reported with mean and variance scores.
Effectiveness: Task Failures	If the participant abandoned the task, did not reach the correct answer or performed it incorrectly, or reached the end of the allotted time before successful completion, the task was counted as a "Failure." No task times were taken for errors. The total number of errors was calculated for each task and then divided by the total number of times that task was attempted. Not all deviations would be counted as errors. This should also be expressed as the mean number of failed tasks per participant. On a qualitative level, an enumeration of errors and error types should be collected.
Efficiency: Task Deviations	The participant's path (i.e., steps) through the application was recorded. Deviations occur if the participant, for example, went to a wrong screen, clicked on an incorrect menu item, followed an incorrect link, or interacted incorrectly with an on-screen control. This path was compared to the optimal path. The number of steps in the observed path is divided by the number of optimal steps to provide a ratio of path deviation. It is strongly recommended that task deviations be reported. Optimal paths (i.e., procedural steps) should be recorded when constructing tasks.
Efficiency: Task Time	Each task was timed from when the administrator said "Begin" until the participant said, "Done." If he or she failed to say "Done," the time was stopped when the participant stopped performing the task. Only task times for tasks that were successfully completed were included in the average task time analysis. Average time per task was calculated for each task. Variance measures (standard deviation and standard error) were also calculated.
Satisfaction: Task Rating	Participant's subjective impression of the ease of use of the application was measured by administering both a simple post-task question as well as a post-session questionnaire. After each task, the participant was asked to rate "Overall, this task was:" on a scale of 1 (Very Difficult) to 5 (Very Easy). These data are averaged across participants. Common convention is that average ratings for systems judged easy to use should be 3.3 or above. To measure participants' confidence in and likeability of the [EHRUT] overall, the testing team administered the System Usability Scale (SUS) post-test questionnaire. Questions included, "I think I would like to use this system frequently," "I thought the system was easy to use," and "I would imagine that most people would learn to use this system very quickly." See full System Usability Score questionnaire in Appendix E.

Table of 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. Participants who failed to follow session and task instructions had their data excluded from the analyses. There were no exclusions in this test.

The usability testing results for the EHRUT are detailed 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.

Scores	N	Task Success		Task Time		Path Deviation		Errors		Task Rating Avg
Task	#	Mean	SD	Mean	SD	Observed	SD	Mean	SD	
Record Medication Order	10	92.31%	0.05	47.0	1.41	0.50	0.35	0.08	0.06	5.0
Change Medication Order	10	89.11%	0.07	25.9	2.76	1.10	0.78	0.12	0.09	4.5
Access Medication Order	10	100.00%	0.00	10.1	0.07	0.00	0.00	0.00	0.00	5.0
Record Laboratory Order	10	94.59%	0.04	49.6	2.55	0.40	0.28	0.06	0.04	5.0
Change Laboratory Order	10	78.95%	0.14	69.5	6.72	3.20	2.26	0.27	0.19	3.5
Access Laboratory Order	10	100.00%	0.00	20.9	0.64	0.00	0.00	0.00	0.00	5.0
Record Radiology/imaging Order	10	97.22%	0.00	47.3	1.63	0.20	0.14	0.03	0.02	5.0
Change Radiology/imaging Order	10	86.33%	0.10	68.1	5.73	1.90	1.34	0.16	0.11	3.5
Access Radiology/imaging Order	10	100.00%	0.00	20.9	0.64	0.00	0.00	0.00	0.00	5.0
Create drug-drug and drug-allergy interventions prior to CPOE completion	10	92.44%	0.06	86.2	4.38	0.90	0.64	0.08	0.06	4.5
Adjustment of severity level of drug-drug interventions	10	97.35%	0.02	74.1	2.90	0.30	0.21	0.03	0.02	4.5
Record Demographics	10	99.10%	0.01	108.6	6.08	0.80	0.57	0.40	0.28	5.0
Change Demographics	10	98.24%	0.01	64.5	3.18	0.40	0.28	0.13	0.09	5.0
Access Demographics	10	100.00%	0.00	10.3	0.21	0.00	0.00	0.00	0.00	5.0
Record Problem List	10	95.24%	0.03	107.9	2.05	0.20	0.14	0.05	0.04	5.0
Change Problem List	10	88.89%	0.08	45.3	3.75	1.00	0.71	0.13	0.09	5.0
Access Problem List	10	100.00%	0.00	10.0	0.00	0.00	0.00	0.00	0.00	5.0
Record Medication List	10	93.75%	0.04	34.1	2.90	0.40	0.28	0.07	0.05	5.0
Change Medication List	10	86.96%	0.08	40.4	3.11	1.20	0.85	0.15	0.11	5.0
Access Medication List	10	100.00%	0.00	10.2	0.14	0.00	0.00	0.00	0.00	5.0
Record Medication Allergy List	10	92.86%	0.05	75.1	3.61	1.00	0.71	0.08	0.05	4.5
Change Medication Allergy List	10	95.65%	0.06	38.6	1.84	0.50	0.35	0.05	0.03	5.0
Access Medication Allergy List	10	100.00%	0.00	10.0	0.00	0.00	0.00	0.00	0.00	5.0
Activate, trigger and configure clinical decision support intervention with problem list	10	83.33%	0.12	49.1	6.43	2.80	1.98	0.20	0.14	4.5
Activate, trigger and configure clinical decision support intervention with medication List	10	82.76%	0.14	72.8	5.52	2.50	1.77	0.21	0.15	4.5
Activate, trigger and configure clinical decision support intervention with Medication Allergy List	10	85.11%	0.10	74.7	4.74	2.10	1.48	0.18	0.12	4.5
Activate, trigger and configure clinical decision support intervention with Demographics	10	89.3%	0.08	47.5	5.30	1.60	1.13	0.27	0.19	4.5
Activate, trigger and configure clinical decision support intervention with Lab Tests and Results	10	85.89%	0.09	69.3	6.58	2.30	1.63	0.16	0.12	4.5
Activate, trigger and configure clinical decision support intervention with Vital Signs	10	91.60%	0.05	55.5	3.89	1.10	0.78	0.09	0.06	4.5
Log into the system with the various users provided and verify the limitations identified for each	10	80.32%	0.14	129.2	6.51	4.90	3.46	0.25	0.17	5.0
Record Implantable Devices	10	100.00%	0.00	42.0	1.41	0.00	0.00	0.00	0.00	5.0
Change Implantable Device Status	10	93.75%	0.04	10.7	0.49	0.20	0.14	0.07	0.05	5.0
Access Implantable Devices List	10	100.00%	0.00	6.2	0.14	0.00	0.00	0.00	0.00	5.0
Review, validate and reconcile the active medication list, allergy list and problem list with data from an external source	10	80.46%	0.14	76.6	4.67	1.70	1.20	0.24	0.17	4.5
Create New Prescription	10	93.75%	0.04	37.8	1.98	0.40	0.28	0.07	0.05	5.0
Change Rx	10	97.22%	0.02	58.8	2.69	0.40	0.28	0.03	0.02	5.0
Cancel Rx	10	100.00%	0.00	5.0	0.00	0.40	0.28	0.20	0.14	5.0
Check Fill Status	10	100.00%	0.00	10.3	0.21	0.00	0.00	0.00	0.00	5.0
Manage Refill Request	10	100.00%	0.00	20.9	0.64	0.00	0.00	0.00	0.00	5.0

The results from the SUS (System Usability Scale) scored the subjective satisfaction with the system based on performance with these tasks to be: **81.0**. Broadly interpreted, scores under 60 represent systems with poor usability; scores over 80 would be considered above average.

RISK

All of the tasks created involve clinical functionality. User errors in most of the tasks were initially considered to be of potential <u>HIGH</u> risk to patient safety. Our aim with this exercise was to determine the level of complexity for the users to successfully complete the tasks presented. The prioritization of risk on patient safety by user errors for the created tasks listed below is based on the test results.

	Task	**Risk**
-	**Computerized provider order entry**	
1.	Record Medication Order	Low
2.	Change Medication Order	Low
3.	Access Medication Order	Low
4.	Record Laboratory Order	Low
5.	Change Laboratory Order	Medium
6.	Access Laboratory Order	Low
7.	Record Radiology/imaging Order	Low
8.	Change Radiology/imaging Order	Medium
9.	Access Radiology/imaging Order	Low
-	**Drug-drug, drug-allergy interaction checks**	
10.	Create drug-drug and drug-allergy interventions prior to CPOE completion	Low
11.	Adjustment of severity level of drug-drug interventions	Low
-	**Demographics**	
12.	Record Demographics	Low
13.	Change Demographics	Low
14.	Access Demographics	Low
-	**Problem list**	
15.	Record Problem List	Low
16.	Change Problem List	Low
17.	Access Problem List	Low
-	**Medication list**	
18.	Record Medication List	Low
19.	Change Medication List	Low
20.	Access Medication List	Low
-	**Medication allergy list**	
21.	Record Medication Allergy List	Low
22.	Change Medication Allergy List	Low
23.	Access Medication Allergy List	Low

- **Clinical decision support**

  24. Problem List Interventions   Low
  25. Medication List Interventions   Low
  26. Medication Allergy List Interventions   Medium
  27. Demographics Interventions   Low
  28. Lab Tests and Results Interventions   Medium
  29. Vital Signs Interventions   Low
  30. Identify User Diagnostic and Therapeutic
       Reference Information   Low
  31. Configuration of CDS interventions by user   Low

- **Implantable Device list**

  32. Record Implantable Devices   Low
  33. Change Implantable Device Status   Low
  34. Access Implantable Device List   Low

- **170.314(b)(4) Clinical information reconciliation**

  35. Reconcile patient's active medication list,
       medication allergy and active problem list
       with another source   Low

- **170.314(b)(3) Electronic prescribing**

  36. Create New Prescription   Low
  37. Manage Change Request   Low
  38. Cancel Prescription   Low
  39. Manage Refill Request   Low
  40. Check Prescription Fill Status   Low

EFFECTIVENESS

All of the test participants were able to complete the 39 tasks that were presented to them. Only one of the tasks had overall success rates in the 70-80% range, mostly due to newly integrated functionality that the users were in large part unaware of. Nevertheless this did create an area for improvement as per the results of the test.

EFFICIENCY

All but two of the tasks were completed well within the allotted time. The overall success rate was 92% with few deviations or errors. Tasks were completed in an average of 47 seconds. The two tasks that the average completion time was above the allotted time presented the user with new functionality that delayed its completion. We're confident that minor changes will make the interface easier for the user to complete these tasks much more quickly.

SATISFACTION

All of the participants rated the system very favorably. The average task rating was 4.8 and the System Usability Scale Questionnaire Score was 81.0.

MAJOR FINDINGS

No major findings were observed. The participants were able to complete all of the tasks within the allotted time. Some commented on the new functionality on this version, suggested different ideas for the integration of the "Change Rx" and "Fill Status" functions.

AREAS FOR IMPROVEMENT

Based on the findings, we may decide to add new functionality that better adapts the "Change Rx" and "Fill Status" criteria into the user's workflow. Right click options were also suggested to access, modify or add data without exiting screens.

APPENDICES

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

A: Participant Demographics

B: Recruiting Screener

C: Informed Consent Form

D: Moderator's Guide

E: System Usability Scale Questionnaire

F: Incentive Receipt and Acknowledgement Form

Appendix A: PARTICIPANT DEMOGRAPHICS FORM

Name: _____

Address: _____
                    _____

Phone: _____

E-Mail: _____

Demographics:

1. _____ Male   _____ Female

2. Have you participated in a focus group or usability test in the past *12* months?
    _____ Yes   _____ No

3. Do you, or does anyone in your home, work in marketing research, usability research, web design […etc.]?
    _____ Yes   _____ No

4. Do you, or does anyone in your home, have a commercial or research interest in an electronic health record software or consulting company?
    _____ Yes   _____ No

5. Which of the following best describes your age?
    _____ 23 to 39
    _____ 40 to 59
    _____ 60 to 74
    _____ Over 75

6. Which of the following best describes your race or ethnic group?
    _____ Caucasian
    _____ Asian
    _____ Black/African-American
    _____ Latino/a or Hispanic
    _____ Other

7. Do you require any assistive technologies to use a computer?
    _____ Yes   _____ No

8. What is your current position and title?

☐ RN
☐ Physician
☐ Clinical Staff Member
☐ Administrative Staff
☐ Other _____

9. How long have you held this position? _____

10. Which of the following describes your highest level of education?
　_____ 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.)

12. About how many hours per week do you spend on the computer? _____
13. What computer platform do you usually use? (Windows / Mac) _____
14. What Internet browser(s) do you usually use? _____
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? _____
18. How does your work environment patient records?
　☐ On paper
　☐ Some paper, some electronic
　☐ All electronic

Signature: _____   Date: _____

Appendix B: RECRUITING SCREENER

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

Recruiting Script for Recruiting Firm

Hello, my name is _____, calling from *E-Health Partners, Inc.* 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 would like to participate. This should only take a few minutes of your time. This is strictly for research purposes. If you are interested and qualify for the study, you will be paid to participate. Can I ask you a few questions?

1. _____ Male   _____ Female

2. Have you participated in a focus group or usability test in the past *12* months?
    _____ Yes   _____ No

3. Do you, or does anyone in your home, work in marketing research, usability research, web design […etc.]?
    _____ Yes   _____ No

4. Do you, or does anyone in your home, have a commercial or research interest in an electronic health record software or consulting company?
    _____ Yes   _____ No

5. Which of the following best describes your age?
    _____ 23 to 39
    _____ 40 to 59
    _____ 60 to 74
    _____ Over 75

6. Which of the following best describes your race or ethnic group?
    _____ Caucasian
    _____ Asian
    _____ Black/African-American
    _____ Latino/a or Hispanic
    _____ Other

7. Do you require any assistive technologies to use a computer?
    _____ Yes   _____ No

Professional Demographics

8. What is your current position and title?

☐ RN
☐ Physician
☐ Clinical Staff Member
☐ Administrative Staff
☐ Other _____

9. How long have you held this position? _____

10. Which of the following describes your highest level of education?
   _____ 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.)

12. About how many hours per week do you spend on the computer? _____

13. What computer platform do you usually use? _____

14. What Internet browser(s) do you usually use? _____

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? _____

18. How does your work environment patient records?
   ☐ On paper
   ☐ Some paper, some electronic
   ☐ All electronic

Contact Information

Those are all the questions I have for you. Your background matches the people we're looking for. For your participation, you will be paid $200.00.

The test will be conducted at our main offices in San Juan. We will contact you several days prior to the session to confirm the.

May I get your contact information?

☐ Name of participant: ☐ Evening phone number:

☐ Address: ☐ Alternate [cell] phone number:

☐ City, State, Zip: ☐ Email address:

☐ Daytime phone number:

Appendix C: INFORMED CONSENT FORM

Informed Consent

E-Health Partners, Inc. would like to thank you for participating in this study. The purpose of this study is to evaluate an electronic health records system. If you decide to participate, you will be asked to perform several tasks using the prototype and give your feedback. The study will last about *6-8* hours. At the conclusion of the test, you will be compensated for your time.

Agreement

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

I understand that the information is for research purposes only and that my name will not be used for any purpose other than research.

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

I understand and agree that the data collected from this study may be shared with outside of E-Health Partners, Inc. and E-Health Partners' clients.

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:** _____

EHRez v5.0 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

Prior to each participant:

☐ Reset application
☐ Start session recordings with *tool*

Prior to each task:

☐ Reset application to starting point for next task

Orientation (5 minutes)

Thank you for participating in this study. Our session today will last about 5 hours. During that time, you will take part in evaluating the usability of our electronic health record system EHRez v5.0. 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 help you with anything to do with the system itself. Please save your detailed comments until the end of a task or the end of the session as a whole when we can discuss freely.

I did not have any involvement in its creation, so please be honest with your opinions.

The product you will be using today is *describe the state of the application, i.e., production version, early prototype, etc*. Some of the data may not make sense as it is placeholder data.

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

Do you have any questions or concerns?

Task 1 – CPOE – Record Medication Order

Task Description:

- o Create the following medication prescription for patient Jane Doe

    - Simvastatin 20 mg tablet
    - SIG = "Take one tablet by mouth daily"
    - Quantity = 30
    - Refills = 1

Optimal Path

Right click on the "Medications" section or press the "Plus" button next to the hyperlink on the Medication section, select "New Prescription", search for Simvastatin, double click or press the "Add" button on Simvastatin 20 mg tablet, complete SIG, Quantity and Refills. Click Save. Review order and Press "Save"

Task Success:

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

Comments:

Task Time: _____ Seconds

Task Deviations:

☐ Correct
☐ Minor Deviations
☐ Major Deviations

Comments:

Task Rating:

Overall, this task was: _____ (Scale of 1 to 5)

Administrator Comments:

Task 2 - CPOE – Change Medication Order

Task Description:

- o Change Simvastatin to the following medication for patient Jane Doe

    - Atorvastatin 20 mg tablet
    - SIG = "Take one tablet by mouth daily"
    - Quantity = 30
    - Refills = 2

Optimal Path

Click on the "Medications" hyperlink on the Medication section, select the drug Simvastatin and click on "Edit", press the "Cancelled or Discontinued" option, select or add reason for change and press Save. Click on "New Prescription", search for Atorvastatin, double click or press the "Add" button on Atorvastatin 20 mg tablet, complete SIG, Quantity and Refills. Click Save. Review order and Press "Save"

Task Success:

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

Comments:

Task Time: _____ Seconds

Task Deviations:

☐ Correct
☐ Minor Deviations
☐ Major Deviations

Comments:

Task Rating:

Overall, this task was: _____ (Scale of 1 to 5)

Administrator Comments:

Task 3 - CPOE – Access Medication Order

Task Description:

- o Access Medication Order for Atorvastatin for patient Jane Doe

Optimal Path

Click on the "View Orders" button on the "side bar" of the Clinical Screen. Select the order for Atorvastatin, select to view details or Press the printer icon.

Task Success:

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

Comments:

Task Time: _____ Seconds

Task Deviations:

☐ Correct
☐ Minor Deviations
☐ Major Deviations

Comments:

Task Rating:

Overall, this task was: _____ (Scale of 1 to 5)

Administrator Comments:

Task 4 – CPOE – Record Laboratory Order

Task Description:

- o   Create the following laboratory order for patient Jane Doe

    - ▪   Creatinine 24 H Urine Panel
    - ▪   Cholesterol in HDL in serum or plasma
    - ▪   Fasting Blood Glucose in serum or plasma

Optimal Path

Right click on the "Pending Orders" section or press the "Plus" button next to the hyperlink on the Pending Orders section, select "Add Order", search for Creatinine, press the "Add" button on Creatinine 24 H search results, search for cholesterol, press the "Add" button on the HDL option, search for glucose, press the "Add" button on the "glucose, serum" option.

Select the "Patient Dx Code" button, select Dx and press "Main Dx" button. Press Save

Task Success:

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

Comments:

Task Time: _____ Seconds

Task Deviations:

☐ Correct
☐ Minor Deviations
☐ Major Deviations

Comments:

Task Rating:

Overall, this task was: _____ (Scale of 1 to 5)

Administrator Comments:

Task 5 - CPOE – Change Laboratory Order

Task Description:

- o   Change the laboratory order for patient Jane Doe

    - ▪   Change Cholesterol in HDL in serum or plasma to Cholesterol in LDL

Optimal Path

Click on the hyperlink on the "Pending Orders" section, press the "Order History" button, select the Cholesterol in HDL order and press de (-) icon to deactivated, type reason for change and press OK, press the "Previous" button, and the "Previous" button again on the next screen. Right click on the "Pending Orders" section or press the "Plus" button next to the hyperlink on the Pending Orders section, select "Add Order", search for LDL, press the "Add" button on LDL cholesterol search results. Select the Dx from the drop down list and Press Save.

Task Success:

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

Comments:

Task Time: _____ Seconds

Task Deviations:

☐ Correct
☐ Minor Deviations
☐ Major Deviations

Comments:

Task Rating:

Overall, this task was: _____ (Scale of 1 to 5)

Administrator Comments:

Task 6 - CPOE – Access Laboratory Order

Task Description:

     o   Access Laboratory Order for patient Jane Doe

Optimal Path

Click on the "View Orders" button on the "side bar" of the Clinical Screen. Select the order listed as laboratory, select to view details or Press the printer icon.

Task Success:

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

Comments:

Task Time: _____ Seconds

Task Deviations:

☐ Correct
☐ Minor Deviations
☐ Major Deviations

Comments:

Task Rating:

       Overall, this task was: _____ (Scale of 1 to 5)

Administrator Comments:

Task 7 – CPOE – Record Radiology/imaging Order

Task Description:

- o Create the following Radiology/Imaging order for patient Jane Doe

    - ▪ Radiologic examination, knee; 3 views
    - ▪ CT head/brain w/o contrast material

Optimal Path

Right click on the "Pending Orders" section or press the "Plus" button next to the hyperlink on the Pending Orders section, select "Add Order", Press the "Images" option on the search screen, search for "knee", press the "Add" button on the Radiologic examination, knee 3 views test, search for "Head" or "Brain", press the "Add" button on the required test.

Select the "Patient Dx Code" button, select Dx and press "Main Dx" button. Press Save

Task Success:

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

Comments:

Task Time: _____ Seconds

Task Deviations:

☐ Correct
☐ Minor Deviations
☐ Major Deviations

Comments:

Task Rating:

Overall, this task was: _____ (Scale of 1 to 5)

Administrator Comments:

Task 8 - CPOE – Change Radiology/imaging Order

Task Description:

- o Change the Radiology/Imaging order for patient Jane Doe

    - ▪ Change the CT head/brain w/o contrast material to CT head/brain with contrast material

Optimal Path

Click on the hyperlink on the "Pending Orders" section, press the "Order History" button, select the CT in the image order and press de (-) icon to deactivated, type reason for change and press OK, press the "Previous" button, and the "Previous" button again on the next screen. Right click on the "Pending Orders" section or press the "Plus" button next to the hyperlink on the Pending Orders section, select "Add Order", Press the "Images" option on the search screen, search for "Head" or "Brain", press the "Add" button on CT w/ contrast material test. Select the Dx from the drop down list and Press Save.

Task Success:

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

Comments:

Task Time: _____ Seconds

Task Deviations:

☐ Correct
☐ Minor Deviations
☐ Major Deviations

Comments:

Task Rating:

Overall, this task was: _____ (Scale of 1 to 5)

Administrator Comments:

Task 9 - CPOE – Access Radiology/imaging Order

Task Description:

- o Access the Radiology/Imaging Order for patient Jane Doe

Optimal Path

Click on the "View Orders" button on the "side bar" of the Clinical Screen. Select the order listed as image, select to view details or Press the printer icon.

Task Success:

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

Comments:

Task Time: _____ Seconds

Task Deviations:

☐ Correct
☐ Minor Deviations
☐ Major Deviations

Comments:

Task Rating:

Overall, this task was: _____ (Scale of 1 to 5)

Administrator Comments:

Task 10 - Drug-drug, drug-allergy interaction checks

Task Description:

- o   Automatically Generate and Electronically Indicate Drug-drug and Drug-allergy Interventions

    - ▪   Create new prescription for patient John Sinclair for the following drug: **Plavix 75 mg** – 1 tablet by mouth daily, 30 Ct, 0 Refills and **Codeine Phosphate** or any other codeine drug – 1 tablet by mouth daily, 30 Ct, 0 Refills

        - •   Will return a Major drug interaction - Plavix

        - •   Will return a Drug/Allergy interaction - Codeine

Optimal Path

Right click on the "Medications" section or press the "Plus" button next to the hyperlink on the Medication section, select "New Prescription", search for Plavix, double click or press the "Add" button on Plavix 75 mg tablet, complete SIG, Quantity and Refills. Search for Codeine, double click or press the "Add" button on Codeine Phosphate tablet, complete SIG, Quantity and Refills.

Review alerts, cancel order (Review Interactions)

Task Success:

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

Comments:

Task Time: _____ Seconds

Task Deviations:

☐ Correct
☐ Minor Deviations
☐ Major Deviations

Comments:

Task Rating:

Overall, this task was: _____ (Scale of 1 to 5)

Administrator Comments:

Task 11 - Drug-drug, drug-allergy interaction checks – Adjust severity level

Task Description:

- o Adjustment of severity level of drug-drug interventions

  - Change interaction check for Drug-Drug interactions to Severe

    - Create new prescription for patient John Sinclair for the following drug: Amaryl, any strength, Qty, Refills.

      - o No Interaction is observed

  - Change interaction check for Drug-Drug interactions to Moderate

    - Create new prescription for patient John Sinclair for the following drug: Amaryl, any strength, Qty, Refills.

      - o Moderate interaction is presented

Optimal Path

Right click on the "Medications" section or press the "Plus" button next to the hyperlink on the Medication section, select "New Prescription", Change interaction for Drug-Drug to Severe, search for Amaryl, double click or press the "Add" button on any Amaryl option, complete SIG, Quantity and Refills. Cancel Order.

Change interaction for Drug-Drug to Moderate, search for Amaryl, double click or press the "Add" button on any Amaryl option, complete SIG, Quantity and Refills. Review Interaction, cancel order

Task Success:

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

Comments:

Task Time: _____ Seconds

Task Deviations:

☐ Correct
☐ Minor Deviations
☐ Major Deviations

Comments:

Task Rating:

Overall, this task was: _____ (Scale of 1 to 5)

Administrator Comments:

Task 12 – Record Demographics

Task Description:

- o Create a new patient record (Use your own Name) and complete all required fields and be sure to complete the following:

  - Date of Birth
  - Gender
  - Race
  - Ethnicity
  - Preferred Language
  - Sexual Orientation
  - Gender Identity

Optimal Path

On the Patient Details screen click on the "Add" button on the toolbar. Add all demographic data and click on the "Save" button on the toolbar.

Task Success:

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

Comments:

Task Time: _____ Seconds

Task Deviations:

☐ Correct
☐ Minor Deviations
☐ Major Deviations

Comments:

Task Rating:

Overall, this task was: _____ (Scale of 1 to 5)

Administrator Comments:

Task 13 – Change Demographics

Task Description:

- o Change patient demographics information for the record created on task 11 to the data elements below:

  - Date of Birth   - Change to 1/1/1970 (change if it matches the initial entry)
  - Gender   - Change to M/F
  - Race   - Change to "Declined to Specify"
  - Ethnicity   - Change to "Declined to Specify"
  - Preferred Language   - Change to "Declined to Specify"
  - Sexual Orientation   - Change to "Don't Know"
  - Gender Identity   - Change to "Genderqueer, neither exclusively male nor female"

Optimal Path

On the Patient Details screen type the patient name on the search field and select the appropriate record from the "Drop Down" results. Click on the "Edit" button on the toolbar and modify the required data elements and click on the "Save" button on the toolbar.

Task Success:

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

Comments:

Task Time: _____ Seconds

Task Deviations:

☐ Correct
☐ Minor Deviations
☐ Major Deviations

Comments:

Task Rating:

Overall, this task was: _____ (Scale of 1 to 5)

Administrator Comments:

Task 14 – Access Demographics

Task Description:

- o Access patient demographics information for the record created on task 11 and ascertain that the information presented matches the changes made on task 12.

Optimal Path

On the Patient Details screen type the patient name on the search field and select the appropriate record from the "Drop Down" results. Review the data elements modified on the previous step.

Task Success:

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

Comments:

Task Time: _____ Seconds

Task Deviations:

☐ Correct
☐ Minor Deviations
☐ Major Deviations

Comments:

Task Rating:

Overall, this task was: _____ (Scale of 1 to 5)

Administrator Comments:

Task 15 – Record Problem List

Task Description:

    o   Add the following problems to the patient record created for the demographics Task.

- Essential Hypertension (disorder); SNOMED code: 59621000
- Diabetes Mellitus Type 2 (disorder); SNOMED code: 44054006
- Acquired Hypothyroidism (disorder): SNOMED code: 111566002
- Chronic Rejection of Renal Transplant (disorder); SNOMED code: 236578006

Optimal Path

Click on the "Problem List" hyperlink on the Problem List section, click on the "Add" button on the toolbar, search for and select each SNOMED value listed above. Click on the "Disc" icon on the toolbar to confirm the selections.

Task Success:

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

Comments:

Task Time: _____ Seconds

Task Deviations:

☐ Correct
☐ Minor Deviations
☐ Major Deviations

Comments:

Task Rating:

       Overall, this task was: _____ (Scale of 1 to 5)

Administrator Comments:

Task 16 – Change Problem List

Task Description:

- o Change the following problems for the patient record selected on the previous task.

  - **Resolve** Diabetes Mellitus Type 2 (disorder); SNOMED code: 44054006
  - **Change** Acquired Hypothyroidism (disorder) to <u>Severe Hypothyroidism (disorder)</u> <u>SNOMED code: 83986005</u>

Optimal Path

Click on the "Problem List" hyperlink on the Problem List section, select the entry for Diabetes Mellitus Type 2, click on the "Edit" button on the toolbar, on the "Status" field, select "Resolved" from the drop-down menu and click on the "disc" icon.
Select the Acquired hypothyroidism problem, click on the "Edit" button on the toolbar, on the SNOMED field, select the SNOMED value 83986005 from the drop-down menu and click on the "Disc" icon on the toolbar to confirm the change

Task Success:

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

Comments:

Task Time: _____ Seconds

Task Deviations:

☐ Correct
☐ Minor Deviations
☐ Major Deviations

Comments:

Task Rating:

Overall, this task was: _____ (Scale of 1 to 5)

Administrator Comments:

Task 17 – Access Problem List

Task Description:

- o Access the problems list for the patient record selected on the previous task. Review that the active problems are as follow:

  - ▪ Essential Hypertension (disorder) - SNOMED code: 59621000
  - ▪ Severe Hypothyroidism (disorder) - SNOMED code: 83986005
  - ▪ Chronic Rejection of Renal Transplant (disorder) - SNOMED code: 236578006

Optimal Path

Click on the "Problem List" hyperlink on the Problem List section, review that the "Status" option on the top of the screen is showing the "Active" problems.

Task Success:

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

Comments:

Task Time: _____ Seconds

Task Deviations:

☐ Correct
☐ Minor Deviations
☐ Major Deviations

Comments:

Task Rating:

Overall, this task was: _____ (Scale of 1 to 5)

Administrator Comments:

Task 18 – Record Medication List

Task Description:

- o Add the following medication to your patient record (as created for the demographics task)

  - ▪ Simvastatin 20 mg tablet, SIG = "Take one tablet by mouth daily"
  - ▪ Lorazepam .5 mg tablet, 1 tablet three times daily

Optimal Path

Click on the "Medications" hyperlink on the Medications section, select "Add Medication", search for Simvastatin, double click or press the "Add" button on Simvastatin 20 mg tablet, search for Lorazepam, double click or press the "Add" button on Lorazepam .5 mg tablet. Click Save.

Task Success:

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

Comments:

Task Time: _____ Seconds

Task Deviations:

☐ Correct
☐ Minor Deviations
☐ Major Deviations

Comments:

Task Rating:

Overall, this task was: _____ (Scale of 1 to 5)

Administrator Comments:

Task 19 – Change Medication List

Task Description:

- o Make the following changes to the medication list of your patient record

  - ▪ Change Simvastatin from 20 mg tablet to **40 mg tablet**
  - ▪ Change the SIG on Lorazepam .5 mg from 1 tablet three times daily to **1 tablet every 6 hours**

Optimal Path

Click on the "Medications" hyperlink on the Medications section, select Simvastatin, right click and highlight "Change Dosage" and select Simvastatin 40 mg tablet. Enter reason for change and press "OK".

Select Lorazepam, press "Edit", Change SIG to "1 tablet every 6 hours", press "Save".

Task Success:

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

Comments:

Task Time: _____ Seconds

Task Deviations:

☐ Correct
☐ Minor Deviations
☐ Major Deviations

Comments:

Task Rating:

Overall, this task was: _____ (Scale of 1 to 5)

Administrator Comments:

Task 20 – Access Medication List

Task Description:

- o Access and view the medication list for your patient record

Optimal Path

Click on the "Medications" hyperlink on the Medications section.

Task Success:

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

Comments:

Task Time: _____ Seconds

Task Deviations:

☐ Correct
☐ Minor Deviations
☐ Major Deviations

Comments:

Task Rating:

Overall, this task was: _____ (Scale of 1 to 5)

Administrator Comments:

Task 21 – Record Medication Allergy List

Task Description:

- o Add the following medication allergy to your patient record (as created for the demographics task)

  - ▪ Sulfasalazine, Reaction: Wheezing
  - ▪ Penicillin V, Reaction: Dizziness
  - ▪ Carbamazepine, Reaction: Rash

Optimal Path

Right click on the "Allergies" section or press the "Plus" button next to the hyperlink on the Allergies section, select "Add Allergies", search for Sulfasalazine on the Medication search, double click on the drug Sulfasalazine, select reaction "Rash". Press the "Disc" icon to save. Follow the same steps for the other 2 medication allergies with their appropriate reactions.

Task Success:

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

Comments:

Task Time: _____ Seconds

Task Deviations:

☐ Correct
☐ Minor Deviations
☐ Major Deviations

Comments:

Task Rating:

Overall, this task was: _____ (Scale of 1 to 5)

Administrator Comments:

Task 22 – Change Medication Allergy List

Task Description:

- o   Make the following changes to the medication allergy list of your patient record

    - ▪ **Inactivate** Sulfasalazine
    - ▪ **Change** Penicillin V to **Penicillin G**
    - ▪ Change Carbamazepine to **Codeine**

Optimal Path

Click on the "Allergies" hyperlink on the Allergies section, select the line for Sulfasalazine, click "Deactivate", type "Test" as the inactivation reason and "Save".
Select the entry for Penicillin V, click "Edit", on the "Medication" line, click, search for and select Penicillin G and press "Save".
Select the entry for Carbamazepine, click "Edit", on the "Medication" line, click, search for and select Codeine and press "Save".

Task Success:

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

Comments:

Task Time: _____ Seconds

Task Deviations:

☐ Correct
☐ Minor Deviations
☐ Major Deviations

Comments:

Task Rating:

Overall, this task was: _____ (Scale of 1 to 5)

Administrator Comments:

Task 23 – Access Medication Allergy List

Task Description:

- o Access the active medication allergy list of your patient record. Ascertain that it displays the following:

  - ▪ Penicillin G, Reaction: Dizziness
  - ▪ Codeine, Reaction: Rash

Optimal Path

Click on the "Allergies" hyperlink on the Allergies section.

Task Success:

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

Comments:

Task Time: _____ Seconds

Task Deviations:

☐ Correct
☐ Minor Deviations
☐ Major Deviations

Comments:

Task Rating:

Overall, this task was: _____ (Scale of 1 to 5)

Administrator Comments:

Task 24 – Clinical decision support - Problem List Interventions

Task Description:

    o   Activate, trigger and configure clinical decision support alerts

        ▪   Access InfoButton documentation

Optimal Path

Open new progress note for patient John Sinclair. After the alerts warning, access the alerts details screen, select any of the listed alerts and press the "infoButton" for more information. Press the process alert button and complete the task. "After returning to the PN screen, the processed alert will no longer appear".

Select a different alert and press the deactivate button (Reject). Enter reason for rejection and press save.

Identify any of the listed alerts and access the "Settings" menu via the QuickLinks option on the screen's header menu. Click on "Clinical" and select "Clinical Decision Support". Select the alert previously identified for modification and press the "Edit" button. Press the "Diagnosis" tab, search for "Diabetes", press "select all" and "Save".

Press "Previous" to return to the PN screen and notice that the system no longer displays the modified alert. (Ask participants to explain why??)

Task Success:

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

Comments:

Task Time: _____ Seconds

Task Deviations:

☐ Correct
☐ Minor Deviations
☐ Major Deviations

Comments:

Task Rating:

    Overall, this task was: _____ (Scale of 1 to 5)

Administrator Comments:

Task 25 – Clinical decision support - Medication List Interventions

Task Description:

      o   Activate, trigger and configure clinical decision support alerts

           ▪   Access InfoButton documentation

Optimal Path

Open new progress note for patient John Sinclair. Access the "Settings" menu via the QuickLinks option on the screen's header menu. Click on "Clinical" and select "Clinical Decision Support". Press the "Add" button. Select "Medications" as the alert type, enter the description: "Crestor Medication Test", for frequency select every 1 year, enter "Both" in the gender option, enter age range 20 to 100, enter alert message: "Crestor Test". Press the "Medication" tab, search for "Crestor", press "select all", select the "Medication present" check and click "Save".

Press "Previous" to return to the PN screen and notice that the activated alert is now visible. (Patient has crestor in his medication list).

Task Success:

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

Comments:

Task Time: _____ Seconds

Task Deviations:

☐ Correct
☐ Minor Deviations
☐ Major Deviations

Comments:

Task Rating:

      Overall, this task was: _____ (Scale of 1 to 5)

Administrator Comments:

Task 26 – Clinical decision support – Medication Allergy List Interventions

Task Description:

- o Activate, trigger and configure clinical decision support alerts

  - ▪ Access InfoButton documentation

Optimal Path

Open new progress note for patient John Sinclair. Access the "Settings" menu via the QuickLinks option on the screen's header menu. Click on "Clinical" and select "Clinical Decision Support". Press the "Add" button. Select "Allergies" as the alert type, enter description: "Penicillin Test", for frequency select "Always", enter "Both" in the gender option, enter age range 20 to 100, enter alert message: "Penicillin Allergy Test". Press the "Allergies" tab, search for "Penicillin", press "select all" and "Save".

Press "Previous" to return to the PN screen and notice that the activated alert is not visible.

Right click on the allergies section, select add allergy, select the medication option, search for and select penicillin, add reaction and press "OK". The alert warning will display the activated alert.

Task Success:

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

Comments:

Task Time: _____ Seconds

Task Deviations:

☐ Correct
☐ Minor Deviations
☐ Major Deviations

Comments:

Task Rating:

Overall, this task was: _____ (Scale of 1 to 5)

Administrator Comments:

Task 27 – Clinical decision support – Demographics Interventions

Task Description:

- o Activate, trigger and configure clinical decision support alerts

    - Access InfoButton documentation

Optimal Path

Open new progress note for patient John Sinclair. Identify any of the listed alerts and access the "Settings" menu via the QuickLinks option on the screen's header menu. Click on "Clinical" and select "Clinical Decision Support". Select the alert previously identified for modification and press the "Edit" button. Modify the age range to between 50 and 75 and press "Save"

Press "Previous" to return to the PN screen and notice that the system no longer displays the modified alert.
(Ask participants to explain why??)

Task Success:

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

Comments:

Task Time: _____ Seconds

Task Deviations:

☐ Correct
☐ Minor Deviations
☐ Major Deviations

Comments:

Task Rating:

Overall, this task was: _____ (Scale of 1 to 5)

Administrator Comments:

Task 28 – Clinical decision support – Lab Tests and Results Interventions

Task Description:

  o Activate, trigger and configure clinical decision support alerts

    ▪ Access InfoButton documentation

Optimal Path

Open new progress note for patient John Sinclair. Access the "Settings" menu via the QuickLinks option on the screen's header menu. Click on "Clinical" and select "Clinical Decision Support". Press the "Add" button. Select the alert type "Labs", enter description: "Cholesterol Result Test Alert", for frequency select "Always", enter "Both" in the gender option, enter age range 20 to 100, enter alert message: "Lab result test". On the "Selection" line, double click to search for and select "Lipid Panel", press the "Lab Results" tab, select the "Total Cholesterol" test and select "Greater than" and add the value of 200. Press "Save".

Press "Previous" to return to the PN screen. On the "Pending Orders" section, right click on the Lipid panel order, select "add results". Select the "Total Cholesterol" test, add the value of 210 and press "Save". Press the "Previous" button to return to the PN screen.

The Lab alert is now displayed.

Task Success:

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

Comments:

Task Time: _____ Seconds

Task Deviations:

☐ Correct
☐ Minor Deviations
☐ Major Deviations

Comments:

Task Rating:

  Overall, this task was: _____ (Scale of 1 to 5)

Administrator Comments:

Task 29 – Clinical decision support – Vital Signs Interventions

Task Description:

- o   Activate, trigger and configure clinical decision support alerts

    - ▪   Access InfoButton documentation

Optimal Path

Open new progress note for patient John Sinclair. Access the "Settings" menu via the QuickLinks option on the screen's header menu. Click on "Clinical" and select "Clinical Decision Support". Press the "Add" button. Select the alert type "Miscellaneous", enter description: "Vitals Test", for frequency select "Always", enter "Both" in the gender option, enter age range 20 to 100, enter alert message: "Vital signs test". Click on "Vital Signs", on the BP option, enter 150/100. Press "Save".

Press "Previous" to return to the PN screen. On the "Vital Signs" section, right click and select "Add Vital Signs", add weight, height and BP of 160/110 and press "Save".

The BP alert is now displayed.

Task Success:

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

Comments:

Task Time: _____ Seconds

Task Deviations:

☐ Correct
☐ Minor Deviations
☐ Major Deviations

Comments:

Task Rating:

Overall, this task was: _____ (Scale of 1 to 5)

Administrator Comments:

Task 30 – Clinical decision support – Identify User Diagnostic and Therapeutic Reference Information

Task Description:

- o Verify the use of the "Infobutton" function in CDS alerts for each of the following categories:

  - Problem List
  - Medication List
  - Lab Tests
  - Combo of Problem List, Med List, Med Allergy List, Demographics, Lab Tests, Vital Signs

Optimal Path

This was documented during each of the CDS tests by the administrator

Task Success:

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

Comments:

Task Time: _____ Seconds

Task Deviations:

☐ Correct
☐ Minor Deviations
☐ Major Deviations

Comments:

Task Rating:

Overall, this task was: _____ (Scale of 1 to 5)

Administrator Comments:

Task 31 – Clinical decision support – Configuration of CDS interventions by user

Task Description:

o Log into the system with the various users provided and verify the limitations identified for each.

- Initial user provided: Can create/modify CDS interventions and therapeutic reference resources (recorded in the steps above)
- User2: Has CDS indications (can view/process CDS alerts)
- User3: Does not have CDS indications (Cannot view alerts)
- User4: Can Access Diagnostic and Therapeutic Reference Resources (Can view alerts and reference resources (Infobutton))
- User5: Can **Not** Access Diagnostic and Therapeutic Reference Resources (Can view alerts but **not** reference resources (Infobutton))
- User6: Can not configure CDS or Diagnostic and Therapeutic Reference Resources (Does not have access to create/modify CDS alerts or Therapeutic Reference Resources)

Optimal Path

Log into the system with each of the users provided. Open a new progress note for patient John Sinclair and validate the limitations for each of the clinical users provided.

**** (login / logout times are to be excluded from Task Times) ****

Task Success:

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

Comments:

Task Time: _____ Seconds

Task Deviations:

☐ Correct
☐ Minor Deviations
☐ Major Deviations

Comments:

Task Rating:

Overall, this task was: _____ (Scale of 1 to 5)

Administrator Comments:

Task 32 – Record Implantable Device

Task Description:

- o Record the Implantable Devices below for your patient record (as created in the Demographics task). Review "Active" device list.

  - (01)10884521062856(11)141231(17)150707(10)A213B1(21)1234
  - +B066000325011NS1/$$420020216LOT123456789012345/SXYZ456789012345678/16D20130202C1
  - =/W4146EB0010T0475=,000025=A99971312345600=>014032=}013032&,1000000000000XYZ123

Optimal Path

Click on the "Implantable Devices" on the Side Bar of the Clinical Screen. Enter UDI in the search field and press the "Search" button. Enter "2/1/2017" on the "Date Implanted" field and click on the disc icon to save. Repeat the process for all 3 UID's.
The "Active" devices list is displayed on the left section of the Implantable devices screen.

Task Success:

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

Comments:

Task Time: _____ Seconds

Task Deviations:

☐ Correct
☐ Minor Deviations
☐ Major Deviations

Comments:

Task Rating:

Overall, this task was: _____ (Scale of 1 to 5)

Administrator Comments:

Task 33 – Change Implantable Device

Task Description:

- o Change the Implantable Device below for your patient record.

  - ▪ Select 1 of the entries on the "Active" devices list and change to "Inactive"

Optimal Path

Click on the "Implantable Devices" on the Side Bar of the Clinical Screen. Select an entry displayed on the "Active" devices list. On the "Status" field, select "Inactive" from the drop-down menu and press the disc icon to save the entry.

Task Success:

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

Comments:

Task Time: _____ Seconds

Task Deviations:

☐ Correct
☐ Minor Deviations
☐ Major Deviations

Comments:

Task Rating:

Overall, this task was: _____ (Scale of 1 to 5)

Administrator Comments:

Task 34 – Access Implantable Device List (Active & Inactive)

Task Description:

- o Access the Implantable Device List and review both Active and Inactive devices

Optimal Path

Click on the "Implantable Devices" on the Side Bar of the Clinical Screen. The "Default" view is for "Active Devices. Click on the "Inactive" devices button to review inactive devices.

Task Success:

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

Comments:

Task Time: _____ Seconds

Task Deviations:

☐ Correct
☐ Minor Deviations
☐ Major Deviations

Comments:

Task Rating:

Overall, this task was: _____ (Scale of 1 to 5)

Administrator Comments:

Task 35 – Clinical information reconciliation - Reconcile patient's active medication list, active medication allergy list and active problem list with another source

Task Description: Review, validate and reconcile the active medication list, allergy list and problem list with data from an external source

- o View a received C-CDA file and perform clinical information reconciliation for the medication list, allergy list and problem list.
- o Validate the information to be reconciled.
- o Confirm and save to the patient record

Optimal Path

Open the Messages and Tasks screen. Open the message containing the C-CDA file. Click on the attachment name to view the file. Review the information displayed on the screen. Search for and select the patient in question ("Isabella Jones"). On the "View specific section:" field, select "All" from the drop-down menu. Click on the "import" button on the toolbar. On the "Summary Reconciliation" screen, validate the data available for reconciliation (Allergies, Medications and Problems). Click on the "Reconcile" button.

Task Success:

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

Comments:

Task Time: _____ Seconds

Task Deviations:

☐ Correct
☐ Minor Deviations
☐ Major Deviations

Comments:

Task Rating:

Overall, this task was: _____ (Scale of 1 to 5)

Administrator Comments:

Task 36 – Electronic prescribing – Create New / Cancel Prescription

Task Description: Create new prescription – Cancel prescription

Optimal Path

On the Clinical Screen, search for and select patient Sophia Biscayne. Click on the hyperlink on the "Medication List" section, click on "New Rx". Select any medication from the displayed "favorites" and click "Save".   Click on "Select Pharmacy" and select the following pharmacy: "tp depr testing region" and press "Send".

On the Medications screen, select the medication prescribed above, "right click" on the "Status" column and select "Cancel". The status field will display "Cancellation Sent".

Task Success:

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

Comments:

Task Time: _____ Seconds

Task Deviations:

☐ Correct
☐ Minor Deviations
☐ Major Deviations

Comments:

Task Rating:

Overall, this task was: _____ (Scale of 1 to 5)

Administrator Comments:

Task 37 – Electronic prescribing – Manage Change Requests

Task Description: Process change requests

Optimal Path

On the Clinical Screen, Click on the hyperlink on the "Medication List" section, click on the "E-Health Network" tab and select the "Change Requests" option. On the "Pending" list, select the displayed request type G (Generic Substitution), "right click" and select the "Manage Request" option. Press "Deny" for this request, add a denial reason and press Save.

On the "Pending" list, select the displayed request type G (Generic Substitution), "right click" and select the "Manage Request" option. Press the "Approved" option.

On the "Pending" list, select the displayed request type T (Same Therapeutic Class), "right click" and select the "Manage Request" option. Modify the days' supply to 60 and Press the "Approved" option.

Task Success:

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

Comments:

Task Time: _____ Seconds

Task Deviations:

☐ Correct
☐ Minor Deviations
☐ Major Deviations

Comments:

Task Rating:

Overall, this task was: _____ (Scale of 1 to 5)

Administrator Comments:

Task 38 – Electronic prescribing – Check Fill Status

Task Description: Check Fill Status

Optimal Path

On the Clinical Screen, click on the hyperlink on the "Medication List" section, click on the "E-Health Network" tab and select the "Fill Status" option. The list displays the Medication prescribed, date prescribed and status.

Task Success:

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

Comments:

Task Time: _____ Seconds

Task Deviations:

☐ Correct
☐ Minor Deviations
☐ Major Deviations

Comments:

Task Rating:

Overall, this task was: _____ (Scale of 1 to 5)

Administrator Comments:

Task 39 – Electronic prescribing – Manage Refill Request

Task Description: Manage Refill Request

Optimal Path

On the Clinical Screen, click on the hyperlink on the "Medication List" section, click on the "E-Health Network" tab and select the "Refill Requests" option. The list displays the Pending refill requests. "Right click" to process.

Task Success:

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

Comments:

Task Time: _____ Seconds

Task Deviations:

☐ Correct
☐ Minor Deviations
☐ Major Deviations

Comments:

Task Rating:

Overall, this task was: _____ (Scale of 1 to 5)

Administrator Comments:

Appendix E: SYSTEM USABILITY SCALE QUESTIONNAIRE

	Strongly disagree				Strongly agree

1. I think that I would like to use this system frequently

| 1 | 2 | 3 | 4 | 5 |

2. I found the system unnecessarily complex

| 1 | 2 | 3 | 4 | 5 |

3. I thought the system was easy to use

| 1 | 2 | 3 | 4 | 5 |

4. I think that I would need the support of a technical person to be able to use this system

| 1 | 2 | 3 | 4 | 5 |

5. I found the various functions in this system were well integrated

| 1 | 2 | 3 | 4 | 5 |

6. I thought there was too much inconsistency in this system

| 1 | 2 | 3 | 4 | 5 |

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

| 1 | 2 | 3 | 4 | 5 |

8. I found the system very cumbersome to use

| 1 | 2 | 3 | 4 | 5 |

9. I felt very confident using the system

| 1 | 2 | 3 | 4 | 5 |

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

| 1 | 2 | 3 | 4 | 5 |

Appendix F: INCENTIVE RECEIPT AND ACKNOWLEDGMENT FORM

Acknowledgement of Receipt

I hereby acknowledge receipt of *$_____* for my participation in a research study run by *e-Health Partners, Inc.*

Printed Name: _____

Address: _____
           _____

Signature: _____   Date: _____

Usability Researcher: _____

Signature of Usability Researcher: _____

Date: _____

Witness: _____

Witness Signature: _____

Date: _____