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EHR Usability Test Report of OncoEMR v2.7

OncoEMR v2.7

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Executive Summary

A usability test of OncoEMR v2.7 commenced on April 29, 2014 and was finalized on July 1, 2014. The tests were conducted by users at multiple sites with oversight provided by Flatiron Health, Inc. The purpose of this test was to test and validate the usability of the current user interface. During the usability test, five OncoEMR users with various levels of experience served as participants. The test was conducted in a testing environment using test data; no live patient data was utilized. The purpose of the test was to assess the usability of OncoEMR in the following areas:

- 170.314.(a)(1) Computerized Provider Order Entry
- 170.314(a)(2) Drug-drug, Drug-allergy Interactions Checking
- 170.314(a)(6) Medication List
- 170.314(a)(7) Medication Allergy List
- 170.314(a)(8) Clinical Decision Support
- 170.314(a(16) Electronic Medication Administration Record (Inpatient setting only)
- 170.314(b)(3) Electronic Prescribing
- 170.314(b)(4) Clinical Information Reconciliation

Each test was executed twice to ensure stable results. Each test session lasted approximately 30 minutes. The test results were documented on the test plan. The tests were also monitored for deviations related to data entry, navigation and errors in the test plans. Any failed test steps were documented on an incident report form. Items that failed during testing were:

- 170.314(a)(1) test ID 1.49 failed due to test plan written with past date
- 170.314(a)(2) test ID 2.43 failed due to a change in the drug interactions from the time the test plan was written
- 170.314(a)(8) test ID 5.39 failed due to pop up blockers being enabled
- 170.314(b)(3) test ID 7.24 failed due to inadequate user permissions

This document contains the test results and incident report forms associated with usability testing are available upon request.

Introduction

The EHR tested was OncoEMR v2.7. OncoEMR is a clinical management solution that addresses oncologist's major management concerns: treatment, disease and business. OncoEMR is web-based, assuring secure access to patient data while providing seamless data backups.

This test was conducted to test and validate the usability of the current user interface and provide evidence of usability in the EHR. It is intended to determine the extent that the OncoEMR interface facilitates a user's ability to complete routine tasks.

OncoEMR users from several oncology practices conducted web-based testing using a test version of OncoEMR. Each tester was provided test plans that dictated the test steps and expected results. WebEx recording was used to capture each test session and the actual results received. A staff member from Flatiron Health administered each test.

Method

Participants

A total of 5 participants were recruited for testing. All test participants were oncology nurses or persons with previous experience using OncoEMR. Initially, 5 testers were scheduled over 6 testing dates.

Tester	Gender	Occupation	Product Experience
1	F	RN, OCN	8 years
2	F	RN, OCN	8 years
3	F	BSN, RN, OCN	8 years
4	F	RN, OCN	3.5 years
5	F	QA Associate	10 years

Study Design

The objective of this test was to determine if OncoEMR has the capability to manage certain tasks electronically as well as determine the usability of the system as it related to those tasks. During the usability test, participants

interacted with OncoEMR; each participant accessed the software from their specific location. The system was tested for usability in the following areas:

- 170.314.(a)(1) Computerized Provider Order Entry
- 170.314(a)(2) Drug-drug, Drug-allergy Interactions Checking
- 170.314(a)(6) Medication List
- 170.314(a)(7) Medication Allergy List
- 170.314(a)(8) Clinical Decision Support
- 170.314(b)(3) Electronic Prescribing
- 170.314(b)(4) Clinical Information Reconciliation

Tasks

The tasks for each test were defined in individual test plans. The test plans were derived from certification criteria available on http://healthcare.nist.gov.

In all tests users were required to log in using a unique username and password and navigate to the test patient identified in the test plan.

170.314.(a)(1) Computerized Provider Order Entry – Test plan required users to enter orders for a drug, test, radiology procedure and other activity. This test included modification of existing orders and entry of new orders.

170.314(a)(2) Drug-drug, Drug-allergy Interactions Checking – Test plan required users to enter drug allergy and then order a drug that would trigger the drug-allergy interaction warning. This test also required users to enter a drug for the patient and then order a subsequent drug that would trigger a drug to drug interaction warning.

170.314(a)(6) Medication List – Test plan required users to add medications to the patients medication list.

170.314(a)(7) Medication Allergy List – Test plan required users to add drug allergy information to the patient record.

170.314(a)(8) Clinical Decision Support – Test plan required users to use enter patient vitals, problems, demographics, medications, lab values and allergies that trigger alerts, interactions or other rules to provide clinical decision support to end user.

170.314(b)(3) Electronic Prescribing – Test plan required users to use the e-prescribing feature to e-prescribe medications.

170.314(b)(4) Clinical Information Reconciliation – Test plan required users to navigate to the medication table and perform medication reconciliation to ensure current patient medication list is current and inclusive.

Procedures

The test administrator contacted current OncoEMR users to determine interest and availability. The administrator provided the test plans to each user prior

to testing and also provided details of the WebEx meeting information. Testers were instructed to print or have electronic versions of the test plans available at the time of testing.

Prior to beginning each test session, the test administrator reviewed the test instructions with the tester and verified that the user was accessing the correct URL for testing. Testers were instructed to read each test step, enter the data from the "entered" column, verify the actual result matched the expected result and document their result as "pass" or "fail". Testers recorded the date, start time, end time and total time of each individual test plan. Testers recorded deviations and any failed steps on an incident report form.

After all instructions were provided, the test administrator turned controls over to the testers. The administrator remained on the line in the event that a question or issue arose. The administrator monitored the test steps, user interaction, as well as the time to complete each test plan. If the tester deviated from the test plan, it was noted and the administrator assisted as necessary by pointing the user back to the test plan. At the completion of each test plan, the administrator documented the total time to complete the test plan and thanked the tester for their participation.

Test Location/Environment

The tests were conducted remotely using WebEx sessions for recording. Only one tester and the administrator were on the line for each session. The administrator could observe the tester's screen at all times but could not manipulate the test environment in any way. Testers were instructed to have access to a computer and each test plan contained a section regarding test pre-requisites. The test administrator verified that the tester accessed the appropriate test environment (https://secure8.oncoemr.com/RC) prior to beginning.

Testing sessions were allocated 30 minutes for completion of all tasks.

Test Forms and Tools

Test plans were created by a Flatiron Health, Inc. staff member. The test plans included test instructions, test pre-requisites and test steps as well as areas to document the tester's name, test date, start/end/total time and test results. Any failed test steps were reported on an Incident Report Form. The form captured details of the failed step, including, test plan, test ID, action taken, actual result (deviation from test plan) and any supporting screen shots or other details. WebEx was used to record each test session.

Participants were asked to complete a System Usability Scale Questionnaire at the completion of testing (Appendix B). The results of the questionnaire

were compiled to determine efficiency, satisfaction and potential areas for improvement.

Results

Each tester completed a minimum of 2 test plans. The recorded sessions were reviewed after completion to determine the number of deviations that occurred during each test session. Deviations were categorized as major or minor findings. Major findings included any deviations where the expected result did not match the actual result. Major findings were documented as "fails" on the test plan; an incident report form supporting each major finding was completed. Minor findings included any deviations noted as data entry errors, navigation errors or test script errors. Data Entry Deviation is defined as data that differed from the test plan (i.e. incorrect password typed in). Navigation Deviation is defined as user deviated from the test plan by using a path different from the path detailed in the test plan. Test Script Error is defined as inconsistencies in the test plan. All deviations are summarized below. The number of tasks associated with the applicable test was determined by the number of times each test plan was executed (ex. Test 170.314(a)(1) contains 58 steps and was completed by 2 testers; therefore, total tasks is 116).

Summary of Deviations

Test	Tester #	Total Tasks	Data Entry	Navigation	Test Script	Fails*	Minor %	Major* %
170.314 (a)(1)	1, 4	116	0	1	3	0	**3.4%**	**0%**
170.314 (a)(2)	1, 4	94	1	0	0	1	**1.1%**	**1.1%**
170.314 (a)(6)	1, 4	72	2	0	0	0	**2.8%**	**0%**
170.314 (a)(7)	1, 4	144	0	0	0	0	**0%**	**0%**
170.314 (a)(8)	2, 5	164	3	4	0	1	**4.3%**	**0.6%**
170.314 (b)(3)	3, 5	60	0	1	0	1	**1.7%**	**1.7%**
170.314 (b)(4)	3, 5	62	3	0	0	0	**4.8%**	**0%**

***Fails =major deviation**

System Usability Scale Questionnaire Results

Each tester completed the Usability Scale Questionnaire. The results of the questionnaire are found below.

Survey Item	Tester 1	Tester 2	Tester 3	Tester 4	Tester 5	Mean
1. I thought it was easy to accomplish the assigned tasks	5	5	5	5	5	5
2. I felt confident using the system	5	5	5	5	5	5
3. I found the system very cumbersome to use	1	1	1	1	1	1
4. I found the functionality of the system to be very intuitive	4	5	5	5	5	4.8
5. I became frustrated when trying to perform the assigned tasks	1	1	1	1	1	1

***Scale from 1 to 5 where 1 is Strongly Disagree and 5 is Strongly Agree**

Scoring

Tasks were counted as successful if the user was able to complete the test with a major deviation rate less than 10% and a minor deviation rate of less than 20%. Deviations were counted and compared to the total number of tasks completed to determine the deviation rate. The mean deviation rate for minor deviations was 3.3%. The mean rate for major deviations was 0.5%. Overall task completion rate is 99.4%.

A mean score of 3 or higher (questions 1, 2, 4) or a mean score of 3 or less (questions 3,5) are defined as a successful for the Usability Scale Questionnaire. As outlined above questions 1,2 and 4 each have a mean score of >3. Questions 3 and 5 both have a mean score of 1.

Effectiveness

Based on the scoring detailed above, the task completion versus observed deviation rate is within defined parameters indicating users are able to successfully complete tested workflows.

Efficiency

Test plans were made available to testers for review. All testers were able to complete the testing sessions in the allotted 30 minutes.

Satisfaction

As noted in the results of the System Usability Scale Questionnaire Users found the tasks to be easily accomplished using OncoEMR. They expressed confidence in their use of the application and found the system to be intuitive. No user voiced frustration with the application in performance of the tasks.

Major Findings

Major findings as noted above were documented on an incident report form. Each error was categorized with an action of "error occurred, able to continue" or "error occurred, could not continue". Three of the errors experienced during testing were able to be remedied at the point of testing and tester was able to continue with the test plan. One error 170.314(a)(2) noted below resulted in inability of the user to complete that task.

- 170.314(a)(8) test ID 5.39 failed due to pop up blockers being enabled
- 170.314(b)(3) test ID 7.24 failed due to inadequate user permissions
- 170.314(a)(2) test ID 2.43 failed due to a change in the drug interactions from the time the test plan was written

These errors are reflected in the deviation table above and incident report forms detailing each error were completed.

A task completion rate of 99.4% combined with the results of the user satisfaction questionnaire indicates acceptable understanding of the application in relation to assigned tasks.

Areas for Improvement

All testers are current users of OncoEMR. Although each of the testers use the system frequently, there were areas in the test plans that exposed them to functionality with which they were not familiar. Comments from users during testing included:

In relation to 170.314(a)(8) Clinical Decision Support – "This is not an area I am very familiar with" also in relation to step 5.35, the user was confused by the language in the test plan and had to be refocused to the correct step.

In relation to 170.314(a)(16) Electronic Medication Administration Record – user stated "This is weird" and "are you kidding me" in regards to step 6.15.

Appendix A

Incident Report Form

Please provide the following information. Complete one form for each "fail" documented in the test plan.

1. Test Plan ☐ 170.314(a)(1) ☐ 170.314(a)(8) ☐ 170.314(a)(2) ☐ 170.314(a)(16) ☐ 170.314(a)(6) ☐ 170.314(b)(3) ☐ 170.314(a)(7) ☐ 170.314(b)(4)
2. Test ID: _____
3. Action Taken ☐ Error occurred, able to continue ☐ Error occurred, could not continue
4. Actual Result:
5. Details (please provide screen shots or other details below):

Appendix B

System Usability Scale Questionnaire

In regards to OncoEMR v2.7.0, please complete the following questionnaire. Rate each item on a scale from 1 to 5 where 1 is Strongly Disagree and 5 is Strongly Agree.

	Strongly Disagree				Strongly Agree
1. I thought it was easy to accomplish the assigned tasks	1	2	3	4	5
2. I felt confident using the system	1	2	3	4	5
3. I found the system very cumbersome to use	1	2	3	4	5
4. I found the functionality of the system to be very intuitive	1	2	3	4	5
5. I became frustrated when trying to perform the assigned tasks	1	2	3	4	5