TRIARQ QSuite Manistee

Usability Tests

2017

TRIARQ
HEALTH

EHR Usability Test Report of QSuite

Report based on ISO/IEC 25062:2006 Common Industry Format for Usability Test Reports

NISTIR7742

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Usability tests of QSuite Manistee were conducted over two weeks period by the TRIARQ Usability Team, Julie Lundberg, Sankaralingam Lakshmanaraj and Chandra King

The purpose was to test and validate the usability of the EHR under Test, for the product with **Name: QSuite and Version: Manistee**.

10 participants including, 2 healthcare providers and 8 managers/administrators, matching the target demographic criteria served as participants and used QSuite in simulated manner.

The study collected performance data on 43 tasks, in the following 12 areas required of an ambulatory EHR for 2015 ONC certification and **prioritized according to risk**.

§ 170.315 (a)(1) Computerized Provider Order Entry (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 for CPOE

§ 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

During the hour one-on-one usability test, each participant was met over an online conference using the web meeting application, GoToMeeting. They were asked for their verbal consent to record the meeting session; they were instructed that they could withdraw at any time.

Participants all had prior experience with QSuite [Mean: 4.7 years].

During the testing, the data logger timed each task and recorded user performance.

The administrator did not give the participant assistance on how to complete the task.

Participant computer screens and audio were recorded for subsequent analysis using the web conference recording function.

The following types of data were collected for each participant:

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

All participant data was de-identified and no correspondence was 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.

No participant was given compensation.

Various recommended metrics, in accordance with the examples set forth in the *NIST Guide 7741 to the Processes Approach for Improving the Usability of Electronic Health Records*, were used to evaluate the usability of the QSuite. Please refer https://www.nist.gov/publications/nistir-7741-nist-guide-processes-approach-improving-usability-electronic-health-records for citation and for document. Following is a summary of the performance and rating data collected on the QSuite.

Quantitative Results

Effectiveness -> Success:

28 out of the 43 tasks were successfully completed by all participants. The remaining tasks had at least one participant not complete the task. 1 out of the 43 tasks were completed successfully by less than 60% of the participants.

These tasks will be reviewed in the detailed findings section.

Efficiency:

13 out of the 43 tasks were completed by all participants following the optimum path. 12 out of the 43 tasks had less than 20% of the participants following deviated path whereas the rest 1 out of the 14 tasks had half of the participants following deviated path.

These tasks will be reviewed in the detailed findings section.

Satisfaction:

SUS - The results from the System Usability Scale scored the subjective satisfaction with the system based on performance with these tasks to be normal, with an average of 69.9 and with individual results ranging from 50 to 100.

Task Ratings - Participants were asked to rate each task as they performed, with 1 meaning 'Very Easy' and 5 meaning 'Very Difficult'. Mean rating scores from individual tasks ranged from 1 to 3 with a Mean of 1.26 and standard deviation of 0.31.

Major findings

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

QSuite Manistee generally performed well with live test participants. Individual task rating scores were good, while overall System Usability Scores were mixed.

Participants were most comfortable with tasks that match their normal work experience. For unfamiliar tasks, some tasks were performed very well while others were poor.

When participants were asked "What was your overall impression of the tasks you just performed?"

"All tasks were pretty easy to use"

"Easy"

"I enjoyed the new features. The tasks are easy and informative."

"I would use most of the tasks performed but some of them are inapplicable to our practice"

"It was usually easy but some areas were difficult to perform as I had not performed them in the past."

"Informative"

"Helpful, except CDA pt info status felt like a waste of time."

"Some of the new functions were really neat. In our practice specialty, there are just some things we do not need /use and being exposed to those for the first time were a bit nerve wracking as I am well versed in using the features I am familiar with."

"Easy to access and complete"

"Very easy to navigate these tasks."

Many tasks covered capabilities in the product that have existed for years. While others were new to Manistee and were of major interest:

CCDA Import and Reconciliations

While participants were not always sure what the purpose of this was for initially, participants were very accurate and efficient with these tasks. All have recommended to make changes to this screen simple and easy, but team liked the CCDA viewer screen with capability to rearrange the sections and views.

No Known Information Screens e.g.) "No Known Medications" for a patient

We discovered a usability flaw. The screen that allows users to perform actions on entering in a single screen, Users felt that it should be there as part of every screen. For e.g.) No Known Implantable devices can be entered in the same implantable devices screen rather than coming to another screen to enter this information. Before the product release, this feature was incorporated across some of No known information.

ePrescriptions - RxChange and CancelRx

Major changes to ePrescription module were made to QSuite Manistee. These were largely successful; however, some users had felt that 'Delete' and 'Cancel' should not be given.

Areas for Improvement

Identify Diagnostic and Therapeutic References

Four of the Users accessed MedLine data rather than provider reference material. Then walked user through correct process to use optimum path.

One of the Users right clicked on problem to start a new exam and realized error and click on info button.

Although all participants succeeded with this task, the average time for this was 41.7 seconds and only half of participants hit the optimal path.

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Change a Medication Allergy to Inactive

Two of the Users deleted latex allergy from the list

One of User was unaware of the checkbox to make an allergy inactive and tried double-clicking and right-clicking on the allergy to mark it inactive.

One of the User entered 'Inactive' in the comments of the allergy rather than unchecking the Active checkbox.

Another User marked PCN as inactive rather than Latex.

Configure Clinical Recommendations by Roles [CDS Interventions]

Two of the Users are unfamiliar with EMR admin and were not sure where to navigate

Adjust the severity level of drug-drug interventions

One of the User needed reminder to click Settings under the Tools drop-down and user updated DFA field rather than DI Document level.

One of the User initially changed DFA Document level and saved and closed and went back and updated DO Document Level without needing verbal queues

Change the status of implantable device

One of the User opened up Active device and selected the radio button within the screen rather than right-click.

One of the User clicked Inactive radio button and when device disappeared user stated the task was done.

INTRODUCTION

The EHRUT tested for this study was for the product with **Name: QSuite and Version: Manistee**.

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Designed to streamline the recording and organization of medical information to healthcare providers for a wide variety of ambulatory specialties, QSuite consists of a state of the art, client server application.

Medical professionals and office team members use QSuite for a wide variety of clinical visit and practice administrative functions.

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 QSuite. To this end, measures of effectiveness, efficiency and user satisfaction were captured during the usability testing.

METHOD

DESCRIPTION OF INTENDED USERS

Intended users of QSuite are doctors, nurses, physician's assistants, medical assistants, anyone entering or accessing clinical data at an ambulatory medical practice, anyone responsible for the training users and anyone responsible for system administration or IT of a medical practice.

PARTICIPANT RECRUITMENT AND SCREENING

Healthcare employees/staff of medical practices that utilize QSuite were targeted for the study.

Participants were invited to enroll in the study via a general message on the TRIARQ support portal. Volunteers requested to join the study by sending an email to the TRIARQ Usability Team.

TRIARQ Partners, trainers and consultants ever paid by TRIARQ, or anyone directly affiliated with TRIARQ or TRIARQ's software development was not allowed to participate.

PARTICIPANTS

A total of 10 participants were selected to test QSuite.

Participants in the test were both providers and administrators.

Volunteers were accepted as participants by the TRIARQ Usability Testing team.

Participants had no direct connection to the development of QSuite or organization producing QSuite.

All Participants had prior experience using QSuite, averaging 4.7 years.

Accepted participants had a mix of backgrounds and demographic characteristics.

Each participant worked in a separate practice organization.

Each participant had an opportunity to review training materials similar to what will be made available to actual end users of QSuite Manistee.

10 volunteers enrolled and participated for the study.

The following is a table of participants by characteristics, including demographics, professional experience, computing experience. Participant names were replaced with Participant IDs so that an individual's data cannot be tied back to individual identities.

Participant ID	Gender	Age	Education	Occupation / Role	Professional Experience (Months)	Computer Experience : Proficiency (Months)	Medical Software Experience (Months)	gloSuite / QSuite Experience (Months)	Assistive Technology Needs
1	Male	75 and older	Postgraduate (MD/PhD)	Doctor / President of Corporation	300	Very Savvy (350)	72	72	No
2	Female	40 to 59	College graduate (RN, BSN)	Quality Control / Admin Staff	132	Somewhat Savvy (140)	11	11	No
3	Female	23 to 39	Other (Technical School)	Medical Assistant	96	Very Savvy (108)	84	84	No
4	Female	23 to 39	High school graduate / GED	Administrative Assistance / Admin Staff	108	Very Savvy (125)	96	72	No
5	Female	40 to 59	College graduate (RN, BSN)	Practice Manager	180	Very Savvy (200)	180	84	No
6	Male	60 to 74	Postgraduate (MD/PhD)	Internal Medicine Doctor	288	Very Savvy (300)	36	36	No
7	Female	23 to 39	High school graduate / GED	No title / Admin Staff	120	Very Savvy (145)	72	60	No
8	Female	40 to 59	College graduate (RN, BSN)	Office Manager / Admin Staff	204	Very Savvy (225)	60	60	No
9	Female	40 to 59	College graduate (RN, BSN)	Practice Manager / Admin Staff	240	Very Savvy (265)	240	18	No
10	Female	40 to 59	College graduate (RN, BSN)	Office Director	324	Very Savvy (330)	84	72	No

Participants were scheduled for 90 to 100 minutes sessions on separate days. No Participants were needed any assistive technology.

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.

During the usability test, participants interacted with QSuite Manistee. Each participant used the same hosted system with the same initial conditions. Each participant was provided with the same written instructions and the instructions were read allowed by the Administrator.

The system was evaluated for effectiveness, efficiency and satisfaction as defined by measures collected and analyzed for each participant:

• Number of tasks successfully completed within the allotted time without assistance
• Time to complete the tasks
• Number and types of errors
• Path deviations
• Participant's verbalizations (comments)
• Participant's satisfaction ratings of the system

The data from this test may serve as a baseline for future tests with an updated version of QSuite 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 shall be made.

TASKS

A number of tasks were constructed that would be realistic and representative of the kinds of activities a user might do with QSuite.

Tasks were chosen for priority of risk [frequency of use, criticality of function, and those that may be most troublesome for users].

Tasks were specifically geared to meet the testing objectives for 2015 ONC Certification.

Record a Medication Order as CPOE

Review a Medication Order

Change a Medication Order

Record a Laboratory Order as CPOE

Review a Laboratory Order

Change a Laboratory Order

Record a Radiology/Imaging Order as CPOE

Review a Radiology/Imaging Order

Change a Radiology/Imaging Order

View drug-drug intervention prior to medication CPOE completion

View drug-allergy intervention prior to medication CPOE completion

Adjust the severity level of drug-drug interventions

Record a Medication

Review the Medication List

Discontinue a Medication

Indicate "No Known Medications" for a patient

Record Demographics Data for a Patient with multiple races, ethnicities, Birth Sex, Gender Identity, sexual orientation

Change Demographics Data for a Patient with some of the items to be unknown or decline to specify

Record a Problem

Review the Problem List

Change a problem

Delete a Problem

Indicate "No Known Problems" for a patient

Record a Medication Allergy

Review the Medication Allergy List

Change a Medication Allergy to Inactive

Indicate "No Known Allergies" for a patient

Identify and View Clinical Recommendations [CDS Alerts]

Quick Order from Clinical Recommendation

Satisfy a Clinical Recommendation

Cancel a Clinical Recommendation

Identify Diagnostic and Therapeutic Interventions

Configuration of CDS interventions by User Role

Add an implantable device along with UDI

View Implantable device list

Change the status of implantable device

Delete an implantable device

Indicate "No Known Implantable Devices" for a patient

Transmit Electronic Prescription

Cancel Electronic Prescription

Import a C-CDA

Reconcile Patient's Medication List with another source [C-CDA]

Reconcile Patient's Problem List with another source [C-CDA]

Reconcile Patient's Active medication allergy list with another source [C-CDA]

View outstanding Lab and Radiology Orders across patients

PROCEDURES

Upon arrival, participants were greeted; their identity and demographic characteristics were verified.

Participants were assigned a participant ID.

Each participant gave verbal consent to having the session recorded.

To ensure that the test ran smoothly, two staff members participated in this test, the usability administrator and the data logger.

The administrator moderated the session including administering instructions and tasks. The administrator also obtained post-task rating data. A second person served as the data logger and took notes on task success, path deviations, number and type of errors, and comments. The data logger also prepared QSuite ?? prior to each task.

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.

Following the session, the administrator gave the participant the post-test questionnaire and thanked each individual for their participation.

Participants' demographic information, task success rate, time on task, errors, deviations, verbal responses, and post-test questionnaire were recorded into a copy of the Moderator's guide, appendix 2.

TEST LOCATION

Each participant performed their test from their own internet connected computer. A remote session was used for testing to reduce the time and cost of the testing. Participants could join from locations all across the country, allowing TRIARQ access to a variety of experienced participants, with low cost to TRIARQ and high convenience to participants.

The administrator/ data logger made sure the participant successfully joined the internet conference and the conference application was recording the session. The administrator / Data logger connected each participant to the remote hosted controlled testing session. The only participants in the session were the participant, the administrator/ data logger.

The administrator / data logger could be heard, but not seen. The only thing visible to them was the participant's computer desktop, which was only displaying the remote hosted controlled session.

TEST ENVIRONMENT

The remote hosted controlled test environment was the same for each participant and simulated a typical configuration for a normal small-to-medium sized ambulatory medical practice.

The remote hosted controlled test environment was the same hosting configuration and facility as all the TRIARQ hosted practices.

QSuite was hosted in a virtualized environment utilizing VMWare, and Windows Server 2012 R2 as the operating system.

The screen behavior and performance resembled what would be experienced at a typical practice.

TEST FORMS AND TOOLS

During the usability test, documents were used, including:

Moderator's Guide

Post-test Questionnaire

Examples of these documents can be found in Appendices.

The Moderator's Guide was devised so as to be able to capture required data.

The participant's interaction with QSuite was captured and recorded digitally via the web conferencing recording function.

The administrator /data logger could clearly see all screen activities.

PARTICIPANT INSTRUCTIONS

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

Thank you for participating in this study. Your input is very important. Our session today will last about 90 minutes. During that time, you will use an instance of an electronic health record system. 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.

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 43 tasks to complete. Tasks are listed in the moderator's guide in Appendix 2.

USABILITY METRICS

According to the *NIST Guide 7741 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:

Effectiveness of QSuite by measuring participant success rates

Efficiency of QSuite by measuring the average task time and path deviations

Satisfaction with QSuite 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.
Effectiveness: Success / Total	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 not counted as a "Success." No task times or Ease of Use ratings were included for these. The total number of Successes 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. On a qualitative level, errors and error types were collected to be included as findings.
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, as well as standard deviation.
Efficiency: % optimal path	Each task that was performed optimally was counted and then divided by total. This gives a sense of how often the task was performed just as expected, without any deviations.
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 Easy) to 5 (Very Difficult). These data are averaged across participants. Common convention is that average ratings for systems judged easy to use should be 2.7 or below. To measure participants' confidence in and likeability of the QSuite 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 3.

RESULTS

DATA ANALYSIS AND REPORTING

The results of the usability test were calculated according to the methods specified in the

Usability Metrics section above.

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

Sl. No	Criteria	Tasks	Optimal Number of Steps	Optimal Time for Tasks (Seconds)	Task success % — Mean % (Standard Deviation %)	Task error % — Mean % (Standard Deviation %)	Effectiveness: Success — #	Effectiveness: Success — # Success / Total	Efficiency: Task Time (Seconds) — Mean Seconds (Standard Deviation Seconds)	Efficiency: % Optimal Path — # Optimal Path / Total	Satisfaction: TRIARQ Used Ratings Scale [1 = very Easy, 5= Very Difficult] — Mean (Standard Deviation)	Satisfaction: ONC Suggested Ratings Scale [1 = very Difficult, 5= Very Easy] — Mean (Standard Deviation)
1	(a)(5)	Record Demographics Data for a Patient with multiple races, ethnicities, Birth Sex, Gender Identity, sexual orientation	3	110	90.3% (16.2%)	9.7% (16.2%)	9	90%	134 (93.46)	70%	1.50 (0.71)	4.50 (0.71)
2	(a)(5)	Change Demographics Data for a Patient with some of the items to be unknown or decline to specify	4	20	100% (0%)	0% (0%)	10	100%	30 (18.55)	100%	1.00 (0.00)	5.00 (0.00)
3	(a)(8)	Indicate No Known Allergies for a specific patient	4	10	91.2% (18.3%)	8.8% (18.3%)	9	90%	15 (8.90)	90%	1.00 (0.00)	5.00 (0.00)
4	(a)(7)	Record Medication	4	15	92.7% (12.2%)	7.3% (12.2%)	9	90%	23 (17.93)	90%	1.00 (0.00)	5.00 (0.00)
5	(a)(1)	Record a Medication Order as CPOE	5	50	100% (0%)	0% (0%)	10	100%	62 (38.67)	80%	1.60 (0.70)	4.40 (0.70)
6	(a)(4)	View drug-drug intervention prior to medication CPOE	2	5	100% (0%)	0% (0%)	10	100%	6 (9.45)	100%	1.22 (0.44)	4.78 (0.44)
7	(a)(1)	Change a Medication Order	4	30	100% (0%)	0% (0%)	10	100%	56 (36.82)	90%	1.50 (0.97)	4.50 (0.97)
8	(a)(1)	Review the Medication Order	2	5	100% (0%)	0% (0%)	10	100%	6 (5.87)	100%	1.00 (0.00)	5.00 (0.00)
9	(a)(7)	Discontinue Medication	3	10	100% (0%)	0% (0%)	10	100%	6 (10.42)	90%	1.00 (0.00)	5.00 (0.00)
10	(b)(3)	Transmit (eRx) Prescriptions	4	15	100% (0%)	0% (0%)	10	100%	23 (16.88)	100%	1.10 (0.32)	4.90 (0.32)
11	(b)(3)	Cancel eRx Prescription	4	10	90.7% (12.3%)	9.3% (12.3%)	9	90%	17 (6.21)	90%	1.10 (0.32)	4.90 (0.32)
12	(a)(8)	Record a Medication Allergy	4	15	100% (0%)	0% (0%)	10	100%	28 (15.48)	90%	1.20 (0.42)	4.80 (0.42)

#	Ref	Task										
13	(a)(8)	Change a Medication Allergy to Inactive	4	12	70.3% (26.9%)	29.7% (26.9%)	6	60%	18 (8.63)	50%	1.40 (1.26)	4.60 (1.26)
14	(a)(4)	View drug-allergy intervention prior to medication CPOE completion	4	1	100% (0%)	0% (0%)	10	100%	1 (2.21)	100%	1.00 (0.00)	5.00 (0.00)
15	(a)(4)	Adjust the severity level of drug-drug interventions	4	20	92.3% (18.7%)	7.7% (18.7%)	9	90%	30 (20.35)	70%	1.00 (0.00)	5.00 (0.00)
16	(a)(6)	Record a Problem	5	50	90.7% (16.2%)	9.3% (16.2%)	9	90%	61 (44.08)	80%	2.00 (1.25)	4.00 (1.25)
17	(a)(6)	Modify a Problem	5	20	100% (0%)	0% (0%)	10	100%	32 (12.55)	80%	1.20 (0.63)	4.80 (0.63)
18	(a)(6)	View Problem list	4	5	100% (0%)	0% (0%)	10	100%	11 (16.27)	90%	1.00 (0.00)	5.00 (0.00)
19	(a)(6)	Delete a Problem for a patient	4	8	100% (0%)	0% (0%)	10	100%	15 (7.67)	100%	1.00 (0.00)	5.00 (0.00)
20	(a)(14)	Add an implantable device along with UDI 877234000447	5	50	100% (0%)	0% (0%)	10	100%	63 (62.33)	80%	1.90 (1.20)	4.10 (1.20)
21	(a)(14)	Change the status of implantable device	6	20	90% (16.8%)	10% (16.8%)	9	90%	23 (11.66)	80%	1.20 (0.42)	4.80 (0.42)
22	(a)(14)	View Implantable device list	2	10	89.7% (17.9%)	10.3% (17.9%)	9	90%	14 (11.40)	90%	1.30 (0.48)	4.70 (0.48)
23	(a)(14)	Delete an implantable device for a patient	4	20	100% (0%)	0% (0%)	10	100%	21 (16.03)	80%	1.20 (0.63)	4.80 (0.63)
24	(a)(2)	Record a Lab Order as CPOE	4	15	100% (0%)	0% (0%)	10	100%	16 (7.45)	90%	1.10 (0.32)	4.90 (0.32)
25	(a)(2)	Change a Lab Order	4	1	88.8% (14.8%)	11.2% (14.8%)	9	90%	2 (4.74)	60%	1.40 (1.26)	4.60 (1.26)
26	(a)(2)	Review a Lab Order	4	5	100% (0%)	0% (0%)	10	100%	9 (8.79)	100%	1.00 (0.00)	5.00 (0.00)
27	(a)(3)	Record a Radiology/Imaging Order as CPOE	5	20	100% (0%)	0% (0%)	10	100%	27 (18.34)	80%	1.22 (0.44)	4.78 (0.44)
28	(a)(3)	Change a Radiology/Imaging Order	5	10	100% (0%)	0% (0%)	10	100%	20 (10.92)	60%	1.10 (0.32)	4.90 (0.32)
29	(a)(3)	Review the Radiology/Imaging Order	2	5	100% (0%)	0% (0%)	10	100%	9 (9.23)	100%	1.00 (0.00)	5.00 (0.00)
30	(b)(2)	Import CCDA	8	60	100% (0%)	0% (0%)	10	100%	72 (17.04)	80%	1.70 (1.34)	4.30 (1.34)
31	(b)(2)	Reconcile Medications	3	10	100% (0%)	0% (0%)	10	100%	17 (11.11)	100%	1.80 (1.69)	4.20 (1.69)
32	(b)(2)	Reconcile Problems	3	10	100% (0%)	0% (0%)	10	100%	17 (20.12)	90%	1.10 (0.32)	4.90 (0.32)
33	(b)(2)	Reconcile Active Medication Allergies	3	5	100% (0%)	0% (0%)	10	100%	10 (9.99)	100%	1.00 (0.00)	5.00 (0.00)

					100%				13		1.11	4.89
34	(a)(9)	Identify and View Clinical Recommendations	2	10	100% (0%)	0% (0%)	10	100%	13 (14.84)	90%	1.11 (0.33)	4.89 (0.33)
35	(a)(9)	Quick Order from Clinical Recommendation	5	15	100% (0%)	0% (0%)	10	100%	20 (19.98)	100%	1.60 (0.97)	4.40 (0.97)
36	(a)(9)	Satisfy a Clinical Recommendation	4	14	100% (0%)	0% (0%)	10	100%	21 (22.87)	80%	1.30 (0.95)	4.70 (0.95)
37	(a)(9)	Cancel a Clinical Recommendation	4	10	100% (0%)	0% (0%)	10	100%	13 (5.19)	100%	1.10 (0.32)	4.90 (0.32)
38	(a)(9)	Configure Clinical Recommendations by Roles [CDS Interventions]	5	50	60.8% (26.8%)	9.2% (26.8%)	8	80%	62 (17.52)	80%	2.30 (1.57)	3.70 (1.57)
39	(a)(7)	Indicate "No Known Medications" for a patient	2	20	88.6% (26.2%)	11.4% (26.2%)	9	90%	21 (20.58)	70%	1.40 (0.97)	4.60 (0.97)
40	(a)(6)	Indicate a "No Known Problems" for a patient	2	10	90.5% (17.7%)	9.5% (17.7%)	9	90%	12 (16.11)	90%	1.10 (0.32)	4.90 (0.32)
41	(a)(14)	Indicate a "No Known Implantable Devices" for a patient	2	5	90.5% (17.7%)	9.5% (17.7%)	9	90%	7 (6.89)	90%	1.00 (0.00)	5.00 (0.00)
42	(a)(9)	Identify Diagnostic and Therapeutic References	4	30	90.5% (17.7%)	9.5% (17.7%)	9	90%	42 (35.79)	60%	1.10 (0.32)	4.90 (0.32)
43	(a)(2), (a)(3)	View Outstanding Lab and Radiology Orders	3	15	100% (0%)	0% (0%)	10	100%	16 (14.21)	100%	1.14 (0.38)	4.86 (0.38)

The results from the SUS (System Usability Scale) scored the subjective satisfaction with the system based on performance with these tasks to be: 69.9 out of 100.

DISCUSSION OF FINDINGS

NON-SYSTEM ADVERSE FACTORS

Besides actual system usability challenges, discussed below, there were non-system factors that lead to some below expectation outcomes. Some of these factors could be mitigated in future studies.

- Sometimes participants were confused by the tasks themselves.

- New workflows for functions unrelated to real world experience
  - Example:
    - Provider reference not useful. We use up to date material.
    - Implant device recording with bar code scanning
    - Unnecessary to enter multiple ethnicities, not a fan or entering gender identity
    - The entire CCDA import and reconciliation process.
- Participant may not have had much experience with a particular area of the system
  - Example: Most users had never or rarely had a reason to change user permissions at their live practice

- Even if participants understood the task, sometimes participants were being asked to perform a task differently from how they were used to working at their real office.

  - Example: We asked participants to select drugs for CPOE, Medication List, and e-prescribe using the "All Drugs" list instead of the "Doctor Favorites" or "SmartDx" lists.
  - Example: QSuite can be highly personalized. Since we had to test using generic layouts of the Dashboard, instead of the participants own Dashboard configurations, some users found the study configuration disruptive.
  - Example: The names of the lab and radiology tests chosen for the study did not match the actual test names used at their live office. One participant complained that instead of having a test for "X-Ray Knee" [used in the study], they normally had very specific tests like "X-Ray Right Knee" and "X-Ray Left Knee".

These non-system factors lead to failed tasks resulted for lower participant satisfaction ratings.

EFFECTIVENESS

28 out of the 43 tasks were successfully completed by all participants. The remaining tasks had at least one participant not completed the task. Breakdown of Remaining 15 tasks is given below.

1 out of the 43 tasks were completed successfully by less than 60% of the participants, another 1 out of the 43 tasks were completed successfully by less than 80% of the participants and the rest 13 out of the 43 tasks were completed successfully by less than 90% of the participants.

Problematic Tasks

1) Change a Medication Allergy to Inactive

Two of the Users deleted latex allergy from the list
One of User was unaware of the checkbox to make an allergy inactive and tried double-clicking and right-clicking on the allergy to mark it inactive.
One of the User entered 'Inactive' in the comments of the allergy rather than uncheck the Active checkbox.
Another User marked PCN as inactive rather than Latex.

2) Configure Clinical Recommendations by Roles [CDS Interventions]

Two of the Users are unfamiliar with EMR admin and were not sure where to navigate

EFFICIENCY

A participant may have completed a task successfully [accurately and within the allotted time] but may not have performed the task using the optimal path.
13 out of the 43 tasks were completed by all participants following the optimum path. Breakdown of Remaining 30 tasks is given below.

17 out of the 43 tasks had less than 60% of the participants following the minor deviated path, 12 out of the 43 tasks had less than 20% of the participants following deviated path whereas the rest 1 out of the 14 tasks had half of the participants following deviated path.

Problematic Tasks

1) Change a Medication Allergy to Inactive

Two of the Users deleted latex allergy from the list

One of User was unaware of the checkbox to make an allergy inactive and tried double-clicking and right-clicking on the allergy to mark it inactive.

One of the User entered 'Inactive' in the comments of the allergy rather than uncheck the Active checkbox.

Another User marked PCN as inactive rather than Latex.

2) Configure Clinical Recommendations by Roles [CDS Interventions]

Two of the Users are unfamiliar with EMR admin and were not sure where to navigate

3) Identify Diagnostic and Therapeutic References

Four of the Users access MedLine data rather than provider reference material. Then walked user through correct process.

One of the Users right clicked on problem to start a new exam and realized error and click on info button.

Although all participants succeeded with this task, the average time for this was 41.7 seconds and only half of participants hit the optimal path.

4) Adjust the severity level of drug-drug interventions

One of the User needed reminder to click Settings under the Tools drop-down and user updated DFA field rather than DI Document level.

One of the User initially changed DFA Document level and saved and closed and went back and updated Document Level without needing verbal queues

5) Change the status of implantable device

One of the User opened up Active device and selected the radio button within the screen rather than using right-click option.

One of the User clicked Inactive radio button and when device disappeared user stated the task was done.

6) Record Medication

One of the User entered Ferrous Fumarate as a Prescription rather than a Medication.

7) Indicate "No Known Information" e.g.) "No Known Medications" for a patient

One of the User opened the list and clicked save and close without changing list.

The User needed verbal queue to open Tools >CDA Patient Info Status and the User marked all 7 fields as no known information

8) Cancel eRx Prescription

One of the User selected Delete Prescription rather than Cancel Prescription.

9) View Implantable device list

User searched for Implantable devices under View and then navigated to Go > Implantable devices and needed verbal instruction to click

10) Change a Lab Order

One of the User right clicked on the order number and selected modify. User needed verbal instruction to click the Modify hot button to be able to add and remove. User entered CBC rather than CBC w/ auto diff. User was not familiar with the process of modify an order

SATISFACTION

Satisfaction was measured by individual task Ease of Use Ratings and an overall System User Satisfaction survey.

For individual task ratings, a response of 1 meant 'Very Easy' and 5 meant 'Very Difficult'.

- No individual task averaged as much as 3.
- While some tasks were rated 3 by individual participants, no task received a rating of 4 or 5.

SUS scores were more variable with an average of 69.9 and with individual results ranging from 50 to 100.

Problematic Tasks

Overall individual task ratings were very good. Only two tasks received an average greater than 2.

1) Configure Clinical Recommendations by Roles [CDS Interventions]
   Two of the Users were unfamiliar with EMR admin and were not sure where to navigate.
2) Record a Problem
   One of the User initially tried search for SnoMed Left knee pain and when unable to locate user closed SnoMed search and searched under ICD10.
   User was unfamiliar with the process of manually adding a problem to the problem list.

MAJOR FINDINGS

Overall, QSuite performed well. Most of the tasks were easy for participants and they rated those tasks with a 1 or 2 Ease of Use rating.

Above we specifically discussed the most problematic tasks.

Now we will review the system results overall:

Identify Diagnostic and Therapeutic References

Four of the Users access MedLine data rather than provider reference material. Then walked user thru correct process.

One of the Users right clicked on problem to start a new exam and realized error and clicked on info button.

Although all participants succeeded with this task, the average time for this was 41.7 seconds and only half of participants hit the optimal path.

CCDA Import and Reconciliations

While participants were not always sure what the purpose of this was for initially, participants were very accurate and efficient with these tasks. All have recommended to make changes to this screen simple and easy, but team liked the CCDA viewer screen with capability to rearrange the sections and views.

No Known Information Screens e.g.) "No Known Medications" for a patient

We discovered a usability flaw. The screen that allows users to perform actions on entering in a single screen, Users felt that it should be there as part of every screen. For e.g.) No Known Implantable devices can be entered in the same implantable devices screen rather than coming to another screen to enter this information. Before the product release, this feature was incorporated across some of No known information.

Change a Medication Allergy to Inactive

Two of the Users deleted latex allergy from the list

One of User was unaware of the checkbox to make an allergy inactive and tried double-clicking and right-clicking on the allergy to mark it inactive.

One of the User entered 'Inactive' in the comments of the allergy rather than uncheck the Active checkbox.

Another User marked PCN as inactive rather than Latex.

Configure Clinical Recommendations by Roles [CDS Interventions]
Two of the Users are unfamiliar with EMR admin and were not sure where to navigate

Adjust the severity level of drug-drug interventions
One of the User needed reminder to click Settings under the Tools drop-down and user updated DFA field rather than DI Document level.

One of the User initially changed DFA Document level and saved and closed and went back and updated DO Document Level without needing verbal queues

Change the status of implantable device
One of the User opened up Active device and selected the radio button within the screen rather than right-click.

One of the User clicked Inactive radio button and when device disappeared user stated the task was done.

ePrescriptions - RxChange and CancelRx
Big changes to ePrescriptions were made to Manistee. These were largely successful; however, some users had felt that 'Delete' and 'Cancel' should not be given.

For all the medication history, order, and prescription task, the concern that stood out the most is the difficulty participants had with typing the name of the drug, 'Tylenol with Codeine #3 300 mg' and then selecting it.

Study tasks required the participant to type this name and find it in a list of all drugs. For accuracy, efficiency, and satisfaction to improve, we need to reduce the need for typing and improve the behavior of the drug list.

Record Medication
One of the User entered Ferrous Fumarate as a prescription rather than a Medication.

View Implantable device list
User searched for Implantable devices under View and then navigated to Go > Implantable devices and needed verbal instruction to click

Change a Lab Order
One of the User right clicked on the order number and selected modify. User needed verbal instruction to click the Modify hot button to be able to add and remove. User entered CBC rather than CBC w/ auto diff. User was not familiar with the process of modify an order

AREAS FOR IMPROVEMENT

CCDA Import and Reconciliations
We need to come out with intuitive screen for this where it should be more user friendly.

Software Change Ideas:

We can have the screen like Adjustable CCDA viewer to be present side by side to do reconciliations better.

No Known Information Screens e.g.) "No Known Medications" for a patient
We discovered a usability flaw. The screen that allows users to perform actions on entering in a single screen, Users felt that it should be there as part of every screen. For e.g.) No Known Implantable devices can be entered in the same implantable devices screen rather than coming to another screen to enter this information. Before the product release, this feature was incorporated across some of No known information.

Identify Diagnostic and Therapeutic References
We have created quick guides in order to make optimal path and this was included as part of the release.

Change a Medication Allergy to Inactive

We have created quick guides in order to make optimal path and this was included as part of the release.

Change the status of implantable device

We have created quick guides in order to make optimal path and this was included as part of the release.

APPENDICES

Appendix 1: PARTICIPANT DEMOGRAPHICS

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

Gender

Men   [2]   Women   [8]

Total(participants) [10]

Occupation/Role

RN/BSN   [0]   Physician   [2]

Admin   Staff   [8]

Total(participants) [10]

Years of Experience

Mean Years of total Experience [16.6]

Mean Years with gloSuite/QSuite [4.7]

Appendix 2: Example Moderator's Guide

QSuite Manistee Usability Test Moderator's Guide

Administrator:

Data Logger (if data logger is different from Administrator):

Date: Time:

Participant #:

Prior to Testing
- Confirm Schedule with Participant
- Ensure QSuite hosted lab is running properly

Prior to Participant Testing
- Reset System
- Start session recordings

Prior to Each Task
- Set application to starting point for each task

After Each Participant
- End Session Recordings
- Archive Recording and Notes

After All Testing
- Review Notes and Findings with team
- Document Study

Orientation (*2 minutes*)

*Thank you for participating in this study. Our session today will last **about 90 minutes**.*

*I will ask you to complete a few tasks using this QSuite 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 the development of this system, so please be honest with your opinions. Please let me know once the task is completed!

The product you will be using today is the early release of QSuite Manistee.

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.

Preliminary Questions (*5 minutes*)

Step 1: Preliminary Questions

1. Gender: Male   Female

2. Which of the following best describes your age?

   [23 to 39; 40 to 59; 60 to 74; 75 and older]

3. Which of the following describes your highest level of education?

   [high school graduate/GED; college graduate (RN, BSN); postgraduate (MD/PhD); other (explain)]

4. What is your current position and title?

5. How long have you held this position?

6. Which of the following role currently suits you in this position?

   [RN/BSN; Physician; Admin Staff]

7. In the last month, how often have you used an electronic health record?

8. How many years have you used an electronic health record?

9. What are some of your main responsibilities?

10. How many years of experience you have with using QSuite/gloSuite?

11. Are your computer savvy:

   - Somewhat savvy

   - Not at all

   - Very savvy

When you believe you have completed the task, please say done.

Detailed Tasks (*60 minutes*)

Step 2: Record Demographics Data for a Patient with multiple races, ethnicities, Birth Sex, Gender Identity, sexual orientation

Scenario: You are a provider. New patient (Patient A) has come to you complaining of knee pain in the right knee. He has no known allergies and is already taking a medication, 'Ferrous Fumarate 324mg Tablet' You have to register the patient and enter Demographics data. He is having multiple races and ethnicities. His pharmacy has ePrescriping allowed features.

When I say Begin, *Create a new patient, completing demographics only (multiple races, ethnicities, Birth Sex, Gender Identity, sexual orientation)*, *Allotted Time: 360 seconds* **Begin Now**

Success:

__ **Easily Completed**

__ Completed with Difficulty or Help

__Not Completed

Comments:

Task Time: __ Seconds

Optimal Path: *View Menu on Top -> Select New Patient button -> Then enter the details*

__ **Correct**

__ Minor Deviations

__Major Deviations

Comments:

Observed Errors and Verbalizations:

Rating:

Overall this task was: __ "Very Easy" (1) … "Very Difficult" (5)

Administrator/Notetaker Comments:

Step 3: Change Demographics Data for a Patient with some of the items to be unknown or decline to specify

This is just a test to see if the user can enter new fields for Demographics Data.

When I say Begin *Select the same patient, add an e-prescribing pharmacy, Allotted Time: 60 seconds* **Begin Now**

Success:

__ Easily Completed

__ Completed with Difficulty or Help

__Not Completed

Comments:

Task Time: __ Seconds

Optimal Path: *Select Patient from grid and view menu on top -> Select "Modify" Button -> Change Race, Ethnicity or Gender -> Save&Close.*

__ Correct

__ Minor Deviations

__Major Deviations

Comments:

Observed Errors and Verbalizations:

Rating:

Overall this task was: __ "Very Easy" (1) … "Very Difficult" (5)

Administrator/Notetaker Comments:

Step 4: Indicate No Known Allergies for a specific patient

Take the participant to the starting point of this task.

We will select the newly added patient and go to his Patient History display screen.

When I say Begin, record in Patient's chart that he has No Known Allergies, *Allotted Time: 30 seconds* **Begin Now**

Success:

__ Easily Completed

__ Completed with Difficulty or Help

__Not Completed

Comments:

Task Time: __ seconds

Optimal Path: Select Patient History -> Allergy list -> Select No Known Allergy from List -> Save&Cls button to Save Patient History

__ Correct

__ Minor Deviations

__Major Deviations

Comments:

Observed Errors and Verbalizations:

Rating:

Overall this task was: __ "Very Easy" (1) … "Very Difficult" (5)

Administrator/Notetaker Comments:

Step 5: Record Medication

Take the participant to the starting point of this task. Navigate to the Rx-Meds screen.

<mark>We are in the Rx-Meds screen. When I say Begin, enter patient's reported medication of 'Ferrous Fumarate 324mg Tablet'</mark> *, Allotted Time: 60 seconds* **Begin Now.**

Success:

__ Easily Completed

__ Completed with Difficulty or Help

__Not Completed

Comments:

Task Time: __ minutes

Optimal Path: Rx-Meds Screen -> Select Medication Pane -> Double click the medication OR right click to add under medications, save button to save in patient's medication list.

__ Correct

__ Minor Deviations

__Major Deviations

Comments:

Observed Errors and Verbalizations:

Rating:

Overall this task was: __ "Very Easy" (1) … "Very Difficult" (5)

Administrator/Notetaker Comments:

Step 6: Record a Medication Order as CPOE

Remain on the same screen for prescriptions.

<mark>You decide to prescribe 'Levaquin 250mg Tablet', for every day for 10 days with 10 tablets. When I say Begin, Enter and Save this new Rx so that staff can dispense at checkout. Do not transmit electronically or print the Rx.</mark> *<mark>, Allotted Time: 140 seconds</mark>* <mark>Begin Now</mark>

If you see an alert, stop and ask what you think of this alert!!

Success:

__ Easily Completed

__ Completed with Difficulty or Help

__Not Completed

Comments:

Task Time: __ minutes

Optimal Path: Rx Meds screen -> Select the Rx Pane -> Double click the drug to open the script pad to enter details for the order-> Click save & close.

__ Correct

__ Minor Deviations

__Major Deviations

Comments:

Observed Errors and Verbalizations:

Rating:

Overall this task was: __ "Very Easy" (1) … "Very Difficult" (5)

Administrator/Notetaker Comments:

Step 7: View drug-drug intervention prior to medication CPOE

If the prescription has been entered properly, a drug interaction alert will appear. If not, skip this step.

<mark>Please stop, an alert has appeared. Please tell us what you think the alert is for and then dismiss the alert.</mark> *<mark>, Allotted Time: 30 seconds</mark>* <mark>Begin Now</mark>

Success:

__ Easily Completed

__ Completed with Difficulty or Help

__ Not Completed

Comments:

Task Time: 8 seconds

Optimal Path: Explain this alert is advising of a drug-drug interaction between the reported

medication and the new prescription -> *select OK button in the upper right*

__ Correct

__ Minor Deviations

__ Major Deviations

Comments:

Observed Errors and Verbalizations:

Rating:

Overall this task was: 2 "Very Easy" (1) … "Very Difficult" (5)

Administrator/Notetaker Comments:

Step 8: Change a Medication Order

Keep the participant here.

<mark>Because you are concerned about Drug Interaction between Ferrous Fumarate and Levaquin when I say Begin, change the prescription you just entered to 'Keflex 250mg Capsules' every day, duration 10 days, quantity, 10. , *Allotted Time: 140 seconds* **Begin Now.**</mark>

Success:

__ Easily Completed

__ Completed with Difficulty or Help

__ Not Completed

Comments:

Task Time: __

Optimal Path: *Rx-Meds Screen -> Delete old Order -> Enter new order -> Save*

__ Correct

__ Minor Deviations

__ Major Deviations

Comments:

Observed Errors and Verbalizations:

Rating:

Overall this task was: __ "Very Easy" (1) ... "Very Difficult" (5)

Administrator/Notetaker Comments:

Step 9: Review the Medication Order

Keep the participant here.

<mark>After your correction of the prescription, confirm that the prescription has saved correctly for the patient. *, Allotted Time: 20 seconds* Begin Now.</mark>

Success:

__ Easily Completed

__ Completed with Difficulty or Help

__Not Completed

Comments:

Task Time: __

Optimal Path: *Rx-Meds Screen -> Prescriptions entered will appear under prescriptions if saved properly*

__ Correct

__ Minor Deviations

__Major Deviations

Comments:

Observed Errors and Verbalizations:

Rating:

Overall this task was: __ "Very Easy" (1) ... "Very Difficult" (5)

Administrator/Notetaker Comments:

Step 10: Discontinue Medication

Take the participant back to patient's medication list.

Success:

 ___ Easily Completed

 ___ Completed with Difficulty or Help

 ___Not Completed

 Comments:

Task Time: ___

Optimal Path: *Rx-Meds Screen -> Select the medication -> Right Click ->Mark as Discontinued -> Save & close Button ->*

 ___ Correct

 ___ Minor Deviations

 ___Major Deviations

 Comments:

Observed Errors and Verbalizations:

Rating:

Overall this task was: ___ "Very Easy" (1) … "Very Difficult" (5)

Administrator/Notetaker Comments:

Step 11: Transmit (eRx) Prescriptions

Go to Patient's Medications

You decide to send the Keflex prescription to the pharmacy. When I say "Begin", electronically transmit new prescription for 'Keflex'. *, Allotted Time: 60 seconds* **Begin Now.**

 Success:

 ___ Easily Completed

 ___ Completed with Difficulty or Help

 ___Not Completed

 Comments:

Task Time: ___

Optimal Path: *Rx-Meds Screen-> Under Prescriptions tab, select the med to be e-prescribed, click on eRx hot button on top -> Confirm New eRx*

> __ Correct
>
> __ Minor Deviations
>
> __Major Deviations
>
> *Comments:*

Observed Errors and Verbalizations:

Rating:

Overall this task was: __ "Very Easy" (1) … "Very Difficult" (5)

Administrator/Notetaker Comments:

Step 12: Cancel eRx Prescription

<mark>You decide to cancel an already electronically prescribed item. The ability to send this cancel message from within Q-EMR is new! When I say Begin, open RxMeds for the patient we have been using and CANCEL the prescription. , Allotted Time: 20 seconds **Begin Now**</mark>

Success:

> __ Easily Completed
>
> __ Completed with Difficulty or Help
>
> __Not Completed
>
> *Comments:*

Task Time: __

Optimal Path: Rx Meds screen -> Select the Rx Pane -> Right click the prescription-> select cancel prescription

> __ Correct
>
> __ Minor Deviations
>
> __Major Deviations
>
> *Comments:*

Observed Errors and Verbalizations:

Rating:

Overall this task was: __ "Very Easy" (1) … "Very Difficult" (5)

Administrator/Notetaker Comments:

Step 13: Record a Medication Allergy

Scenario for Established Patient B:

<mark>Now you will see an existing patient for a new problem: Knee Pain.</mark>

<mark>Patient reports a new allergy to Penicillins (Hives) and also reports that previously recorded Latex Allergy appears to be dormant. He hasn't had any noticeable reaction in a long time. You also learn that this patient has an implantable device which we will record in the new feature for this process.</mark>

Take the participant to the starting point of this task, Patient History.

<mark>When I say Begin, enter an indication of this allergy. *, Allotted Time: 50 seconds* **Begin Now**</mark>

Success:

____ Easily Completed

____ Completed with Difficulty or Help

____Not Completed

Comments:

Task Time: ____

Optimal Path: *Patient history screen -> enter the allergies section -> select the penicillins, save & close button to save in patient's history*

____ Correct

____ Minor Deviations

____Major Deviations

Comments:

Observed Errors and Verbalizations:

Rating:

Overall this task was: ____ "Very Easy" (1) … "Very Difficult" (5)

Administrator/Notetaker Comments:

Step 14: Change a Medication Allergy to Inactive

Take the participant to the starting point of this task, remain in Patient History.

Success:

    __ Easily Completed

    __ Completed with Difficulty or Help

    __ Not Completed

    Comments:

Task Time: __ Seconds

Optimal Path: *Patient History Screen -> Select Latex -> Uncheck the box under active column-> save & close Button to save in patient's history*

    __ Correct

    __ Minor Deviations

    __Major Deviations

    Comments:

Observed Errors and Verbalizations:

Rating:

Overall this task was: __ "Very Easy" (1) … "Very Difficult" (5)

Administrator/Notetaker Comments:

Step 15: View drug-allergy intervention prior to medication CPOE completion

Take the participant to the starting point of this task, RxMeds.

Success:

    __ Easily Completed

    __ Completed with Difficulty or Help

___Not Completed

Comments:

Task Time: __

Optimal Path: *Rx-Meds Screen -> Enter the prescription under Prescriptions tab -> Save & close Button -> View Alert*

___ Correct

___ Minor Deviations

___Major Deviations

Comments:

Observed Errors and Verbalizations:

Rating:

Overall this task was: __ "Very Easy" (1) … "Very Difficult" (5)

Administrator/Notetaker Comments:

Step 16: Adjust the severity level of drug-drug interventions

<mark>There is a need to the change the severity level of DI Document Level from "Likely Established" to "Not Established".</mark> *, Allotted Time: 70 seconds* **Begin Now**

Success:

___ Easily Completed

___ Completed with Difficulty or Help

___Not Completed

Comments:

Task Time: __

Optimal Path: *Tools->Settings->Drug Interaction->adjust the level for DI Document Level->Save&cls.*

___ Correct

___ Minor Deviations

___Major Deviations

Comments:

Observed Errors and Verbalizations:

Rating:

Overall this task was: __ "Very Easy" (1) … "Very Difficult" (5)

Administrator/Notetaker Comments:

Step 17: Record a Problem

Success:

> __ Easily Completed

> __ Completed with Difficulty or Help

> __Not Completed

> *Comments:*

Task Time: __

Optimal Path: *Select Patient from grid and Bottom tab to click problem list->click New->click snomed selector->add knee pain Left->Save&Cls*

> __ Correct

> __ Minor Deviations

> __Major Deviations

> *Comments:*

Observed Errors and Verbalizations:

Rating:

Overall this task was: __ "Very Easy" (1) … "Very Difficult" (5)

Administrator/Notetaker Comments: Increase time as user was unaware of process of adding problem list directly and was recalling steps.

Step 18: Modify a Problem

Success:

 __ Easily Completed

 __ Completed with Difficulty or Help

 __Not Completed

 Comments:

Task Time: __

Optimal Path: *Select Patient from grid and Bottom tab to click problem list->right click View problem list->Click Edit->Select snomed selector and change to injury of knee->Save&Cls*

 __ Correct

 __ Minor Deviations

 __Major Deviations

 Comments:

Observed Errors and Verbalizations:

Rating:

Overall this task was: __ "Very Easy" (1) … "Very Difficult" (5)

Administrator/Notetaker Comments:

Step 19: View Problem list

This is just a test to see if the user can view problems for a patient.

<mark>*When I say Begin: Select the same patient from the dashboard and view Problem List. , Allotted Time: 10 seconds* **Begin now**</mark>

Success:

 __ Easily Completed

 __ Completed with Difficulty or Help

 __Not Completed

 Comments:

Task Time: __

Optimal Path: *Select Patient from grid and Bottom tab to click problem list*

 __ Correct

 __ Minor Deviations

__Major Deviations

Comments:

Observed Errors and Verbalizations:

Rating:

Overall this task was: __ "Very Easy" (1) … "Very Difficult" (5)

Administrator/Notetaker Comments:

Step 20: Delete a Problem for a patient

This is just a test to see if the user can delete a problem for a patient. Delete the knee pain problem just entered.

<mark>*When I say begin, Select the same patient and Delete the Knee Pain Problem, , Allotted Time: 20 seconds* **Begin now**</mark>

Success:

__ Easily Completed

__ Completed with Difficulty or Help

__Not Completed

Comments:

Task Time: __

Optimal Path: *Select Patient from grid and Bottom tab to click problem list->->right click View problem list->Click Delete->Save&Cls*

__ Correct

__ Minor Deviations

__Major Deviations

Comments:

Observed Errors and Verbalizations:

Rating:

Overall this task was: 1 "Very Easy" (1) … "Very Difficult" (5)

Administrator/Notetaker Comments:

Step 21: Add an implantable device along with UDI 877234000447

Success:

      __ Easily Completed

      __ Completed with Difficulty or Help

      __Not Completed

      Comments:

Task Time: __

Optimal Path: *Select Patient from grid and go menu to select implantable devices->Click New->Enter UDI against UDI->Click Parse button->Save&Cls*

      __ Correct

      __ Minor Deviations

      __Major Deviations

      Comments:

Observed Errors and Verbalizations:

Rating:

Overall this task was: __ "Very Easy" (1) … "Very Difficult" (5)

Administrator/Notetaker Comments:

Step 22: Change the status of implantable device

Success:

      __ Easily Completed

      __ Completed with Difficulty or Help

      __Not Completed

Comments:

Task Time: __

Optimal Path: *Select Patient from grid and go menu to select implantable devices->Select Device->Modify->Change active radio button to inactive radio button->Save&Cls->Enter Reason for Inactive->Save&Cls*

 __ Correct

 __ Minor Deviations

 __Major Deviations

 Comments:

Observed Errors and Verbalizations:

Rating:

Overall this task was: __ "Very Easy" (1) … "Very Difficult" (5)

Administrator/Notetaker Comments:

Step 23: View Implantable device list

<mark>This is just a test to see if the user can view implantable device for a patient.</mark>

<mark>When I say Begin, Select the same patient, then view implantable device list. , Allotted Time: 20 seconds **Begin now**</mark>

Success:

 __ Easily Completed

 __ Completed with Difficulty or Help

 __Not Completed

 Comments:

Task Time: __

Optimal Path: *Select Patient from grid and go menu to select implantable devices->Select inactive radio button*

 __ Correct

 __ Minor Deviations

 __Major Deviations

Comments:

Observed Errors and Verbalizations:

Rating:

Overall this task was: __ "Very Easy" (1) … "Very Difficult" (5)

Administrator/Notetaker Comments:

Step 24: Delete an implantable device for a patient

<mark>*This is just a test to see if the user can delete an implantable device for a patient.*</mark>

<mark>*When I say Begin, Select the same patient, view ALL Implantable Devices, then Delete the device. ,*</mark>

<mark>*Allotted Time: 30 seconds* **Begin now**</mark>

Success:

> __ Easily Completed

> __ Completed with Difficulty or Help

> __Not Completed

> *Comments:*

Task Time: __

Optimal Path: *Select Patient from grid and go menu to select implantable devices->select inactive->select delete button->Enter Reason for Delete->Save&Cls*

> __ Correct

> __ Minor Deviations

> __Major Deviations

> *Comments:*

Observed Errors and Verbalizations:

Rating:

Overall this task was: __ "Very Easy" (1) … "Very Difficult" (5)

Administrator/Notetaker Comments:

Step 25: Record a Lab Order as CPOE

Take the participant to the starting point of this task, Order Entry.

<mark>You decide to order a lab test, 'CBC Auto Diff'.</mark>

Success:

    __ Easily Completed

    __ Completed with Difficulty or Help

    __Not Completed

    Comments:

Task Time: __

Optimal Path: *Click on Orders & Results, then order entry screen. Type and Select from left and click on save & close once the test is added.*

    __ Correct

    __ Minor Deviations

    __Major Deviations

    Comments:

Observed Errors and Verbalizations:

Rating:

Overall this task was: __ "Very Easy" (1) … "Very Difficult" (5)

Administrator/Notetaker Comments:

Step 26: Change a Lab Order

Take the participant to the starting point of this task, Order Entry.

You change your mind and decide to modify the order from 'CBC Auto Diff' to 'CBC w/Auto Diff'.

When I say Begin, modify the CBC Auto Diff to CBC W/Auto Diff. *, Allotted Time: 10 seconds* **Begin Now**

Success:

    __ Easily Completed

    __ Completed with Difficulty or Help

___ Not Completed

Comments:

Task Time: __

Optimal Path: *Order Entry Screen -> Select Test -> Modify->add new test->Select old test->right click->Remove test->Save&Cls*

___ Correct

___ Minor Deviations

___ Major Deviations

Comments:

Observed Errors and Verbalizations:

Rating:

Overall this task was: __ "Very Easy" (1) … "Very Difficult" (5)

Administrator/Notetaker Comments: User was not familiar with the process of modify an order.

Step 27: Review a Lab Order

Keep the participant on this screen.

<mark>Review the lab order and confirm that is has changed correctly. , *Allotted Time: 20 seconds* Begin Now</mark>

Success:

___ Easily Completed

___ Completed with Difficulty or Help

___Not Completed

Comments:

Task Time: __

Optimal Path: *Order Entry Screen -> Once you saved the order, click on orders tab on top to view the saved order -> Click on close if order is saved->*

___ Correct

___ Minor Deviations

___Major Deviations

Comments:

Observed Errors and Verbalizations:

Rating:

Overall this task was: __ "Very Easy" (1) … "Very Difficult" (5)

Administrator/Notetaker Comments:

Step 28: Record a Radiology/Imaging Order as CPOE

Take the participant to the starting point of this task, same.

You decide to order an x-ray of patient's right knee, and you will indicate it is for patient's right knee.

Because you are the physician, enter the minimum information necessary to define the order.

Then office staff will complete the order and send it to the radiologist. When I say Begin, enter the order for X-ray Knee, Right.*, Allotted Time: 50 seconds* **Begin Now.**

Success:

    __ Easily Completed

    __ Completed with Difficulty or Help

    __Not Completed

    Comments:

Task Time: __

Optimal Path: *Order Entry Screen -> Select Knee X-ray test -> Enter Instructions 'Right Knee' and any additional details in instructions and save & close Button -*

    __ Correct

    __ Minor Deviations

    __Major Deviations

    Comments:

Observed Errors and Verbalizations:

Rating:

Overall this task was: __ "Very Easy" (1) … "Very Difficult" (5)

Administrator/Notetaker Comments: User created order following optimal path but entered RIGHT KNEE within the order template rather than Instructions

Step 29: Change a Radiology/Imaging Order

Take the participant to the starting point of this task, Order Entry.

<mark>You notice your mistake, Instead of right knee, it should be for left knee. When I say Begin, modify the order to reflect proper knee to be xrayed. , *Allotted Time: 20 seconds* **Begin Now**</mark>

Success:

⬜ Easily Completed

⬜ Completed with Difficulty or Help

⬜ Not Completed

Comments:

Task Time: __

Optimal Path: *Order Entry Screen -> Select X-ray test -> Modify -> Modify Instructions to 'Left Knee' -> Save & Close*

⬜ Correct

⬜ Minor Deviations

⬜ Major Deviations

Comments:

Observed Errors and Verbalizations:

Rating:

Overall this task was: __ "Very Easy" (1) … "Very Difficult" (5)

Administrator/Notetaker Comments: User updated template with LEFT KNEE rather than within the instructions

Step 30: Review the Radiology/Imaging Order

Keep the participant on this screen.

<mark>Make sure that the radiology order has changed correctly. , *Allotted Time: 30 seconds* **Begin Now**</mark>

Success:

⬜ Easily Completed

⬜ Completed with Difficulty or Help

⬜ Not Completed

Comments:

Task Time: ___

Optimal Path: *View orders and results screen -> Ok Button*

    ___ Correct

    ___ Minor Deviations

    ___Major Deviations

    Comments:

Observed Errors and Verbalizations:

Rating:

Overall this task was: _____ "Very Easy" (1) … "Very Difficult" (5)

Administrator/Notetaker Comments:

Step 31: Import CCDA

New Patient is coming to your practice tomorrow. The referring doctor at community health and hospital has sent you an electronic health information file [C-CDA] for the patient. Patient has already been registered in your QSuite system so now it is time to import this new health information.

Take the participant to the starting point of this task, Import CCDA screen.

Part of your job at this practice is to import the file and reconcile the health information [Problems, Medications, and Med Allergies] that is included in the file. When you import a CCDA file for a patient the system can prepare the information for reconciliation and automatically navigate you to the reconciliation screen.

From within this import screen, import patient's CCDA file, the file has been selected for you and saved on the desktop. When I say begin, import the CCDA and then pause before beginning the health information reconciliation process. *, Allotted Time: 90 seconds* **Begin Now**

Patient code for reconciliation:

B2R11-for CDA version 1.1

B2R21CCD-for CDA version 2.1(Ambulatory Summary)

B2R21RN-for CDA version 2.1(Referral Note/Summary of care record)

Success:

___ Easily Completed

___ Completed with Difficulty or Help

___ Not Completed

Comments:

Task Time: ___

Optimal Path: Tools->CDA Files->Import -> View CCDA display -> Save -> View dialog to create

Reconciliation lists -> Save -> View Reconciliation screen.

___ Correct

___ Minor Deviations

___ Major Deviations

Comments:

Observed Errors and Verbalizations:

Rating:

Overall this task was: ___ "Very Easy" (1) … "Very Difficult" (5)

Administrator/Notetaker Comments:

Step 32: Reconcile Medications

The Reconciliation window should have automatically appeared and defaulted to Medications. If
not, navigate to the patient's imported CCDA file and initiate the reconciliation.

Your job is to compare the Medication list from the referring practice with the patient's active
Medication list already recorded in your chart. The reconciliation window will help you do that,
with the result being a reconciled active Medication list in your chart, possibly updated with
Medications from the CCDA file, if you choose. You do not want to have spurious duplicates or
other errors in the new active problem list.

When I say begin, review the information from the new list and the current active list and then
allow the QSuite system to reconcile the two once you have approved the final list. *, Allotted*
Time: 40 seconds **Begin Now**

Success:

___ Easily Completed

___ Completed with Difficulty or Help

__Not Completed

Comments:

Task Time: __

Optimal Path: *Reconciliation window ->* Click ***Finalize*** after Medication list has been reconciled.

Click ***Accept*** to save to patient chart.

__ Correct

__ Minor Deviations

__Major Deviations

Comments:

Observed Errors and Verbalizations:

Rating:

Overall this task was: __ "Very Easy" (1) … "Very Difficult" (5)

Administrator/Notetaker Comments:

Step 33: Reconcile Problems

The Reconciliation window should now automatically default to Medications.

Your job is to compare the Problem list from the referring practice with the patient's active problem list already recorded in your chart. The reconciliation window will help you do that, with the result being a reconciled active problem list in your chart, possibly updated with problems from the CCDA file, if you choose. You do not want to have spurious duplicates or other errors in the new active problem list.

When I say begin, review the information from the new list and the current active list and then allow the QSuite system to reconcile the two once you have approved the final list. *, Allotted Time: 60 seconds* **Begin Now**

Success:

__ Easily Completed

__ Completed with Difficulty or Help

__Not Completed

Comments:

Task Time: __

Optimal Path: *Reconciliation window -> Click finalize after Problem list is reconciled ->* Click **Accept** to save to patient chart.

      __ Correct

      __ Minor Deviations

      __Major Deviations

      Comments:

Observed Errors and Verbalizations:

Rating:

Overall this task was: __ "Very Easy" (1) … "Very Difficult" (5)

Administrator/Notetaker Comments:

Step 34: Reconcile Active Medication Allergies

The Reconciliation window should have automatically defaulted to Medication Allergies.

Your job is to compare the Medication Allergies list from the referring practice with the patient's active allergies list already recorded in your chart. The reconciliation window will help you do that, with the result being a reconciled active allergy list in your chart, possibly updated with allergies from the CCDA file, if you choose. You do not want to have spurious duplicates or other errors in the new active allergy list.

When I say begin, review the information from the new list and the current active list and then allow the QSuite system to reconcile the two once you have approved the final list. *, Allotted Time: 30 seconds* **Begin Now**

Success:

      __ Easily Completed

      __ Completed with Difficulty or Help

      __Not Completed

      Comments:

Task Time: __

Optimal Path: *Reconciliation window -> Click finalize after medication allergy list is reconciled ->* Click **Accept** to save to patient chart.

Once all lists have been reconciled, the system will show the message: **Patient has No Ready Lists.**

Once each list has been reconciled, click **Close**.

___ Correct

___ Minor Deviations

___Major Deviations

Comments:

Observed Errors and Verbalizations:

Rating:

Overall this task was: ___ "Very Easy" (1) … "Very Difficult" (5)

Administrator/Notetaker Comments

Step 35: Identify and View Clinical Recommendations

Take the participant to the starting point of this task, Patient Dashboard and select the patient.
You are Provider. Established Patient B (the one with the knee pain) also has some chronic conditions that require our attention. When I say begin, identify whether or not patient has clinical recommendation alerts. *, Allotted Time: 50 seconds* Begin Now

Patient:

A9CDS01

A9CDS02

A9CDS03

Success:

___ Easily Completed

___ Completed with Difficulty or Help

___Not Completed

Comments:

Task Time: ___

Optimal Path: *Patient Dashboard and select the patient->* The Clinical Recommendation displays in the Patient Alert section of the patient dashboard on right.

___ Correct

___ Minor Deviations

___Major Deviations

Comments:

Observed Errors and Verbalizations:

Rating:

Overall this task was: ___ "Very Easy" (1) … "Very Difficult" (5)

Administrator/Notetaker Comments:

Step 36: Quick Order from Clinical Recommendation

While viewing the patient's Recommendations…

Your administrator can make ordering tests, referrals, etc easier for you by setting up Quick Orders on Clinical Recommendations. These are things you are likely to want to order for patients that have that particular alert pending.

When I say begin, do a quick order for 'Diabetic Foot Exam' , *Allotted Time: 60 seconds* **Begin Now**.

Note: Time how long it takes to launch the order. Do not include time taken to create the order.

Success:

___ Easily Completed

___ Completed with Difficulty or Help

___Not Completed

Comments:

Task Time: 0m 50s

Optimal Path: *GO-> Recommendations -> Right click to bring up quick orders and actions -> "Order Name" >* Access the Orders Template to complete order details and click on save & close.

___ Correct

___ Minor Deviations

___Major Deviations

Comments:

Observed Errors and Verbalizations:

Rating:

Overall this task was: ___ "Very Easy" (1) … "Very Difficult" (5)

Administrator/Notetaker Comments: User did not feel it was intuitive and needed to be prompted to right-click.

Step 37: Satisfy a Clinical Recommendation

Start the participant in the patients View Recommendation screen.

Success:

    __ Easily Completed

    __ Completed with Difficulty or Help

    __Not Completed

    Comments:

Task Time: __

Optimal Path: *Go button to top, view recommendations screen -> Right click on alert to 'mark satisfied' -> close Button -> -*

    __ Correct

    __ Minor Deviations

    __Major Deviations

    Comments:

Observed Errors and Verbalizations:

Rating:

Overall this task was: __ "Very Easy" (1) … "Very Difficult" (5)

Administrator/Notetaker Comments:

Step 38: Cancel a Clinical Recommendation

Success:

    __ Easily Completed

    __ Completed with Difficulty or Help

___Not Completed

Comments:

Task Time: __

Optimal Path: *Go button to top, view recommendations screen -> Right click on alert to mark 'cancel as not applicable' -> close Button*

___ Correct

___ Minor Deviations

___Major Deviations

Comments:

Observed Errors and Verbalizations:

Rating:

Overall this task was: __ "Very Easy" (1) … "Very Difficult" (5)

Administrator/Notetaker Comments:

Step 39: Configure Clinical Recommendations by Roles [CDS Interventions]

Take the participant to QSuite Admin to configure, QSuite User Permissions.

Clinical Recommendations as special alerts that indicate a patient may be overdue for a test, treatment, or something else.

At your practice, as the office manager, you configured several system recommendations to alert your doctors of key recommendations.

<mark>When I say begin, enable clinical recommendations for the Doctor group. *, Allotted Time: 90 seconds* **Begin Now**</mark>

Success:

___ Easily Completed

___ Completed with Difficulty or Help

___Not Completed

Comments:

Task Time: 1m 4s

Optimal Path: *QSuite Admin -> User Management->Select the provider and check 'view recommendations box to turn on the permissions, save & close.*

__ Correct

　__ Minor Deviations

　__Major Deviations

　Comments:

Observed Errors and Verbalizations:

Rating:

Overall this task was: __ "Very Easy" (1) … "Very Difficult" (5)

Administrator/Notetaker Comments:

Step 40: Indicate "No Known Medications" for a patient

A patient came with unconscious state and you do not know the following: medications, problems,

implantable devices.

This is just a test to see if the user can enter No Known Medications.

==*Select a new patient (already in the system, but not seen by you) and enter No Known*==

==*Medications. , Allotted Time: 60 seconds* **Begin now**==

Success:

　__ Easily Completed

　__ Completed with Difficulty or Help

　__Not Completed

　Comments:

Task Time: __

Optimal Path: *Tools->CCDA Patient info Status*

　__ Correct

　__ Minor Deviations

　__Major Deviations

　Comments:

Observed Errors and Verbalizations:

Rating:

Overall this task was: __ "Very Easy" (1) … "Very Difficult" (5)

Administrator/Notetaker Comments: User felt CCDA Patient Info Status should not be located under tools

Step 41: Indicate a "No Known Problems" for a patient

<mark>This is just a test to see if the user can indicate no known problems for a patient.</mark>

<mark>Select the same patient, , Allotted Time: 50 seconds **Begin now**</mark>

Success:

    __ Easily Completed

    __ Completed with Difficulty or Help

    __Not Completed

    Comments:

Task Time: __

Optimal Path: *Tools->Patient CCDA Info Status*

    __ Correct

    __ Minor Deviations

    __Major Deviations

    Comments:

Observed Errors and Verbalizations:

Rating:

Overall this task was: __ "Very Easy" (1) … "Very Difficult" (5)

Administrator/Notetaker Comments:

Step 42: Indicate a "No Known Implantable Devices" for a patient

<mark>This is just a test to see if the user can indicate no known implantable device for a patient.</mark>

<mark>Select a new patient, , Allotted Time: 10 seconds **Begin now**</mark>

Success:

    __ Easily Completed

    __ Completed with Difficulty or Help

    __Not Completed

    Comments:

Task Time: __

Optimal Path: *Tools->CDA Patient Info Status*

    __ Correct

    __ Minor Deviations

    __ Major Deviations

    Comments:

Observed Errors and Verbalizations:

Rating:

Overall this task was: __ "Very Easy" (1) … "Very Difficult" (5)

Administrator/Notetaker Comments:

Step 43: Identify Diagnostic and Therapeutic References

Take the participant to patient's Problem List.

<mark>Here are Patient's Active Problems. One of the problem is for "Deep Vein Thrombosis", your practice administrator has linked important clinical research and reference information that might help you while you are working. You are curious to see if any of Patient's Problems has any reference material for you to study.</mark>

<mark>When I say begin, review Patient's Problems, and view any reference material that has been linked. *, Allotted Time: 60 seconds* **Begin Now**</mark>

Success:

    __ Easily Completed

    __ Completed with Difficulty or Help

    __ Not Completed

    Comments:

Task Time: __

Optimal Path: Right click on a Problem row -> select i button (infobutton) for provider reference material->view->click Reference Info

    __ Correct

    __ Minor Deviations

    __ Major Deviations

Comments:

Observed Errors and Verbalizations: User access MedLine data rather than provider reference material. Then walked user thru correct process.

Rating:

Overall this task was: __ "Very Easy" (1) … "Very Difficult" (5)

Administrator/Notetaker Comments:

Step 44: View Outstanding Lab and Radiology Orders

This is just a test to see if the user can find the Outstanding Orders.

<mark>Your job is to monitor laboratory and radiology orders to make sure they are being sent and resulted in a timely fashion for the **entire practice**.</mark>

<mark>When I say Begin, navigate to where you would see those orders for the entire practice and display them. *, Allotted Time: 50 seconds* **Begin Now**</mark>

Success:

__ Easily Completed

__ Completed with Difficulty or Help

__Not Completed

Comments:

Task Time: __

Optimal Path: *View menu on top -> Select "Outstanding orders" from list -> close Button -> ->*

__ Correct

__ Minor Deviations

__Major Deviations

Comments:

Observed Errors and Verbalizations:

Rating:

Overall this task was: _____ "Very Easy" (1) … "Very Difficult" (5)

Administrator/Notetaker Comments:

Final Impressions (*10* minutes) _____

Step 45: Final Impressions (10 minutes)

What was your overall impression of the tasks you just performed?

What did you like the most?

What did you like the least?

What were you surprised to see?

Was there something you did not see that was missing?

Administer the SUS - Get answers to the Appendix 3:

"Thank you – the testing is over. We appreciate your help. Is there anything you wanted to talk about in regard to your experiences with the system in your practice?"

Appendix 3: System Usability Scale Questionnaire

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

   Strongly Disagree   1   2   3   4   5   Strongly Agree

2. I found the system unnecessarily complex

   Strongly Disagree   1   2   3   4   5   Strongly Agree

3. I thought the system was easy to use

   Strongly Disagree   1   2   3   4   5   Strongly Agree

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

   Strongly Disagree   1   2   3   4   5   Strongly Agree

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

   Strongly Disagree   1   2   3   4   5   Strongly Agree

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

   Strongly Disagree   1   2   3   4   5   Strongly Agree

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

   Strongly Disagree   1   2   3   4   5   Strongly Agree

8. I found the system very cumbersome to use

   Strongly Disagree   1   2   3   4   5   Strongly Agree

9. I felt very confident using the system

   Strongly Disagree   1   2   3   4   5   Strongly Agree

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

    Strongly Disagree   1   2   3   4   5   Strongly Agree

TRIARQ QSuite Manistee

Usability Tests

2024

EHR Usability Test Report of QSuite

Report based on ISO/IEC 25062:2006 Common Industry Format for Usability Test Reports

TABLE OF CONTENTS

EXECUTIVE SUMMARY

This document provides a summary of usability tests performed for QSuite Manistee. The aim of these tests was to assess and confirm the usability of the current user interface, offering proof of QSuite's user-friendliness. In these sessions, 10 users who fit the target demographic took part, completing simulated but realistic tasks in QSuite.

In the remote, one-on-one usability tests, each participant was welcomed by the administrator, who then explained the details of the safety-enhanced design study. Participants were informed of their option to withdraw at any time. Each participant had prior experience with the EHR. The administrator introduced the test, guiding participants to complete a set of tasks (presented one at a time) within QSuite. Throughout the session, the administrator tracked the time taken and, with the data logger(s), recorded user performance data either electronically or manually. No assistance was provided by the administrator on how to perform the tasks.

The following types of data were collected for each participant:

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

All participant data was de-identified – no correspondence could be made between the identity of the participant to the data collected. Following the conclusion of the testing, participants were asked to complete a post-test questionnaire.

Various recommended metrics, in accordance with the examples set forth in the *NIST Guide 7741 to the Processes Approach for Improving the Usability of Electronic Health Records*, were used to evaluate the usability of the QSuite. Please refer https://www.nist.gov/publications/nistir-7741-nist-guide-processes-approach-improving-usability-electronic-health-records for citation and for document.

INTRODUCTION

The EHRUT tested for this study was QSuite Manistee. Designed to present medical information to healthcare users in Ambulatory setting, QSuite consists of a state of the art, client server application. 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 QSuite. To this end, measures of effectiveness, efficiency and user satisfaction, such as time on task and errors were captured during the usability testing.

METHOD

PARTICIPANTS

Participants in the test were Doctors, Nurses and administrative staff. Participants were selected by TRIARQ and no participants were compensated for their participation. In addition, participants had no direct connection to the development of or organization producing the QSuite. 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.

Participants had a mix of backgrounds and demographic characteristics. The following is a table of participants by characteristics, including demographics, professional experience, computing experience and user needs for assistive technology. Participant names were replaced with Participant IDs so that an individual's data cannot be tied back to individual identities.

Part ID	Gender	Age	Education	Occupation/ role	Professional Experience (months)	Computer Experience (months)	Product Experience (months)	Assistive Technology Needs
P1	Female	75	High School	Office Manager	456	144	144	No
P2	Male	85	Medical School, Residency, and Fellowship	Physician	600	240	240	No
P3	Female	58	Associates	Office Manager	60	480	144	No
P4	Female	34	Bachelors	Practice Administrator	408	408	156	No
P5	Male	62	MD	Physician	348	300	144	No
P6	Female	44	High School	Office/Billing Manager	72	240	72	No
P7	Male	58	MD	Physician	384	216	168	No

P8	Male	50	B.S.	Operations Manager	96	96	72	No
P9	Female	68	Bachelors in Nursing	Nurse and Practice Admin	576	144	144	No
P10	Female	38	Associated Degree	Front Desk	36	48	48	No

Table 1: Participant Details for 170.315 (b)(11)

10 participants (matching the demographics in the section on Participants) were recruited and 10 participated in the usability tests. 0 participants failed to show up for the study.

Participants were scheduled for 30 minutes sessions with 5 minutes in between each session for debriefing by the administrator(s) and data logger(s), and to reset systems to proper test conditions. A data sheet was used to keep track of the participant's 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 the given EHR. Each participant used the system in their own location connected to the administrator over a Microsoft Teams remote session to log the test results and was provided with the same instructions. The system was evaluated for effectiveness, efficiency, and satisfaction as defined by measures collected and analyzed for each participant:

- Number of tasks successfully completed within the allotted time without assistance.

- Time to complete the tasks

- Number and types of errors

- Path deviations
- Participant's verbalizations (comments)
- Participant's satisfaction ratings of the system

TASKS

Several tasks were constructed that would be realistic and representative of the kinds of activities a user might do with this EHR. We used the required user tasks for g.3 SED testing including:

- Decision Support Intervention

Tasks were selected based on their frequency of use, criticality of function, and those that may be most troublesome for users. All tasks were assigned a risk category of high, moderate or low risk, after evaluating the potential risk for patients. High risk tasks were prioritized during the usability tests. The risk category for each task is as given below:

Task	Priority	Risk category
170.315(b)(11) Decision Support Interventions 1. User selects evidence-based DSI and accesses, records and changes source attributes. 2. User triggers evidence-based DSI and provides feedback. 3. User exports feedback.	1	High
170.315(b)(11) Decision Support Interventions 1. User configures user-supplied predictive DSI, accesses, records, or changes source attributes, and then triggers the user-supplied predictive DSI.	2	Moderate

Table 2: Task Risk Categorization

PROCEDURES

TRIARQ adopted a remote testing process with participants logging in to the system to perform the said tasks. The participants were provided with a secure meeting invite (Microsoft Teams) and 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. To ensure that the test ran smoothly, two staff members participated in this test, the usability administrator and the data logger. The usability testing staff conducting the test were experienced usability practitioners.

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. The administrator also 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.

Following the session, the administrator gave the participant the post-test questionnaire (e.g., the System Usability Scale, see Appendix B) and thanked everyone 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.

TEST LOCATION

Each participant performed their test from their own internet connected computer. A remote session was used for testing to reduce the time and cost of the testing. Participants could join from locations across the country, allowing TRIARQ access to a variety of experienced participants, with

low cost to TRIARQ and high convenience to participants. The administrator/ data logger made sure the participant successfully joined the internet conference, and the conference application was recording the session. The administrator / Data logger connected each participant to the remote hosted controlled testing session. The only participants in the session were the participant, the administrator/ data logger. The administrator / data logger could be heard, but not seen. The only thing visible to them was the participant's computer desktop, which was only displaying the remote hosted controlled session.

TEST ENVIRONMENT

The remote hosted controlled test environment was the same for each participant and simulated a typical configuration for a normal small-to-medium sized ambulatory medical practice. The remote hosted controlled test environment was the same hosting configuration and facility as all the TRIARQ hosted practices. QSuite was hosted in a virtualized environment using Windows Server 2019 as the operating system. The screen behaviour and performance resembled what would be experienced at a typical practice.

TEST FORMS AND TOOLS

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

1. Moderator's Guide

2. Post-test Questionnaire

The Moderator's Guide was devised to be able to capture the required data. The participant's interaction with QSuite was captured and recorded using Microsoft Teams on the test machine. The data logger observed the remote test session.

PARTICIPANT INSTRUCTIONS

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

Thank you for joining this study; your feedback is invaluable to us. Today's session will last approximately 30 minutes. During this time, you'll be working with an electronic health record (EHR) system, completing a few tasks and answering some questions along the way. Please aim to follow the instructions closely, completing each task as quickly and accurately as possible. Remember, we are evaluating the system, not you. If you encounter any challenges, this simply indicates areas where the system could be improved.

I will be available for specific guidance if needed, though I won't be able to instruct you on how to use the application itself. We're particularly interested in how easy or difficult it is to find the system, which features you think would be beneficial, and any areas where it could be refined. I was not involved in creating this system, so please feel free to share your honest opinions. Your responses will be kept strictly confidential, and your name will never be linked to any feedback. If at any point you wish to withdraw, you are welcome to do so.

Do you have any questions or concerns before we begin?

Following the procedural instructions, participants were shown the EHR and as their first task, were given time (5 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.

USABILITY METRICS

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

1. Effectiveness of QSuite Manistee by measuring participant success rates and errors

2. Efficiency of QSuite Manistee by measuring the average task time and path deviations

3. Satisfaction with QSuite Manistee by measuring ease of use ratings

DATA SCORING

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

Details of how observed data were scored.

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.
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 an "Failures." No task times were taken for errors.
Efficiency: Task Deviations	The participant's path (i.e., steps) through the application was recorded. Deviations occur if the participant, for example, went to the wrong screen, clicked on an incorrect menu item, followed an incorrect link, or interacted incorrectly with an on-screen control.
Efficiency: Task Time	Time was recorded in seconds.
Satisfaction: Task Rating	To measure participants' confidence in and likeability of the QSuite Manistee, 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 B.

RESULTS

DATA ANALYSIS AND REPORTING

The results of the usability test were calculated according to the methods specified in the Usability Metrics section above. The usability testing results for QSuite Manistee are detailed in the table

below. The data should yield actionable results that, if corrected, yield material, have a positive impact on user performance.

Criteria	Task	N	Task Success	Path Deviation	Task Time		Errors	Task Ratings 5=Easy
		#	Mean (SD)	Deviations (Observed / Optimal)	Mean (SD)	Deviations (Observed / Optimal)	Mean (SD)	Mean (SD)
(b)(11)	User selects evidence-based DSI and accesses, records and changes source attributes	10	100% (0%)	26/24	307/96	96/70	0% (0%)	5.0(0.0)
(b)(11)	User triggers evidence-based DSI and provides feedback	10	100% (0%)	12/10	137/77	77/50	0% (0%)	5.0(0.0)
(b)(11)	User exports feedback	10	100% (0%)	25/22	277/144	144/110	0% (0%)	5.0(0.0)
(b)(11)	User configures user-supplied predictive DSI, accesses, records, or changes source attributes, and then triggers the user-supplied predictive DSI	10	100% (0%)	28/25	326/77	77/70	0% (0%)	5.0(0.0)

Table 3: Summary of performance and rating data for 170.315 (b)(11)

The results from the Likert Scale scored subjective satisfaction with the system based on performance with these tasks to be **70.3**. Broadly interpreted, scores under 60 represent systems with poor usability; scores over 80 would be considered above average.

DISCUSSION OF THE FINDINGS

Overall, our study's findings for each task were positive, with participants successfully achieving the correct outcomes independently. Details of the findings are:

EFFECTIVENESS

The users found the system easy to use and were able to accomplish the tasks with little or no deviation. The system was intuitive and easy to follow.

EFFICIENCY

Participants were able to complete the tasks in the allocated time and the efficiency scores were good across the tasks. Some participants needed to switch screens to locate the computable file which was exported.

SATISFACTION

Participants in general were satisfied with the way the QSuite performed. They were able to navigate through the functions and were able to do it without any assistance. The SUS score was 70.3.

MAJOR FINDINGS

The major findings of this study were that participants successfully navigated through the system to achieve the required outcomes.

AREAS FOR IMPROVEMENT

Improve Visibility of Drop-down Menus: Enhance the clarity and discoverability of the "Satisfied" option in the DSI by making the drop-down menu more intuitive or providing visual cues. For instance, include a tooltip or a direct-action button to guide users.

Clarify Navigation to Reports Dropdown: Address the difficulty in locating the "All" dropdown under Reports > Open Recommendations. Consider making the dropdown more prominent.

Highlight Key Buttons in Task Workflows: Improve the visibility of the PDSI button. Add labels, icons, or visual indicators to guide users to the button on the exam note screen.

Improve File Export Visibility: Provide clear confirmation messages or visual indicators when the DSI feedback file is exported, including the file name and its saved location.

APPENDICES

Appendix A: Demographic Questionnaire

Name	
Gender	
Age	
Education (Highest Attained)	
Clinical Role	
Professional Experience (In Months)	
Experience with Computers in Healthcare (in months)	
Experience with EHR (in months)	

Appendix B: System Usability Scale Questionnaire

Ratings: Strongly Agree (5)   Agree (4)   Neutral (3)   Disagree (2)   Strongly Disagree (1)

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

Appendix C: Participant Briefing/Debriefing

Thank you for joining this study. Our session today will take around 30 minutes, during which you'll explore our EHR system and perform several tasks tied to its ONC certification criteria. The purpose is for you to try completing these tasks to the best of your ability, and we will record your observations as part of our efforts to secure ONC health IT certification. The version you'll use today isn't yet production-ready, but the features you'll be testing are nearly finalized for the upcoming release. While we provide a clinical scenario for each task, some of the test data may not be relevant to your everyday work and should be treated as placeholder data.

I will guide you through a few tasks on this system and ask some follow-up questions. We're interested in understanding how easy or difficult the system is to use, what aspects would be valuable to you, and how we might improve it. You'll be completing these tasks on your own, aiming to perform them as efficiently and accurately as possible without extra steps. If you encounter challenges or get stuck, I won't be able to assist with the system itself. Please hold your detailed feedback until the end of a task or the session, when we can discuss openly. Honest feedback is essential as it helps us refine the product.

Today's session is being recorded via Microsoft Teams, but all information you provide will remain confidential, and your name will never be linked to your feedback. Do you have any questions or concerns?

Appendix D: Usability Tasks

Task 1: User selects evidence-based DSI and accesses, records and changes source attributes

The authorized admin user goes to EHR to select or activate an evidenced-based DSI. After evidenced-based DSI is selected, the admin user will access source attributes and then record and change them.

1. Take the participant to the starting point for the task. Begin timer.
2. User will perform the actions according to the assigned patient data sheet and described above.
3. Record Success:
       a. Completed according to proper steps.
       b. Completed with difficulty or help. Describe below in comments.
       c. Not completed.
       d. Comments:
4. Task Time Observed (seconds):
5. Task Time Optimal (seconds):
6. Results of Pathway Choice
       a. Correct
       b. Minor Deviations/Cycle (describe below)
       c. Major Deviations (describe below)
       d. Comments:
7. Record Errors and Verbalizations:
8. Ask participant: "overall, how would you rate this task? Rating: (5) Very Easy (4) Easy (3) Moderate (2) Difficult (1) Very Difficult":

Associated Criteria: 170.315(b)(11) Decision Support Intervention

Task 2: User triggers evidence-based DSI and provides feedback

The user engages the previously activated evidenced-based DSI and triggers an intervention. User then records user feedback on intervention

1. Take the participant to the starting point for the task. Begin timer.
2. User will perform the actions according to the assigned patient data sheet and described above.
3. Record Success:
       a. Completed according to proper steps.
       b. Completed with difficulty or help. Describe below in comments.
       c. Not completed.
       d. Comments:
4. Task Time Observed (seconds):
5. Task Time Optimal (seconds):
6. Results of Pathway Choice
       a. Correct
       b. Minor Deviations/Cycle (describe below)

        c. Major Deviations (describe below)

        d. Comments:

7. Record Errors and Verbalizations:

8. Ask participant: "overall, how would you rate this task? Rating: (5) Very Easy (4) Easy (3) Moderate (2) Difficult (1) Very Difficult":

Associated Criteria: 170.315(b)(11) Decision Support Intervention

Task 3: User exports feedback

The admin user exports user feedback for evidenced-based DSI. The admin user confirms the file is in computable format with user feedback information

1. Take the participant to the starting point for the task. Begin timer.
2. User will perform the actions according to the assigned patient data sheet and described above.
3. Record Success:

        a. Completed according to proper steps.

        b. Completed with difficulty or help. Describe below in comments.

        c. Not completed.

        d. Comments:

4. Task Time Observed (seconds):
5. Task Time Optimal (seconds):
6. Results of Pathway Choice

        a. Correct

        b. Minor Deviations/Cycle (describe below)

        c. Major Deviations (describe below)

        d. Comments:

7. Record Errors and Verbalizations:

8. Ask participant: "overall, how would you rate this task? Rating: (5) Very Easy (4) Easy (3) Moderate (2) Difficult (1) Very Difficult":

Associated Criteria: 170.315(b)(11) Decision Support Intervention

Task 4: User configures user-supplied predictive DSI, accesses, records, or changes source attributes, and then triggers the user-supplied predictive DSI

The authorized admin user goes to EHR to select or activate a user-supplied predictive DSI. After user-supplied predictive DSI is selected, the admin user will access source attributes and then record and change them. Then user engages and activates user-supplied predictive DSI and triggers an intervention.

1. Take the participant to the starting point for the task. Begin timer.
2. User will perform the actions according to the assigned patient data sheet and described above.
3. Record Success:

a. Completed according to proper steps.

b. Completed with difficulty or help. Describe below in comments.

c. Not completed.

d. Comments:

4. Task Time Observed (seconds):

5. Task Time Optimal (seconds):

6. Results of Pathway Choice

a. Correct

b. Minor Deviations/Cycle (describe below)

c. Major Deviations (describe below)

d. Comments:

7. Record Errors and Verbalizations:

8. Ask participant: "overall, how would you rate this task? Rating: (5) Very Easy (4) Easy (3) Moderate (2) Difficult (1) Very Difficult":

Associated Criteria: 170.315(b)(11) Decision Support Intervention