Usability Testing Report

QSmartCare EHR, Ver 1.0, EP

This report format is adapted from NISTIR 7742, ver. 0.2

Customized Common Industry Format for Electronic Health Record

Usability Testing.

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EHR Usability Test Report for

QSmartCare EHR Ver. 1.0, EP

Report adapted from ISO/IEC 25062:2006 Common Industry Format for Usability Test Reports

QSmartCare EHR Ver. 1.0, EP

Dates of Usability Tests:	Nov 01, 2021
Date of Report:	Nov 01, 2021
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1. Executive Summary

A usability test of QSmartCare Ver. 1.0, EP was conducted on Nov 1st, 2021 at remotely using video conferencing in Miami Beach Florida by QSmartCare. The purpose of this test was to test and validate the usability of the current user interface and provide evidence of usability in the EHR Under Test (EHRUT).

During the usability test, ten (10) healthcare providers matching the target demographic criteria served as participants and used the EHRUT in simulated, but representative tasks.

This study collected performance data on the following tasks typically conducted using an EHR and outlined in the Meaningful Use Stage 3 requirements

1. (a.5) Demographics
2. (a.1) CPOE –Meds
3. (a.2) CPOE – Labs
4. (a.3) CPOE – Diagnostic Imaging
5. (a.4) Drug-drug, drug-allergy interaction checks for CPOE
6. (a.9) Clinical Decision support
7. (b.2) Clinical Information Reconciliation and Incorporation
8. (b.3) e-Prescribing

During the up to 3-hours, one-on-one usability tests, each user sign an informed consent/release form (included in Appendix); they were instructed that they could withdraw at any time. Some participants had limited experience with the EHR prior to training.

Training was provided for all participants covering basic functions and navigation of the EHR. The moderator introduced the test and instructed participants to complete a series of tasks (given one at a time) using the EHRUT. During the testing, the moderator timed the test and recorded user performance data on paper and electronically. The moderators did not give the participant assistance in how to complete the task.

The following types of data were collected for each participant:
1. Number of tasks successfully completed within the allotted time without assistance
2. Time to complete the tasks

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3. Success/Failure
4. Number and types of errors
5. Path deviations
6. Participant's verbalizations
7. Participant's satisfaction ratings of the system

All participant data was de-identified – no correspondence could be made from the identity of the participant to the data collected. Following the conclusion of the testing, participants were asked to complete a post-test questionnaire. Various recommended metrics, in accordance with the examples set forth in the NIST Guide to the Processes Approach for Improving the Usability of Electronic Health Records, were used to evaluate the usability of the EHRUT.

Following is a summary of the performance and rating data collected on the EHRUT

Sl. No	Measure Tested	Task Success	Error Count	Avg. Task Satisfaction Ratings
1	Demographics	100%	0	1.9
2	CPOE –Meds	100%	1	1.1
3	CPOE – Labs	100%	0	1.1
4	CPOE – Diagnostic Imaging	100%	2	1.1
5	Drug-drug, drug-allergy interaction checks for CPOE	100%	4	2.6
6	Clinical Decision support	90%	0	2.1
7	Clinical Information Reconciliation and Incorporation	90%	4	2
8	e-Prescribing	60%	3	2.6

Note for Avg. Task Satisfaction Ratings:
Easy - - - - - - - Difficult
1 2 3 4 5

Task details can be found in the Appendix

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

Major findings

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- Easy to learn and use interface
- Workflow is handled smoothly even during intensive tasks.

Areas for improvement

- Eprescription functionality to make it easy for the users as the task was not user friendly.
- Modify the CDS feature to make user friendly to the users. Need to provide training to the users on CDS alerts.

2. Introduction

The EHRUT tested for this study was QSmartCare, Ver. 1.0. Designed to present medical information to healthcare providers. The EHR Under Test (EHRUT) consists of the recording, storage and retrieval of patient demographics, out-patient clinical information, medication prescription and tracking, ordering of procedures and labs, patient access to medical data and numerous health reports. Providers can use the system live and interactive with patients as well as examining data privately. The usability testing attempted to represent realistic exercises and conditions. The purpose of this study was to test and validate the usability of the current user interface and provide evidence of usability in the EHR. To this end, measures of effectiveness, efficiency, and user satisfaction, such as completion of tasks, accuracy of completed tasks and confidence in said tasks were captured during the usability testing.

3. Method

Participants

A total of 10 participants were tested with the EHRUT. Participants in the test were Nurses, Physicians, & Staff. Participants were recruited by Magilen Enterprises Inc. In addition, participants had no direct connection to the development of or organization producing the EHRUT. Participants were not from the testing or supplier organization.

Participants were given the opportunity to have the same orientation and level of training as the actual end users would have received. For the test purposes, end-user characteristics were identified and translated into a recruitment screener used to solicit potential participants.

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Recruited participants had a mix of backgrounds and demographic characteristics conforming to typical users of the EHRUT.

The following is a table of participants by characteristics, including demographics, professional experience, computing experience and user needs for assistive technology.

Participants

ID	Gender	Age	Education	Occupation/Role	Professional Experience (In Years)	Computer Experience (In Years)	Product Experience (In Years)	Assistive Technology Needs
P1	Female	30	High School Diploma	Provider Relations	3 months	4	0	No
P2	Female	31	MSN	APRN Wound Care	2 months	10	10	No
P3	Female	42	BA, ASN, BSN, MSN	APRN Wound Care	5	12	12	No
P4	Female	48	ADN, FNP	FNP	2	16	16	No
P5	Female	28	MSN	Physician Assistant wound care	1	6	6	No
P6	Male	34	BSN, MSN	APRN Wound Care	2 months	10	10	No
P7	Female	28	BSN, MSN	Physician Assistant	1 and ½	1.5	1 and ½	No
P8	Female	37	BSN, MSN	Wound Care	2	9	9	No
P9	Female	50	ADN, BSN, MSN	APRN Wound Care	9 months	10	7	No
P10	Female	33	ASN, BSN, MSN	APRN Wound Care	2	10	10	No

Participant names were replaced with Participant IDs so that an individual's data cannot be tied back to individual identities.

Ten participants (matching the demographics in the section on Participants) were recruited and ten participated in the usability test. Participants were scheduled for three 1-hour sessions with

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15 - 20 minutes in between each session for debrief & review by the administrator(s) and data logger(s), and to reset systems to proper test conditions.

Study Design

Overall, the objective of this test was to uncover areas where the application performed well – that is, effectively, efficiently, and with satisfaction – and areas where the application failed to meet the needs of the participants. The data from this test may serve as a baseline for future tests with an updated version of the same EHR and/or comparison with other EHRs provided the same tasks are used. In short, this testing serves as both a means to record or benchmark current usability, but also to identify areas where improvements must be made.

During the usability test, participants interacted with one EHR. In the test session, each participant used their computer system on a video call that was recorded and monitored. They were all provided with the same instructions.

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

1. Number of tasks successfully completed within the allotted time without assistance
2. Time to complete the tasks
3. Number and types of errors
4. Path deviations
5. Participant's verbalizations (comments)
6. Participant's satisfaction ratings of the system

Task

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

1. Demographics
2. CPOE –Meds
3. CPOE – Labs
4. CPOE – Diagnostic Imaging
5. Drug-drug, drug-allergy interaction checks for CPOE
6. Clinical Decision support
7. Clinical Information Reconciliation and Incorporation
8. e-Prescribing

The 8 tasks covered measures were guided by Meaningful Use Stage 3 (2015 edition) requirements. Tasks were selected based on their frequency of use, criticality of function, and those that may be most troublesome for users. Tasks were constructed considering the study objectives.

Procedures

Upon arrival, participants were greeted; their identity was verified and matched with a name on the participant schedule. Participants were then assigned a participant ID. Each participant reviewed and signed an informed consent and release form (See Appendix). A representative from the test team witnessed the participant's signature. To ensure that the test ran smoothly, two staff members participated in this test, the usability administrator, and another administrator / moderator.

The usability testing staff conducting the test were experienced usability practitioners with four previous studies covering software usability across several industries. The administrators / moderators moderated the session including administering instructions and tasks. The administrators / moderators also monitored task times, obtained post-task rating data, and took notes on participant comments. They also served as the data loggers 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):

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• 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 setup and question. The task time was stopped once the participant indicated they had successfully completed the task. Scoring is discussed below in Section data scoring.

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

Participants that received compensation signed a receipt and acknowledgement form (See Appendix) indicating that they had received the compensation.

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

Test Location

Due to the covid protocol the usability test was conducted via video conferencing.

Test Environment

The moderator and the users conducting the testing via Video conferencing. The application screen was shared, and the testing was recorded. The application was accessed via the Internet. For testing, the computers used were laptops running MS Windows 8 or MS Windows 10.

The participants used a mouse, pointing pad, keyboard and monitor typical of laptops and equipment used in a medical facility when interacting with the EHRUT. The EHRUT displayed directly on the laptops using screens running in full colour. There were no print based aspects required to complete the test.

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The application was set up by the EHR vendor, Magilen Enterprises Inc., according to documentation describing the system set-up and preparation. The application itself was running on a remote server using a test medical practice via an internet connection.

Technically, the system performance (i.e., response time) was representative to what actual users would experience in a field implementation. Additionally, participants were instructed not to change any of the default system settings (such as control of font size).

Test Forms and Tools

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

1. Informed Consent
2. Participants Demographics
3. Non-Disclosure Agreement
4. Moderator's Guide
5. Participant's Guide
6. Post-test Questionnaire
7. Incentive Receipt and Acknowledgment Form

Examples of these documents can be found in the Appendices.

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

Participants Instructions

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

Thank you for participating in this study. Your input is very important. Our session today will last about up to 3 hours. During that time, you will use an instance of an electronic health record. I will ask you to complete a few tasks using this system and answer some questions. You should complete the tasks as quickly as possible making as few errors as possible. Please try to complete the tasks on your own following the instructions very closely. Please note that we are

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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 the information that you provide will be kept confidential and your name will not be associated with your comments at any time. Should you feel it necessary you are able to withdraw at any time during the testing

Following the procedural instructions, participants were shown the EHR and given time, 20 minutes, to explore the system and make comments. Once this was complete, the administrator gave the following instructions:

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

Participants were then given seven tasks to complete. Tasks are listed in the moderator's and participants guides in the Appendix.

Usability Metrics

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

The goals of the test were to assess:

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

Measure	Rationale and Scoring

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Efficiency: Task Time	Each task was timed from when the administrator said "Begin" until the participant said, "Done." If he or she failed to say "Done," the time was stopped when the participant stopped performing the task. Only task times for tasks that were successfully completed were included in the average task time analysis. Average time per task was calculated for each task. Variance measures (standard deviation and standard error) were also calculated.
Satisfaction: Task Rating	Participant's subjective impression of the ease of use of the application was measured by administering both a simple post task question as well as a post-session questionnaire. After each task, the participant was asked to rate "Overall, this task was:" on a scale of 1 (Very Difficult) to 5 (Very Easy). These data are averaged across participants. Common convention is that average ratings for systems judged easy to use should be 3.3 or above. To measure participants' confidence in and likeability of the [EHRUT] overall, the testing team administered the System Usability Scale (SUS) post-test questionnaire. Questions included, "I think I would like to use this system frequently," "I thought the system was easy to use," and "I would imagine that most people would learn to use this system very quickly." See full System Usability Score questionnaire in the Appendix
Effectiveness: Task Success	A task was counted as a "Success" if the participant was able to achieve the correct outcome, without assistance, within the time allotted on a per task basis. The total number of successes were calculated for each task and then divided by the total number of times that task was attempted. The results are provided as a percentage. Task times were recorded for successes. Observed task times divided by the optimal time for each task is a measure of optimal efficiency. Optimal task performance time, as benchmarked by expert performance under realistic conditions, is recorded when constructing tasks. Target task times used for task times in the Moderator's Guide must be operationally defined by taking multiple measures of optimal performance and multiplying by a factor of 2.0 that allows some time buffer because the participants are presumably not trained to expert

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	performance. Thus, if expert, optimal performance on a task was 90 seconds then allotted task time performance was 180 seconds. This ratio should be aggregated across tasks and reported with mean and variance scores.
Effectiveness: Task Failures	If the participant abandoned the task, did not reach the correct answer or performed it incorrectly, or reached the end of the allotted time before successful completion, the task was counted as a "Failure." The total number of errors was calculated for each task and then divided by the total number of times that task was attempted. Not all deviations would be counted as errors. This should also be expressed as the mean number of failed tasks per participant. On a qualitative level, an enumeration of errors and error types are collected
Efficiency: Task Deviations	The participant's path (i.e., steps) through the application was recorded. Deviations occur if the participant, for example, went to a wrong screen, clicked on an incorrect menu item, followed an incorrect link, or interacted incorrectly with an on-screen control.

4. Results

Data Analysis Reporting

The results of the usability test were calculated according to the methods specified in the Usability Metrics section above. Participants who failed to follow session and task instructions had their data excluded from the analyses. There were no exclusions in this test based on that criterion.

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

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Task No	Measure Tested	Task Success	Max. Deviation Observed Count	Avg. Task Time (mm:ss)	Task Time Optimal (sec)	Errors Count	Task Satisfaction Ratings
1	Demographics	100%	0	04:14	< 1104	0	1.9
2	CPOE –Meds	100%	4	01:27	< 235	1	1.1
3	CPOE – Labs	100%	0	00:47	< 90	0	1.1
4	CPOE – Diagnostic Imaging	100%	0	00:37	< 60	2	1.1
5	Drug-drug, drug-allergy interaction checks for CPOE	100%	6	10:03	< 1046	4	2.6
6	Clinical Decision support	90%	12	04:23	< 539	0	2.1
7	Clinical Information Reconciliation and Incorporation	90%	12	04:29	< 447	4	2
8	e-Prescribing	60%	12	05:27	< 787	3	2.6

Note for Avg. Task Satisfaction Ratings:
Easy - - - - - - - Difficult
1 2 3 4 5

Aggregated results per full measure.

The results from the SUS (System Usability scale) scored the subjective satisfaction with the system based on performance with these tasks to be: 82.88. The satisfaction survey yields a single number that represents a composite measure of the overall perceived usability of the system.

Satisfaction scores have a range of 1 to 5, 1 being most satisfied and 5 being least satisfied. and the score is a relative benchmark that is used against other iterations of the system. Broadly interpreted, % satisfaction scores under 60 represent systems with poor usability; scores over 80 would be considered above average.

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Participant ID	Average Satisfaction Score (1 being the best)	% Satisfaction
1	3.2	94.72%
2	3.1	91.76%
3	2.6	76.96%
4	2.5	74%
5	3.1	91.76%
6	2.8	82.88%
7	3.4	100%
8	2.8	82.88%
9	3	88.8%
10	3.1	91.76%

Discussion of the findings

EFFECTIVENESS
Most of the tasks were performed with a 97% success rate. Reasons for failure were inexperience in clinical terminology, insufficient training. Additional training is expected to resolve most of these errors

EFFICIENCY
Optimal times can vary wildly depending on the user's environment, workload, and clinical situation at hand. For this test, the task times chosen were considered as optimal in a quiet, unhurried, unpressured environment.

SATISFACTION
Participant satisfaction rated very high. Task satisfaction ratings averaged 1.8. Participant experience with the EHRUT (outside of test day training) prior to the test ranged from "Some Experience" to "None". They were all asked to evaluate their experience only on the tasks and subtasks performed during the test

MAJOR FINDINGS
Over all the participants were aptly able to maneuver through the EHRUT and adequately and easily perform the tasks.

In areas where participants may have difficulty on their first try, they quickly learned the optimal path and performed a similar task without issue.

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Of the areas tested, E- prescription and Clinical Decision Support were arguably the most complicated both in terms of the clinical outcome desired and in the use of multiple windows and logins to accomplish the task. These were two areas where participants were unable to complete the task or completed it with difficulty.

AREAS FOR IMPROVEMENT
Based on the findings above, there are some obvious changes need in eprescription and clinical decision support that will improve the user experience, facilitate faster product adaption, and reduce the possibilities of errors.

Appendix 1: RECRUITING SCREENER

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

Recruiting Script for Recruiting Firm

Hello, my name is _____, calling from [Insert name of recruiting firm]. We are recruiting individuals to participate in a usability study for an electronic health record. We would like to ask you a few questions to see if you qualify and if would like to participate. This should only take a few minutes of your time. This is strictly for research purposes. If you are interested and qualify for the study, you will be paid to participate. Can I ask you a few questions?

Customize this by dropping or adding questions so that it reflects your EHR's primary audience

1. [If not obvious] Are you male or female? [Recruit a mix of participants]

2. Have you participated in a focus group or usability test in the past xx months? [If yes, Terminate]

3. Do you, or does anyone in your home, work in marketing research, usability research, web design […etc.]? [If yes, Terminate]

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4. Do you, or does anyone in your home, have a commercial or research interest in an electronic health record software or consulting company? [If yes, Terminate]

5. Which of the following best describes your age? [23 to 39; 40 to 59; 60 - to 74; 75 and older] [Recruit Mix]

6. Which of the following best describes your race or ethnic group? [e.g., Caucasian, Asian, Black/African-American, Latino/a or Hispanic, etc.]

7. Do you require any assistive technologies to use a computer? [if so, please describe]

Professional Demographics Customize this to reflect your EHR's primary audience

8. What is your current position and title? (Must be healthcare provider)
- ☐ RN: Specialty _____
- ☐ Physician: Specialty _____
- ☐ Resident: Specialty _____
- ☐ Administrative Staff
- ☐ Other [Terminate]

9. How long have you held this position?

10. Describe your work location (or affiliation) and environment? (Recruit according to the intended users of the application) [e.g., private practice, health system, government clinic, etc.]

11. Which of the following describes your highest level of education? [e.g., high school graduate/GED, some college, college graduate (RN, BSN), postgraduate (MD/PhD), other (explain)]

Computer Expertise Customize this to reflect what you know about your EHR's audience

12. Besides reading email, what professional activities do you do on the computer? [e.g., access EHR, research; reading news; shopping/banking; digital pictures; programming/word processing, etc.] [If no computer use at all, Terminate]

13. About how many hours per week do you spend on the computer? [Recruit according to the demographics of the intended users, e.g., 0 to 10, 11 to 25, 26+ hours per week]

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14. What computer platform do you usually use? [e.g., Mac, Windows, etc.]

15. What Internet browser(s) do you usually use? [e.g., Firefox, IE, AOL, etc.]

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

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

18. How many EHRs do you use or are you familiar with?

19. How does your work environment patient records? [Recruit according to the demographics of the intended users]

- ☐ On paper
- ☐ Some paper, some electronic
- ☐ All electronic

Contact Information If the person matches your qualifications, ask

Those are all the questions I have for you. Your background matches the people we're looking for. [If you are paying participants or offering some form of compensation, mention] For your participation, you will be paid [amount].

Would you be able to participate on [date, time]? [If so collect contact information]

May I get your contact information?

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

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- ✓ Alternate [cell] phone number:
- ✓ Email address:

Before your session starts, we will ask you to sign a release form allowing us to videotape your session. The videotape will only be used internally for further study if needed. Will you consent to be videotaped?

This study will take place remotely using video conferencing in Miami Beach Florida. I will confirm your appointment a couple of days before your session and provide you with directions to our office. What time is the best time to reach you?

Appendix 2: PARTICIPANT DEMOGRAPHICS

We would like to ask you a few questions to gather demographic information about prospective users of the EHR. This should only take a few minutes of your time. This is strictly for research purposes.

Name of participant:
Address:
City, State, Zip:
Daytime phone number:
Email address: Gender:
Age Group:

1. Have you participated in a focus group or usability test in the past 12 months?

2. Do you, or does anyone in your home, have a commercial or research interest in an electronic health record software or consulting company?

3. Do you require any assistive technologies to use a computer? [if so, please describe]

4. What is your current position and title? (Must be healthcare provider)
RN: Specialty _____
Physician: Specialty _____

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Resident: Specialty _____
Administrative Staff

5. How long have you held this position?

6. Describe your work location (or affiliation) and environment? [e.g., private practice, health system, government clinic, etc.]

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. How many EHRs do you use or are you familiar with?

Appendix 3: NON-DISCLOSURE AGREEMENT and INFORMED CONSENT

THIS AGREEMENT is entered into as of _ _____, 2021, between _____ ("the Participant") and the testing organization Magilen Enterprises Inc located at 1835 Cleveland Road, Miami Beach, FL 33141.

The Participant acknowledges that his or her voluntary participation in today's usability study may bring the Participant into possession of Confidential Information. The term "Confidential Information" means all technical and commercial information of a proprietary or confidential nature which is disclosed by Magilen Enterprises, or otherwise acquired by the Participant, in the course of today's study.

By way of illustration, but not limitation, Confidential Information includes trade secrets, processes, formulae, data, know-how, products, designs, drawings, computer aided design files and other computer files, computer software, ideas, improvements, inventions, training methods and materials, marketing techniques, plans, strategies, budgets, financial information, or forecasts.

Any information the Participant acquires relating to this product during this study is confidential and proprietary to Magilen Enterprises and is being disclosed solely for the purposes of the Participant's participation in today's usability study.

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By signing this form, the Participant acknowledges that s/he will receive monetary compensation for feedback and will not disclose this confidential information obtained today to anyone else or any other organizations.

Participant's printed name: _____
Signature: _____
Date: _____

INFORMED CONSENT

Magilen Enterprises Inc would like to thank you for participating in this study. The purpose of this study is to evaluate an electronic health records system. If you decide to participate, you will be asked to perform several tasks using the prototype and give your feedback. The study will last about 4 hours. At the conclusion of the test, you will be compensated for your time.

Agreement
I understand and agree that as a voluntary participant in the present study conducted by Magilen Enterprises Inc. I am free to withdraw consent or discontinue participation at any time. I understand and agree to participate in the study conducted and videotaped by Magilen Enterprises Inc.

I understand and consent to the use and release of electronic recording by Magilen Enterprises Inc. I understand that the information and recording is for research purposes only and that my name and image will not be used for any purpose other than research. I relinquish any rights to the recording and understand the recording may be copied and used by Magilen Enterprises Inc without further permission.

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

I understand and agree that the data collected from this study may be shared outside of Magilen Enterprises Inc. I understand and agree that data confidentiality is assured, because only de-identified data – i.e., identification numbers not names – will be used in analysis and reporting of the results.

I agree to immediately raise any concerns or areas of discomfort with the study administrator. I understand that I can leave at any time.

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Please check one of the following:

[ ] YES, I have read the above statement and agree to be a participant.
[ ] NO, I choose not to participate in this study.
Name: _____
Signature: _____
Date: _____

Appendix 4: MODERATOR'S GUIDE

Meaningful Use 3
Safety Enhanced Design Study
Nov 1, 2021

Moderator's Guide

Magilen Enterprises Inc

QSmartCare EHR, version 1.0

Moderator 1: _____

Moderator 2: _____

Location: _____

Participant #: _____

Test Date: _____

Start Time:_____

End Time:_____

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Prior to the Testing Session
Ensure that the Recording Equipment and Software is Running Properly

Sign into Magilen Enterprises Inc,
Turn on the testing computer
Open the Firefox web browser
Go to: www.qsmartcare.com

NOTE: Patient names used in testing will end with the participant number.

Upon Participant Arrival
Obtain Consent and NDA From the Participant
Read the following to the participant:

"Thank you for coming today. My name is _____, and I'll be working with you today."

"In this study, we're evaluating the usability of electronic health record systems. To do this, we will have you fill out some surveys and complete seven tasks. Each task will include a number of steps. We will be watching and recording how you perform these tasks. This will include us taking notes as well as recording screenshots and audio of your feedback. All recordings and information that you provide will be kept confidential and you will in no way be identified in any of our reports."

"Each task will include a scenario to explain why you are doing the task. As you work, feel free to perform whatever steps you feel are necessary to complete the tasks. I can try to answer questions about information that you might feel is missing, but I cannot provide you with directions on how to complete the task."

"You are free to stop or take a break at any time, and that will not affect any consideration we will be providing. Please let me know if you need anything to make yourself more comfortable."

"Before we begin, I will need you to read over these documents and sign them. The first describes the study and your rights as participant and the other is a non-disclosure agreement. When you have read and signed them, you may give them to me." "Do you have any questions for me?"

Provide Consent Form and Obtain Signed Copy

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Completed?

Provide Non-Disclosure Agreement and Obtain Signed Copy
Completed? _____
During the Testing Session

Administer Demographic Survey
Provide Demographic Survey to the participant

Completed? _____

Read the following to the participant:
"This is a survey to tell us a little more about you and your background. When you have finished, we will do some basic training with the EHR system, and I will then provide you with the task scenarios and begin the study."

Provide Training

Get the system working/prepared to provide training
Take control of the computer and go to the Home Screen
Read the following to the participant:

"This is the QSmartCare system. You will be using this system to complete the study. Before we begin, we will demonstrate a few things in the EHR that will be necessary for you to complete the tasks."

"First, this is the Dashboard. You select patients here. You open records like this…"
"Second, you can create patient via dashboard or consultation. You can create a consultation and progress note for a patient."
"Third, medications are created by using the Medications tab"

Provide Task Instructions
Ensure that the EHR is on the "starting screen"
Completed? _____

Provide the Task 1 Instructions to the participant
Completed? _____

Read the following to the participant:

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"Here are the instructions for the first task. Each set of instructions provides you with a brief scenario explaining the task that you are to accomplish using the QSmartCare EHR system. In some cases, you will be required to input data into the system to complete the task. You may refer to these instructions at any time. I will provide the next set of instructions when you finish this task."

"In this study we are interested in whether you can complete the tasks, not about your medical decision-making skills or ability to catch a mistake in the record, so please do not spend time reviewing the patients' histories in detail. Assume that everything in the record is accurate unless otherwise specified in the task instructions. Work as quickly as possible but focus on completing the task rather than worry about how long it might be taking."

"Do you have any questions?"

Moderator Tasks

- ✓ Begin any timers and recording devices used in this test.
- ✓ Allow the participant to start the task.
- ✓ Stop the timer when the participant indicates they have completed the task.
- ✓ Allow the participant to complete the task.
- ✓ Use the data collection forms to make notes and measure performance.
- ✓ Repeat this process until all tasks have been completed.

Upon Test Completion
Provide the SUS to the participant and read the following:
"Great, now we have two surveys left. Please fill this one out to the best of your ability. When you are done, I will give you the next one."

Provide the Post-Test Survey and read the following:
"This is the last survey. Again, please complete it to the best of your ability."

End Session Recording
Debrief Participant

Read the following: "Great! That completes our study. I want to thank you for taking the time to complete this study. As you know, the purpose of this study is to allow us to assess the usability of an EHR system and your input has been very valuable."

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"Do you have any questions before you go?"

"Thanks again!"
Upon Participant Departure
Back-up Participant Data
Reset Patient Scenarios

Open each patient chart and either add or remove data that was removed or added as part of the task so that the next participant will start with a clean slate.

Sample Score Recording
Task 1&7a – View compose Rx Page – 170.315.a.1-1, 1.7-1, b.3-1 (Kevin Duster)
* Start timers, recording & instruct participant to begin task.

Effectiveness

[ ] Easily Completed (without help < 1 min) [ ] Completed with difficulty or help (help < 3 min) [ ] Not Completed (7 min or more)	Notes:

Efficiency Optimal Path: View patient page, View Meds widget, Click ERX button.

Task Time: _____(mm:ss) Number of Deviations _____	Notes:

Satisfaction

On a scale of 1 to 5	Notes:

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Easy - - - - - - - Difficult 1 2 3 4 5 How would you rate this task? Rating: [ ]	

Appendix 5: SYSTEM USABILITY SCALE QUESTIONNAIRE

In 1996, Brooke published a "low-cost usability scale that can be used for global assessments of systems usability" known as the System Usability Scale or SUS.16 http://www.usabilitynet.org/trump/documents/Suschapt.doc Lewis and Sauro (2009) and others have elaborated on the SUS over the years. Computation of the SUS score can be found in Brooke's paper, in at or in Tullis and Albert (2008).

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

Strongly disagree				Strongly agree
1	2	3	4	5

2. I found the system unnecessarily complex

Strongly disagree				Strongly agree
1	2	3	4	5

3. I thought the system was easy to use

Strongly disagree				Strongly agree
1	2	3	4	5

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

Strongly disagree				Strongly agree
1	2	3	4	5

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

Strongly disagree				Strongly agree
1	2	3	4	5

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

Strongly disagree				Strongly agree
1	2	3	4	5

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

Strongly disagree				Strongly agree
1	2	3	4	5

8. I found the system very cumbersome to use

Strongly disagree				Strongly agree
1	2	3	4	5

9. I felt very confident using the system

Strongly disagree				Strongly agree
1	2	3	4	5

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

Strongly disagree				Strongly agree
1	2	3	4	5

Appendix 6: INCENTIVE RECEIPT AND ACKNOWLEDGEMENT FORM

Acknowledgement of Receipt

I hereby acknowledge receipt of $_____ for my participation in a research study run by Test Company.

Printed Name: _____

Address: _____

_____

Signature: _____ Date: _____

Usability Researcher: _____

Signature of Usability Researcher: _____

Date: _____

Witness: _____

Witness Signature: _____

Date: _____

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Usability Testing Report

QSmartCare EHR, Ver 1.0, EP

Decision Support Intervention 170.315(b)(11) Supplemental Report

This report format is adapted from NISTIR 7742, ver. 0.2

Customized Common Industry Format for Electronic Health Record

Usability Testing.

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EHR Usability Test Report for

QSmartCare EHR Ver. 1.0, EP

Report adapted from ISO/IEC 25062:2006 Common Industry Format for Usability Test Reports

QSmartCare EHR Ver. 1.0, EP

Dates of Usability Tests:	Nov 21, 2024
Date of Report:	Nov 28, 2024
Report Prepared By:	QSmartCare Inc. Ashline Charles, Director of Provider Relations 305-466-9988 1835 Cleveland Road, Miami Beach, FL 33141
	Jocelyn Ramirez, Assistant Director of Provider Relations 305-466-9988 1835 Cleveland Road, Miami Beach, FL 33141

1. Executive Summary

A usability test of QSmartCare Ver. 1.0, EP was conducted on Nov 21th, 2024 at remotely using video conferencing in Miami Beach Florida by QSmartCare. The purpose of this test was to test and validate the usability of the enhancements made for the ONC criterion § 170.315(b)(11) Decision Support Intervention functionality. This EHR Under Test (EHRUT) was previously certified and usability tested for the functionality of ONC criterion § 170.315(a)(9). The tasks and test results described in this supplemental report focus on the delta updates for § 170.315(b)(11) compared to its predecessor § 170.315(a)(9). Please refer to original usability test report covering § 170.315(a)(9) tasks for additional information

During the usability test, ten (10) healthcare providers matching the target demographic criteria served as participants and used the EHRUT in simulated, but representative tasks.

This study collected performance data on four (4) tasks which cover the changes from § 170.315(a)(9) to § 170.315(b)(11):

- Admin User Configures User-supplied Predictive DSI and Records / Changes / Access Source Attributes and Then User Triggers User-supplied Predictive DSI
- Admin User Selects Evidenced-based DSI and Access / Record / Change Source Attributes
- User Triggers Evidenced-based DSI and Provides User Feedback
- Admin User Exports User Feedback

During the up to 1-hours, one-on-one usability tests, each user sign an informed consent/release form (included in Appendix); they were instructed that they could withdraw at any time. Some participants had limited experience with the EHR prior to training.

Training was provided for all participants covering basic functions and navigation of the EHR. The moderator introduced the test and instructed participants to complete a series of tasks (given one at a time) using the EHRUT. During the testing, the moderator timed the test and recorded user performance data on paper and electronically. The moderators did not give the participant assistance in how to complete the task.

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The following types of data were collected for each participant:

1. Number of tasks successfully completed within the allotted time without assistance
2. Time to complete the tasks
3. Success/Failure
4. Number and types of errors
5. Path deviations
6. Participant's verbalizations
7. Participant's satisfaction ratings of the system

All participant data was de-identified – no correspondence could be made from the identity of the participant to the data collected. Following the conclusion of the testing, participants were asked to complete a post-test questionnaire. Various recommended metrics, in accordance with the examples set forth in the NIST Guide to the Processes Approach for Improving the Usability of Electronic Health Records, were used to evaluate the usability of the EHRUT.

Following is a summary of the performance and rating data collected on the EHRUT

Sl. No	Task	Task Success	Error Count	Avg. Task Satisfaction Ratings
1	Admin User Configures User-supplied Predictive DSI and Records / Changes / Access Source Attributes and Then User Triggers User-supplied Predictive DSI	90%	1	1.2
2	Admin User Selects Evidenced-based DSI and Access / Record / Change Source Attributes	100%	0	1.6
3	User Triggers Evidenced-based DSI and Provides User Feedback	90%	1	1.6
4	Admin User Exports User Feedback	100%	0	1.1

Note for Avg. Task Satisfaction Ratings:
Easy - - - - - - - Difficult
1 2 3 4 5

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Task details can be found in the Appendix

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

Major findings

- Easy to learn and use interface
- Workflow is handled smoothly even during intensive tasks.

Areas for improvement

- The CDS screen had many fields and user had a lot of scrolling, the user felt it would be nice if it would be nice to see more options on the page without scrolling

2. Introduction

The EHRUT tested for this study was QSmartCare, Ver. 1.0. designed to test and validate the usability of the enhancements made for the ONC criterion § 170.315(b)(11) Decision Support Intervention functionality. This EHRUT was previously certified and usability tested for the functionality of ONC criterion § 170.315(a)(9). The tasks and test results described in this supplemental report focus on the delta updates for § 170.315(b)(11) compared to its predecessor § 170.315(a)(9). The usability testing attempted to represent realistic exercises and conditions associated with the § 170.315(b)(11) functionality within the EHRUT.

The purpose of this study was to test and validate the usability of the current user interface and provide evidence of usability in the EHRUT. To this end, measures of effectiveness, efficiency, and user satisfaction, such as completion of tasks, accuracy of completed tasks and confidence in said tasks were captured during the usability testing.

3. Method

Design Standard
QSmartCare employed NISTIR 7741 usability standard in our product design. It is a user-centered design (UCD) created for improving the usability of electronic health records (https://www.nist.gov/publications/nistir-7741-nist-guide-processes-approach-improving-usability-electronic-health-records)

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Participants

A total of 10 participants were tested with the EHRUT. Participants in the test were Nurses, Physicians, & Staff. Participants were recruited by Magilen Enterprises Inc. In addition, participants had no direct connection to the development of or organization producing the EHRUT. Participants were not from the testing or supplier organization.

Participants were given the opportunity to have the same orientation and level of training as the actual end users would have received. For the test purposes, end-user characteristics were identified and translated into a recruitment screener used to solicit potential participants.

Recruited participants had a mix of backgrounds and demographic characteristics conforming to typical users of the EHRUT.

The following is a table of participants by characteristics, including demographics, professional experience, computing experience and user needs for assistive technology.

Participants

ID	Gender	Age	Education	Occupation/Role	Professional Experience (In Months)	Computer Experience (In Months)	Product Experience (In Months)	Assistive Technology Needs
101	Female	42	Master degree	ARNP	120	180	96	No
102	Female	54	Master degree	ARNP	240	240	228	No
103	Female	35	Master degree	Physician Assistance	72	180	72	No
104	Female	48	Master degree	Physician Assistance	216	192	120	No
105	Female	33	Master degree	ARNP	60	156	60	No
106	Female	36	Master degree	ARNP	120	240	108	No
107	Female	32	Master degree	ARNP	72	108	60	No
108	Female	50	Master degree	ARNP	240	216	180	No
109	Female	59	Bachelor's degree	Registered Nurse	300	240	216	No
110	Female	33	Master degree	Physician Assistance	96	96	96	No

Participant names were replaced with Participant IDs so that an individual's data cannot be tied back to individual identities.

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Ten participants (matching the demographics in the section on Participants) were recruited and ten participated in the usability test. Participants were scheduled for 1-hour sessions.

Study Design

Overall, the objective of this test was to uncover areas where the application performed well – that is, effectively, efficiently, and with satisfaction – and areas where the application failed to meet the needs of the participants. The data from this test may serve as a baseline for future tests with an updated version of the same EHR and/or comparison with other EHRs provided the same tasks are used. In short, this testing serves as both a means to record or benchmark current usability, but also to identify areas where improvements must be made.

During the usability test, participants interacted with one EHR. In the test session, each participant used their computer system on a video call that was recorded and monitored. They were all provided with the same instructions.

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

1. Number of tasks successfully completed within the allotted time without assistance
2. Time to complete the tasks
3. Number and types of errors
4. Path deviations
5. Participant's verbalizations (comments)
6. Participant's satisfaction ratings of the system

Task

Several tasks were constructed that would be realistic and representative of the kinds of activities a user might do with this EHR. Tasks were selected based on their frequency of use, criticality of function, and those that may be most troublesome for users. Tasks were constructed considering the study objectives.

- Admin User Configures User-supplied Predictive DSI and Records / Changes / Access Source Attributes and Then User Triggers User-supplied Predictive DSI

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- Admin User Selects Evidenced-based DSI and Access / Record / Change Source Attributes
- User Triggers Evidenced-based DSI and Provides User Feedback
- Admin User Exports User Feedback

Procedures

Upon arrival, participants were greeted; their identity was verified and matched with a name on the participant schedule. Participants were then assigned a participant ID. Each participant reviewed and signed an informed consent and release form (See Appendix). A representative from the test team witnessed the participant's signature. To ensure that the test ran smoothly, two staff members participated in this test, the usability administrator, and another administrator / moderator.

The usability testing staff conducting the test were experienced usability practitioners with four previous studies covering software usability across several industries. The administrators / moderators moderated the session including administering instructions and tasks. The administrators / moderators also monitored task times, obtained post-task rating data, and took notes on participant comments. They also served as the data loggers 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 setup and question. The task time was stopped once the participant indicated they had successfully completed the task. Scoring is discussed below in Section data scoring.

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

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Participants that received compensation signed a receipt and acknowledgement form (See Appendix) indicating that they had received the compensation.

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

Test Location

Testing was done using Teams or Zoom remote session.

Test Environment

The moderator and the users conducting the testing via Video conferencing. The application screen was shared, and the testing was recorded. The application was accessed via the Internet. For testing, the computers used were laptops running MS Windows 8 or MS Windows 10.

The participants used a mouse, pointing pad, keyboard and monitor typical of laptops and equipment used in a medical facility when interacting with the EHRUT. The EHRUT displayed directly on the laptops using screens running in full colour. There were no print based aspects required to complete the test.

The application was set up by the EHR vendor, Magilen Enterprises Inc., according to documentation describing the system set-up and preparation. The application itself was running on a remote server using a test medical practice via an internet connection.

Technically, the system performance (i.e., response time) was representative to what actual users would experience in a field implementation. Additionally, participants were instructed not to change any of the default system settings (such as control of font size).

Test Forms and Tools

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

1. Recruiting Screener
2. Participants Demographics
3. Non-Disclosure Agreement and Informed Consent

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4. Moderator's Guide
5. System Usability Scale Questionnaire

Examples of these documents can be found in the Appendices.

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

Participants Instructions

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

Thank you for participating in this study. Your input is very important. Our session today will last about up to 1 hours. During that time, you will use an instance of an electronic health record. I will ask you to complete a few tasks using this system and answer some questions. You should complete the tasks as quickly as possible making as few errors as possible. Please try to complete the tasks on your own following the instructions very closely. Please note that we are not testing you we are testing the system, therefore if you have difficulty all this means is that something needs to be improved in the system. I will be here in case you need specific help, but I am not able to instruct you or provide help in how to use the application.

Overall, we are interested in how easy (or how difficult) this system is to use, what in it would be useful to you, and how we could improve it. I did not have any involvement in its creation, so please be honest with your opinions. All the information that you provide will be kept confidential and your name will not be associated with your comments at any time. Should you feel it necessary you are able to withdraw at any time during the testing

Following the procedural instructions, participants were shown the EHR and given time, 20 minutes, to explore the system and make comments. Once this 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.

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Participants were then given seven tasks to complete. Tasks are listed in the moderator's and participants guides in the Appendix.

Usability Metrics

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

The goals of the test were to assess:

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

Measure	Rationale and Scoring
Efficiency: Task Time	Each task was timed from when the administrator said "Begin" until the participant said, "Done." If he or she failed to say "Done," the time was stopped when the participant stopped performing the task. Only task times for tasks that were successfully completed were included in the average task time analysis. Average time per task was calculated for each task. Variance measures (standard deviation and standard error) were also calculated.
Satisfaction: Task Rating	Participant's subjective impression of the ease of use of the application was measured by administering both a simple post task question as well as a post-session questionnaire. After each task, the participant was asked to rate "Overall, this task was:" on a scale of 1 (Very Difficult) to 5 (Very Easy). These data are averaged across participants. Common convention is that average ratings for systems judged easy to use should be 3.3 or above. To measure participants' confidence in and likeability of the [EHRUT] overall, the testing team administered the System Usability Scale (SUS) post-test questionnaire. Questions included, "I think I would like to use this system frequently," "I thought the system was easy to use," and "I would imagine that most people would learn to use this

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	system very quickly." See full System Usability Score questionnaire in the Appendix
Effectiveness: Task Success	A task was counted as a "Success" if the participant was able to achieve the correct outcome, without assistance, within the time allotted on a per task basis. The total number of successes were calculated for each task and then divided by the total number of times that task was attempted. The results are provided as a percentage. Task times were recorded for successes. Observed task times divided by the optimal time for each task is a measure of optimal efficiency. Optimal task performance time, as benchmarked by expert performance under realistic conditions, is recorded when constructing tasks. Target task times used for task times in the Moderator's Guide must be operationally defined by taking multiple measures of optimal performance and multiplying by a factor of 2.0 that allows some time buffer because the participants are presumably not trained to expert performance. Thus, if expert, optimal performance on a task was 90 seconds then allotted task time performance was 180 seconds. This ratio should be aggregated across tasks and reported with mean and variance scores.
Effectiveness: Task Failures	If the participant abandoned the task, did not reach the correct answer or performed it incorrectly, or reached the end of the allotted time before successful completion, the task was counted as a "Failure." The total number of errors was calculated for each task and then divided by the total number of times that task was attempted. Not all deviations would be counted as errors. This should also be expressed as the mean number of failed tasks per participant. On a qualitative level, an enumeration of errors and error types are collected
Efficiency: Task Deviations	The participant's path (i.e., steps) through the application was recorded. Deviations occur if the participant, for example, went to a wrong screen, clicked on an incorrect menu item, followed an incorrect link, or interacted incorrectly with an on-screen control.

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4. Results

Data Analysis Reporting

The results of the usability test were calculated according to the methods specified in the Usability Metrics section above. Participants who failed to follow session and task instructions had their data excluded from the analyses. There were no exclusions in this test based on that criterion.

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

Measure	N	Task Success	Path Deviation	Task Time (seconds)		Errors	Task Ratings 1=Easy
Task	#	Mean (SD)	Deviation Observed /Optimal	Mean (SD)	Deviation Observed /Optimal	Mean (SD)	Mean (SD)
Admin User Configures User-supplied Predictive DSI and Records / Changes / Access Source Attributes and Then User Triggers User-supplied Predictive DSI	10	90% (3%)	1/2	214 (138)	6/520	1 (3%)	1.2 (0.60)
Admin User Selects Evidenced-based DSI and Access / Record / Change Source Attributes	10	100% (0%)	1/1	125 (129)	120/474	0 (0%)	1.6 (0.90)
User Triggers Evidenced-based DSI and Provides User Feedback	10	90% (3%)	1/1	245 (43)	20/331	1 (3%)	1.6 (1.01)
Admin User Exports User Feedback	10	100% (0%)	1/1	81 (27)	12/144	0 (0%)	1.10 (0.30)

Note for Avg. Task Satisfaction Ratings:
Easy - - - - - - - Difficult
1 2 3 4 5

Aggregated results per full measure.

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The results from the SUS (System Usability scale) scored the subjective satisfaction with the system based on performance with these tasks to be: 83.52. The satisfaction survey yields a single number that represents a composite measure of the overall perceived usability of the system.

Satisfaction scores have a range of 1 to 5, 1 being most satisfied and 5 being least satisfied. and the score is a relative benchmark that is used against other iterations of the system. Broadly interpreted, % satisfaction scores under 60 represent systems with poor usability; scores over 80 would be considered above average.

Participant ID	Average Satisfaction Score (1 being the best)	% Satisfaction
1	2.6	74.62%
2	3.1	88.97%
3	2.7	77.49%
4	3.4	97.58%
5	3	86.01%
6	2.7	77.49%
7	2.4	68.88%
8	2.9	83.23%
9	2.9	83.23%
10	3	86.01%

Discussion of the findings

EFFECTIVENESS

Most of the tasks were performed with a 98% success rate. Reasons for failure were inexperience in clinical terminology, insufficient training. Additional training is expected to resolve most of these errors

EFFICIENCY

Optimal times can vary wildly depending on the user's environment, workload, and clinical situation at hand. For this test, the task times chosen were considered as optimal in a quiet, unhurried, unpressured environment.

SATISFACTION

Participant satisfaction rated very high. Task satisfaction ratings averaged 1.3 Participant experience with the EHRUT (outside of test day training) prior to the test ranged from

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"Some Experience" to "None". They were all asked to evaluate their experience only on the tasks and subtasks performed during the test

MAJOR FINDINGS
Over all the participants were aptly able to maneuver through the EHRUT and adequately and easily perform the tasks.

In areas where participants may have difficulty on their first try, they quickly learned the optimal path and performed a similar task without issue.

AREAS FOR IMPROVEMENT
The CDS screen had many fields and user had a lot of scrolling, the user felt it would be nice if it would be nice to see more options on the page without scrolling

Appendix 1: RECRUITING SCREENER

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

Recruiting Script for Recruiting Firm

Hello, my name is _____, calling from [Insert name of recruiting firm]. We are recruiting individuals to participate in a usability study for an electronic health record. We would like to ask you a few questions to see if you qualify and if would like to participate. This should only take a few minutes of your time. This is strictly for research purposes. If you are interested and qualify for the study, you will be paid to participate. Can I ask you a few questions?

Customize this by dropping or adding questions so that it reflects your EHR's primary audience

1. [If not obvious] Are you male or female? [Recruit a mix of participants]

2. Have you participated in a focus group or usability test in the past xx months? [If yes, Terminate]

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3. Do you, or does anyone in your home, work in marketing research, usability research, web design […etc.]? [If yes, Terminate]

4. Do you, or does anyone in your home, have a commercial or research interest in an electronic health record software or consulting company? [If yes, Terminate]

5. Which of the following best describes your age? [23 to 39; 40 to 59; 60 - to 74; 75 and older] [Recruit Mix]

6. Which of the following best describes your race or ethnic group? [e.g., Caucasian, Asian, Black/African-American, Latino/a or Hispanic, etc.]

7. Do you require any assistive technologies to use a computer? [if so, please describe]

Professional Demographics Customize this to reflect your EHR's primary audience

8. What is your current position and title? (Must be healthcare provider)
   - ☐ RN: Specialty _____
   - ☐ Physician: Specialty _____
   - ☐ Resident: Specialty _____
   - ☐ Administrative Staff
   - ☐ Other [Terminate]

9. How long have you held this position?

10. Describe your work location (or affiliation) and environment? (Recruit according to the intended users of the application) [e.g., private practice, health system, government clinic, etc.]

11. Which of the following describes your highest level of education? [e.g., high school graduate/GED, some college, college graduate (RN, BSN), postgraduate (MD/PhD), other (explain)]

Computer Expertise Customize this to reflect what you know about your EHR's audience

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12. Besides reading email, what professional activities do you do on the computer? [e.g., access EHR, research; reading news; shopping/banking; digital pictures; programming/word processing, etc.] [If no computer use at all, Terminate]

13. About how many hours per week do you spend on the computer? [Recruit according to the demographics of the intended users, e.g., 0 to 10, 11 to 25, 26+ hours per week]

14. What computer platform do you usually use? [e.g., Mac, Windows, etc.]

15. What Internet browser(s) do you usually use? [e.g., Firefox, IE, AOL, etc.]

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

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

18. How many EHRs do you use or are you familiar with?

19. How does your work environment patient records? [Recruit according to the demographics of the intended users]

- ☐ On paper
- ☐ Some paper, some electronic
- ☐ All electronic

Contact Information If the person matches your qualifications, ask

Those are all the questions I have for you. Your background matches the people we're looking for. [If you are paying participants or offering some form of compensation, mention] For your participation, you will be paid [amount].

Would you be able to participate on [date, time]? [If so collect contact information]

May I get your contact information?

- ✓ Name of participant:
- ✓ Address:

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- ✓ City, State, Zip:
- ✓ Daytime phone number:
- ✓ Evening phone number:
- ✓ Alternate [cell] phone number:
- ✓ Email address:

Before your session starts, we will ask you to sign a release form allowing us to videotape your session. The videotape will only be used internally for further study if needed. Will you consent to be videotaped?

This study will take place remotely using video conferencing in Miami Beach Florida. I will confirm your appointment a couple of days before your session and provide you with directions to our office. What time is the best time to reach you?

Appendix 2: PARTICIPANT DEMOGRAPHICS

We would like to ask you a few questions to gather demographic information about prospective users of the EHR. This should only take a few minutes of your time. This is strictly for research purposes.

Name of participant:
Address:
City, State, Zip:
Daytime phone number:
Email address: Gender:
Age Group:

1. Have you participated in a focus group or usability test in the past 12 months?

2. Do you, or does anyone in your home, have a commercial or research interest in an electronic health record software or consulting company?

3. Do you require any assistive technologies to use a computer? [if so, please describe]

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4. What is your current position and title? (Must be healthcare provider)
RN: Specialty _____
Physician: Specialty _____
Resident: Specialty _____
Administrative Staff

5. How long have you held this position?

6. Describe your work location (or affiliation) and environment? [e.g., private practice, health system, government clinic, etc.]

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. How many EHRs do you use or are you familiar with?

Appendix 3: NON-DISCLOSURE AGREEMENT and INFORMED CONSENT

THIS AGREEMENT is entered into as of _ _____, 2024, between _____ ("the Participant") and the testing organization Magilen Enterprises Inc located at 1835 Cleveland Road, Miami Beach, FL 33141.

The Participant acknowledges that his or her voluntary participation in today's usability study may bring the Participant into possession of Confidential Information. The term "Confidential Information" means all technical and commercial information of a proprietary or confidential nature which is disclosed by Magilen Enterprises, or otherwise acquired by the Participant, in the course of today's study.

By way of illustration, but not limitation, Confidential Information includes trade secrets, processes, formulae, data, know-how, products, designs, drawings, computer aided design files and other computer files, computer software, ideas, improvements, inventions, training methods and materials, marketing techniques, plans, strategies, budgets, financial information, or forecasts.

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Any information the Participant acquires relating to this product during this study is confidential and proprietary to Magilen Enterprises and is being disclosed solely for the purposes of the Participant's participation in today's usability study.

By signing this form, the Participant acknowledges that s/he will receive monetary compensation for feedback and will not disclose this confidential information obtained today to anyone else or any other organizations.

Participant's printed name: _____
Signature: _____
Date: _____

INFORMED CONSENT

Magilen Enterprises Inc would like to thank you for participating in this study. The purpose of this study is to evaluate an electronic health records system. If you decide to participate, you will be asked to perform several tasks using the prototype and give your feedback. The study will last about 1 hours. At the conclusion of the test, you will be compensated for your time.

Agreement
I understand and agree that as a voluntary participant in the present study conducted by Magilen Enterprises Inc. I am free to withdraw consent or discontinue participation at any time. I understand and agree to participate in the study conducted and videotaped by Magilen Enterprises Inc.

I understand and consent to the use and release of electronic recording by Magilen Enterprises Inc. I understand that the information and recording is for research purposes only and that my name and image will not be used for any purpose other than research. I relinquish any rights to the recording and understand the recording may be copied and used by Magilen Enterprises Inc without further permission.

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

I understand and agree that the data collected from this study may be shared outside of Magilen Enterprises Inc. I understand and agree that data confidentiality is assured, because only de-identified data – i.e., identification numbers not names – will be used in analysis and reporting of the results.

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I agree to immediately raise any concerns or areas of discomfort with the study administrator. I understand that I can leave at any time.

Please check one of the following:

[ ] YES, I have read the above statement and agree to be a participant.
[ ] NO, I choose not to participate in this study.
Name: _____
Signature: _____
Date: _____

Appendix 4: MODERATOR'S GUIDE

Meaningful Use 3
Safety Enhanced Design Study
Nov 21, 2024

Moderator's Guide

Magilen Enterprises Inc

QSmartCare EHR, version 1.0

Moderator 1: _____

Moderator 2: _____

Location: _____

Participant #: _____

Test Date: _____

Start Time:_____

End Time:_____

Prior to the Testing Session
Ensure that the Recording Equipment and Software is Running Properly

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Sign into Magilen Enterprises Inc,
Turn on the testing computer
Open the Firefox web browser
Go to: www.qsmartcare.com

NOTE: Patient names used in testing will end with the participant number.

Upon Participant Arrival
Obtain Consent and NDA From the Participant
Read the following to the participant:

"Thank you for coming today. My name is _____, and I'll be working with you today."

"In this study, we're evaluating the usability of electronic health record systems. To do this, we will have you fill out some surveys and complete seven tasks. Each task will include a number of steps. We will be watching and recording how you perform these tasks. This will include us taking notes as well as recording screenshots and audio of your feedback. All recordings and information that you provide will be kept confidential and you will in no way be identified in any of our reports."

"Each task will include a scenario to explain why you are doing the task. As you work, feel free to perform whatever steps you feel are necessary to complete the tasks. I can try to answer questions about information that you might feel is missing, but I cannot provide you with directions on how to complete the task."

"You are free to stop or take a break at any time, and that will not affect any consideration we will be providing. Please let me know if you need anything to make yourself more comfortable."

"Before we begin, I will need you to read over these documents and sign them. The first describes the study and your rights as participant and the other is a non-disclosure agreement. When you have read and signed them, you may give them to me." "Do you have any questions for me?"

Provide Consent Form and Obtain Signed Copy
Completed?

Provide Non-Disclosure Agreement and Obtain Signed Copy
Completed? _____

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During the Testing Session

Administer Demographic Survey
Provide Demographic Survey to the participant

Completed? _____

Read the following to the participant:
"This is a survey to tell us a little more about you and your background. When you have finished, we will do some basic training with the EHR system, and I will then provide you with the task scenarios and begin the study."

Provide Training
Get the system working/prepared to provide training
Take control of the computer and go to the Home Screen
Read the following to the participant:

"This is the QSmartCare system. You will be using this system to complete the study. Before we begin, we will demonstrate a few things in the EHR that will be necessary for you to complete the tasks."

"First, this is the Dashboard. You select patients here. You open records like this…"
"Second, you can create patient via dashboard or consultation. You can create a consultation and progress note for a patient."
"Third, medications are created by using the Medications tab"

Provide Task Instructions
Ensure that the EHR is on the "starting screen"
Completed? _____

Provide the Task 1 Instructions to the participant

Task 1 - Admin User Configures User-supplied Predictive DSI and Records / Changes / Access Source Attributes and Then User Triggers User-supplied Predictive DSI

Click the CDS from the Side Menu
Click the + icon and set a new CDS rule
Enter the below fields and click the save icon

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“Do you have any questions about what I am asking you to do? Remember to tell us when you are done. Go ahead and start.”

Completed?

Task 2 - As an Admin User Selects Evidenced-based DSI and Access / Record / Change Source Attributes

Click the CDS from the Side Menu, Displays the CDS listing page
Search CDS Name which was created by you
Click on the Edit icon and make changes

Check if the CDS is updated successfully.

“Do you have any questions about what I am asking you to do? Remember to tell us when you are done. Go ahead and start.”

Completed?

Task 3 - Log in as a Provider - User Triggers Evidenced-based DSI and Provides User Feedback

Search for the patient provided in the participant document (name / account no) in consultation / progress note and check CDS intervention is triggered in the blue header section.

“Do you have any questions about what I am asking you to do? Remember to tell us when you are done. Go ahead and start.”

Completed?

Task 4 - Log in as Admin User - Admin User Exports User Feedback

Click the Feedback from the Side Menu
Click the Export button
Check if the system generates a excel report on user’s feedback

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"Do you have any questions about what I am asking you to do? Remember to tell us when you are done. Go ahead and start."

Completed?

Read the following to the participant:
"Here are the instructions for the first task. Each set of instructions provides you with a brief scenario explaining the task that you are to accomplish using the QSmartCare EHR system. In some cases, you will be required to input data into the system to complete the task. You may refer to these instructions at any time. I will provide the next set of instructions when you finish this task."

"In this study we are interested in whether you can complete the tasks, not about your medical decision-making skills or ability to catch a mistake in the record, so please do not spend time reviewing the patients' histories in detail. Assume that everything in the record is accurate unless otherwise specified in the task instructions. Work as quickly as possible but focus on completing the task rather than worry about how long it might be taking."

"Do you have any questions?"

Moderator Tasks

- ✓ Begin any timers and recording devices used in this test.
- ✓ Allow the participant to start the task.
- ✓ Stop the timer when the participant indicates they have completed the task.
- ✓ Allow the participant to complete the task.
- ✓ Use the data collection forms to make notes and measure performance.
- ✓ Repeat this process until all tasks have been completed.

Upon Test Completion
Provide the SUS to the participant and read the following:
"Great, now we have two surveys left. Please fill this one out to the best of your ability. When you are done, I will give you the next one."

Provide the Post-Test Survey and read the following:
"This is the last survey. Again, please complete it to the best of your ability."

End Session Recording

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Debrief Participant

Read the following: "Great! That completes our study. I want to thank you for taking the time to complete this study. As you know, the purpose of this study is to allow us to assess the usability of an EHR system and your input has been very valuable."

"Do you have any questions before you go?"

"Thanks again!"
Upon Participant Departure
Back-up Participant Data
Reset Patient Scenarios

Open each patient chart and either add or remove data that was removed or added as part of the task so that the next participant will start with a clean slate.

Sample Score Recording
Task 1&7a – View compose Rx Page – 170.315.a.1-1, 1.7-1, b.3-1 (Kevin Duster)
* Start timers, recording & instruct participant to begin task.

Effectiveness

[ ] Easily Completed (without help < 1 min) [ ] Completed with difficulty or help (help < 3 min) [ ] Not Completed (7 min or more)	Notes:

Efficiency Optimal Path: View patient page, View Meds widget, Click ERX button.

Task Time: _____(mm:ss) Number of Deviations	Notes:

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_____	

Satisfaction

On a scale of 1 to 5 Easy - - - - - - - Difficult 1 2 3 4 5 How would you rate this task? Rating: [ ]	Notes:

Appendix 5: SYSTEM USABILITY SCALE QUESTIONNAIRE

In 1996, Brooke published a "low-cost usability scale that can be used for global assessments of systems usability" known as the System Usability Scale or SUS.16 http://www.usabilitynet.org/trump/documents/Suschapt.doc Lewis and Sauro (2009) and others have elaborated on the SUS over the years. Computation of the SUS score can be found in Brooke's paper, in at or in Tullis and Albert (2008).

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

Strongly disagree				Strongly agree
1	2	3	4	5

2. I found the system unnecessarily complex

Strongly disagree				Strongly agree
1	2	3	4	5

3. I thought the system was easy to use

Strongly disagree Strongly agree

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1	2	3	4	5

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

Strongly disagree Strongly agree

1	2	3	4	5

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

Strongly disagree Strongly agree

1	2	3	4	5

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

Strongly disagree Strongly agree

1	2	3	4	5

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

Strongly disagree Strongly agree

1	2	3	4	5

8. I found the system very cumbersome to use

Strongly disagree Strongly agree

1	2	3	4	5

9. I felt very confident using the system

Strongly disagree Strongly agree

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1 2 3 4 5

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

Strongly disagree Strongly agree

1	2	3	4	5

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