

Safety-Enhanced Design Report for ScriptSure Cloud v.2.0 EHR Usability Test Report

*Report based on NISTIR 7742 - Customized Common Industry Format Template for Electronic
Health Record Usability Testing*

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Daw Systems, Inc.

Product: ScriptSure Cloud v.2.0

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Report Prepared by: Daw Systems, Inc.
Adam Forman, COO
866-755-1500
aforman@dawsystems.com
585 Troy-Schenectady Rd, Ste 2
Latham, NY 12110

The study findings were compiled using the [NISTIR 7742 Customized Common Industry Format Template for EHR Usability Testing](#).

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Executive Summary

A usability test of ScriptSure Cloud v2.0 was conducted on the following dates October 2, 2018 through October 5, 2018 by Daw Systems, Inc. with 10 participants in the healthcare field. The tests were conducted in person as well as over remote computer connections. The purpose of this test was to test and validate the usability of the current user interface, and provide evidence of usability of ScriptSure Cloud v2.0. During the usability test, 10 individuals matching the target demographic criteria served as participants and used ScriptSure Cloud v2.0 in simulated, but representative tasks. The study was based upon the NISTIR 7742 UCD standard.

This study collected performance data on tasks in the following categories as outlined in the 170.315(g)(3), Safety-enhanced design certification class:

1. § 170.315(a)(1) (CPOE – Medication);
2. § 170.315(a)(4) (Drug-drug, drug-allergy interaction checks);
3. § 170.315(a)(5) (Demographics);
4. § 170.315(a)(6) (Problem list);
5. § 170.315(a)(7) (Medication List);
6. § 170.315(a)(8) (Allergy List);
7. § 170.315(b)(3) (Electronic prescribing);

During the 60-minute, one-on-one usability test, each participant that had been screened using Appendix 1, was greeted by the administrator and asked to review and sign a release form (included in Appendix 3); they were instructed that they could withdraw at any time. All of the participants had prior experience with previous versions of ScriptSure Cloud v2.0. For all but two participants, many of the functions were functionality similar to previous versions of ScriptSure that had been used and/or the users have been using ScriptSure for a period of time prior to the usability test; no training or help materials were needed. For two of the questions presented, several of the users needed assistance or more information in understanding what was being asked of them. Participants did have access to the ScriptSure Cloud v2.0 help menu and quick start guide, but none consulted it during testing. The administrator introduced the test, and instructed participants to complete a series of tasks (given one at a time). During the testing, the administrator timed the test and logged recorded user performance data on paper and electronically and then recorded the findings on the testing results record in excel.

The following types of data were collected for each participant:

- Task Success (%)
- Task failures (%)
- Task standard deviations (%)
- Task performance time;
- User satisfaction rating (based on a scale with 1 as very difficult and 5 as very easy) or an alternative acceptable user satisfaction measure; and
- Comments

Table 1: Summary Results of Usability Tests

All participant data was de-identified – no correspondence could be made from the identity of the participant to the data collected. Following the conclusion of the testing, participants were asked to complete a post-test questionnaire and were not compensated for their time. Various recommended metrics, in accordance with the examples set forth in the NIST Guide, were used to evaluate the usability of ScriptSure Cloud v2.0. Following is a summary of the performance and rating data collected on ScriptSure Cloud v2.0.

USABILITY TESTING SPREADSHEET

SUMMARY OF RESULTS OF USABILITY TEST

SUMMARY OF RESULTS OF USABILITY TEST FOR SCRIPTSURE EMR v9.5 (ambulatory)						
	MEASURE	N	Task Success	Path Deviation	Task Time	Task Ratings 1=Easy to 5=Difficult
TASK		#	%		Mean (SD)	Mean (SD)
1. § 170.315(a)(1) (CPOE – Medication);						
	A.MEDICATIONS ORDERS					

	1. Record medication via CPOE	10	100%	0.3	45.86 5.54	1.4 0.699206
	2. Change medication via CPOE	10	100%	0.2	37.26 3.45	2.4 1.429841
	3. Display changed CPOE medication order	10	100%	0	4.73 0.93	1 0
2. § 170.315(a)(4) (Drug-drug, drug-allergy interaction checks);						
	1. Using CPOE, trigger a drug-drug interaction by entering a new medication order	10	100%	0.1	39.19 3.64	1.7 0.823273
	2. Using CPOE, trigger a drug-allergy interaction by entering a new medication order	10	100%	1.3	29.21 4.37	2.4 0.516398
	3. Adjust the severity level of a displayed drug-drug interaction	10	100%	0	8.12 1.26	1 0
3. § 170.315(a)(5) (Demographics);						
	1. Record a patient's preferred language, date of birth, birth sex, race, ethnicity, sexual orientation, gender identity, preliminary cause of death (inpatient only), and preliminary date of death (inpatient only)	10	100%	0	90.2 16.42139526	1.1 0.316228
	2. Change the patient's preferred language, date of birth, birth sex, race, ethnicity, sexual orientation, gender identity, preliminary cause of death (inpatient only), and preliminary date of death (inpatient only)	10	100%	0	7.31 1.50	1 0
	3. Display the patient's changed preferred language, date of birth,	10	100%	0	4.69	1

	birth sex, race, ethnicity, sexual orientation, gender identity, preliminary cause of death (inpatient only), and preliminary date of death (inpatient only)				0.64	0
170.315(a)(6) (Problem list);						
	1. Record a problem to the problem list	10	100%	0.2	17.16 6.80	1.6 1.264911
	2. Change a problem to the problem list	10	100%	0.1	21.87 4.92	1.8 1.47573
	3. Display the active problem & historical list	10	100%	0	5.31 0.81	1 0
170.315(a)(7) (Medication list);						
	1. Record a medication to the medication list	10	100%	0.1	29.00 5.45	1 0
	2. Change a medication to the medication list	10	100%	0.5	28.89 9.48	1.9 1.66333
	3. Display the active medication & historical list	10	100%	0	5.31 0.807533969	1 0
170.315(a)(8) (Medication allergy list);						
	1. Record a medication allergy	10	100%	0.2	18.70 4.36	1.3 0.674949
	2. Change a medication allergy	10	100%	0.7	22.54 10.01	2.6 1.505545
	3. Electronically View Patient Active Med Allergy List	10	100%	0	5.04	1

					0.77	0
170.315(b)(3) (Electronic prescribing);						
	1. Create new prescription	10	100%	0.1	30.71 4.10	1 0
	2. Change prescription (dosage or duration)	10	100%	0	30.16 2.52	1 0
	3. Cancel prescription	10	100%	0	5.61 0.94	1 0
	4. Refill prescription	10	100%	0	6.46 0.87	1 0
	5. Receive fill status notification	10	100%	0	4.17 0.82	1 0
	6. Request and receive medication history information	10	100%	0	3.98 0.78	1 0

The results from the System Usability Scale scored the subjective satisfaction with the system based on performance with these tasks to be: 92.0¹. The SUS results were scaled to a scale of 0-4 per the recommendations of the [measuringu.com](http://www.measuringu.com)².

During and after the tasks, participants commonly commented that the system was easy to use. Overall, almost all users found ScriptSure Cloud v2.0 to be easy to use and usable without training. Nearly all participants found that tasks like changing items after entered in the system was more difficult and after being shown how to do once, thereafter stated they would be able to do without issue in the future. The settings/changes specifically for thresholds for allergy alerts nearly all participants did not know immediately know where to find these settings to

¹ Broadly interpreted, scores under 60 represent systems with poor usability; scores over 80 would be considered above average. See Tullis, T. & Albert, W. (2008). *Measuring the User Experience*. Burlington, MA: Morgan Kaufman (p. 149). <http://www.measuringu.com/sus.php>

² <https://measuringu.com/sus/>

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

Major findings

All participants responded well to the prescribing and medication process and were for the most part quick with the tasks. As there some overlap between the CPOE and the E-Prescribing tasks, the second test of the two was faster and easier for all. While all participants were users of the ScriptSure software, they were asked to test functionality their daily activities usually don't involve and to test improvements in the latest version of ScriptSure Cloud v2.0. There was a high success rate for all tasks. Two tasks proved to be difficult for participants; revolving around changing items. The results from the System Usability Scale scored the subjective satisfaction with the system based on performance with these tasks to be: 92.00. The testing time to complete tasks was variable. The users that had the most experience in their field and with computers performed on average the fastest.

Areas for improvement

The ability to *change* orders, medications, proved difficult for some to understand. After a prescription is sent electronically for example, there is not a way to modify that prescription. The sent prescription can be cancelled or archived and a new one created or removed from chart and new prescription created. That is a workflow process that ScriptSure software has implemented, so understanding the *changing* a prescription as a new user after it is created is not that simple. Re-prescribing the same medication is, but changing an existing one is not. A shortcut to the tolerances settings for drug alerts should be done. We will continue to monitor the ease of use and apply these testing principles to future functional changes and additions to improve the product overall.

INTRODUCTION

The EHRUT (Electronic Health Record System Under Test) tested for this study was ScriptSure Cloud v2.0, which gives medical providers and clinicians the ability to record and manage patient encounters and charts electronically in an ambulatory outpatient practice setting. ScriptSure Cloud v2.0 is a full featured ERX module, giving medical professionals access to order medications, electronically prescribe medications and receive refill requests and store other relevant demographic data and allergies. CPOE for medications, drug interactions, E-Prescribing, recording allergies, are a few of the features of ScriptSure Cloud v2.0 that were tested. 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 to ensure compliance with the Safety-Enhanced design requirement of ONC and for internal purposes to ensure ease of use for our clients/end users. The results contained herein provide evidence of usability of ScriptSure Cloud v2.0. To this end, measures of effectiveness, efficiency and user satisfaction, such as:

Number of tasks successfully completed within the allotted time without assistance

- Task ratings: Ease and efficiency
- Path deviations
- Time to complete the tasks
- Number of errors
- Ease of use rating/Efficiency rating
- Participant's satisfaction ratings of the system if the task was successful, the time on task, etc., were captured during the usability testing.
- Participant's verbalizations (comments)

User-Centered Design Process

Daw Systems, Inc. (DAW) development benefits from having a practicing physician as its CEO. The design and development process is focused largely on real-world use and is not developed in the vacuum of coding environments. Daw Systems, Inc. follows the NISTIR 7742 UCD.

Our software applications are designed with the user in mind first and the requirements of the user and not just the software needs or a certification. This process is based on Planning, Research, Analysis, Design (including white boarding and wireframing) and Evaluation/Testing. We begin by wire-framing or white-boarding the application feature(s). DAW staff then research the needs and requirements of our users and the industry to understand our users, the interaction they have or will have with the software and to understand their overall practice needs. After an initial prototype is made, we test and perform QA to ensure proper functioning and then deploy as a Beta to a live site for feedback to further refine the project and functionality.

METHOD

PARTICIPANTS

A total of **10 participants** were tested on the **ScriptSure Cloud v2.0**. The tests were completed on-site in a medical provider's office as well as by phone and web for some participants. The participants all have a healthcare background and experience. We consulted Usability.gov for information on how many users to test. Testing at least "5 users lets you find almost as many usability problems as you'd find using many more test participants."³ Again, we tested 10 users for this study. The Nielsen Norman Group states that "testing more users didn't result in appreciably more insights."⁴ Participants in the test were healthcare providers including MDs, RNs and administrative staff. Participants were recruited by Daw Systems, Inc. and were not

³ <http://www.usability.gov/how-to-and-tools/methods/recruiting-usability-test-participants.html>

⁴ <http://www.nngroup.com/articles/how-many-test-users/>

compensated for their time. Most of the testing in person and some were done via web connectivity and phone. Participants were given the opportunity to have the same orientation and level of training as the actual end users would have received. In addition, participants had access to the online help menu, but none consulted it during the tests, however, there was nothing to prevent them from consulting it.

For the test purposes, end-user characteristics were identified and translated into a recruitment screener used to solicit potential participants; an example of a screener is provided in Appendix 1.

Recruited participants had a mix of backgrounds and demographic characteristics conforming to the recruitment screener. The following is a table of participants by characteristics, including demographics, specialty, ScriptSure 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.

TABLE 2: Participant Demographics

Participant Identifier	Participant Gender	Participant Age	Participant Education	Participant Occupation/Role	Participant Professional Experience	Participant Computer Experience	Participant Product Experience	Participant Assistive Technology Needs
ID1	Male	80-89	Doctorate degree (e.g., MD, DNP, DMD, PhD)	MD	480	250	14	No
ID2	Female	40-49	Some college credit, no degree	Front desk	220	150	5	No
ID3	Female	40-49	Bachelor’s Degree	Nurse	120	120	5	No
ID4	Female	50-59	Bachelor’s Degree	Nurse	150	120	12	No
ID5	Female	50-59	High school graduate, diploma or the equivalent (for example: GED)	Front Desk	200	160	5	No
ID6	Female	40-49	Some college credit, no degree	Administrator	0	120	0	No
ID7	Female	80-89	High school graduate, diploma or the equivalent (for example: GED)	Office Manager	450	120	12	No
ID8	Male	40-49	Bachelor’s Degree	Support	36	100	0	No
ID9	Female	40-49	Bachelor’s Degree	Nurse	70	150	3	No
ID10	Female	60-69	Bachelor’s Degree	Nurse	180	180	12	No

All of the recruited participants (matching the demographics in the section on Participants) that were recruited participated in the usability test; 100%. None failed to participate.

Participants were scheduled for 60 minute sessions with 5 minutes for instructions to start and the SUS in Appendix 5. In between each session for debrief by the administrator(s) and data logger(s), and to reset systems to proper test conditions. An excel spreadsheet was used to keep track of the participant schedule, and included each participant’s demographic characteristics as provided by the DAW. 4 studies were done on the first day and 3 on each subsequent days.

STUDY DESIGN

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

During the usability test, participants interacted with only ScriptSure Cloud v2.0. Each participant used the system version, but in some cases did so remotely. All were provided 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
- Path deviations
- Number and types of errors
- Participant’s satisfaction ratings of the system
- Participant’s verbalizations (comments)

Additional information about the various measures can be found in the Usability Metrics below.

TASKS

A number of tasks were constructed that would be realistic and representative of the kinds of activities a user might do with this EHR, including these, organized by risk within each criteria. The **ONC § 170.315(g)(3) criteria was used as guidance for testing.**

		<u>Risk Assessment</u>
1. § 170.315(a)(1) (CPOE – Medication);		
	1. Record medication via CPOE	High
	2. Change medication via CPOE	High
	3. Display changed CPOE medication order	High
2. § 170.315(a)(4) (Drug-drug, drug-allergy interaction checks);		
	1. Using CPOE, trigger a drug-drug interaction by entering a new medication order	High
	2. Using CPOE, trigger a drug-allergy interaction by entering a new medication order	High
		High
3. § 170.315(a)(5) (Demographics);		
	1. Record a patient’s preferred language, date of birth, birth sex, race, ethnicity, sexual orientation, gender identity, preliminary cause of death (inpatient only), and preliminary date of death (inpatient only)	High

	2. Change the patient's preferred language, date of birth, birth sex, race, ethnicity, sexual orientation, gender identity, preliminary cause of death (inpatient only), and preliminary date of death (inpatient only)	High
	3. Display the patient's changed preferred language, date of birth, birth sex, race, ethnicity, sexual orientation, gender identity, preliminary cause of death (inpatient only), and preliminary date of death (inpatient only)	Low
170.315(a)(6) (Problem list);		
	1. Record a problem to the problem list	High
	2. Change a problem on the problem list	High
	3. Display the active problem & historical list	High
170.315(a)(7) (Medication list);		
	1. Record a medication to the medication list	High
	2. Change a medication on the medication list	High
	3. Display the active medication & historical list	Moderate
170.315(a)(8) (Medication allergy list);		
	1. Record a medication allergy	High
	2. Change a medication allergy	High
	3. Display the active medication & historical allergy list	High
170.315(b)(3) Electronic prescribing		
	1. Create new prescription	High
	2. Change prescription (dosage or duration)	High
	3. Cancel prescription	Moderate
	4. Refill prescription	High
	5. Receive fill status notification	Low
	6. Request and receive medication history information	Moderate

The above tasks highlight the features of the ScriptSure Cloud ERX v2.0 functionality as specified by the ONC for the appropriate test criteria. For each usability test, the test proctor provided sample test data to the test participant by providing a fictitious patient name and record, encounters and data. The same database of patient was used for all participants and test scenarios. The risk assessment column is based on the potential for affect (adverse) on a patient. High, moderate and low risk were prioritized.

PROCEDURES

Prior to each session with a participant, the excel document to be used for recording the findings of the testing was opened on the test proctors computer, out of site of the participant. Remote access was setup for the test participants and before the start of each session, the proctor had setup an account with only base level test data ready and entered. Test

participants were then instructed to navigate to a website where a remote connection could be initiated for those that were offsite. Participants were greeted and asked to verify their identity over the phone. Participants were then assigned a participant identification number.

One staff member initiated and ran the test with the test participant and recorded the data and findings. The usability testing staff conducting the test was experienced usability practitioners. Each participant reviewed and signed an informed consent and release form (See Appendix 3). The forms were then faxed or emailed or handed to Daw proctor.

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 same served as 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.

Task timing began once the administrator finished reading the task/question. The task time was stopped once the participant indicated they had successfully completed the task or said they could not complete the task. Scoring is discussed below in another section.

Following the session, the administrator gave the participant the post-test questionnaire (e.g., the System Usability Scale, see Appendix 5) and thanked each individual for their participation.

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

TEST LOCATION

The usability tests were conducted at our corporate office location in Latham, NY using controlled testing environment with appropriate database and fictitious names. The remotes were conducted using BOMGAR remote sessions program and recorded using Camtasia Studio. The screen and audio of each participant could be seen and heard. We consulted with usability.gov on developing a remote usability test and followed their guidelines.⁵ (see below). The test with participants was a moderated remote session.

Developing a Remote Usability Test

⁵ <http://www.usability.gov/how-to-and-tools/methods/remote-testing.html>

The processes for developing a remote test are much the same as developing the test and materials for a test you are conducting in-person. Often you can leverage an in-person test you might have run for use in a remote setting. It's important to:

Remember that tests should be about 15–30 minutes long made up of about 3-5 tasks. Develop straightforward tasks that have well-defined end states. If you are using a screener, be sure to include the minimum system requirements, both of the site or tool you are testing, but also for the screen sharing service that you propose to use. Make sure you have the correct contact information for your participants for reminders and follow-up if needs be. Prepare introductory and/or test materials so the participants will know what is expected of them as well as what they can expect from you. Prepare test consent forms. Prepare compensations and receipts for compensation should you choose to pay your participants. Remote testing differs mainly in the technology. You will need to assure that:

*Whatever you are testing is accessible outside the firewall of **your** business, agency or dev environment.*

You will need to determine if any firewall issues might affect the ability of your participants to access the site or tool you are testing.

Participants can download/access the screen-sharing software, or online remote usability vendor services.

Moderated Remote Usability Testing

During moderated remote testing, participants are observed on interacted with while they complete the tasks for the test. Moderated testing is best for complex tasks that do not have a structured sequence of steps or where a more interaction and questioning will benefit testing.

TEST ENVIRONMENT

The ScriptSure Cloud v2.0 is typically used in a healthcare office or practice and the primary users are secretarial staff, RNs, physicians and other healthcare providers in medical office settings. In this instance, the testing was conducted remotely using a realistic reproduction of a ScriptSure User. The participants used a mouse and keyboard when interacting with ScriptSure Cloud v2.0.

ScriptSure Cloud v2.0 was used on a 1600x1200 resolution and it is not known the capabilities of their remote screens, but they could see colors of the remote application. Any users that were on-site, in person used the application on a 1600x1200 resolution PC. ScriptSure Cloud v2.0 was set up by the DAW according to the vendor's test specifications. The application itself was running as a web application. Google Chrome browser was used on Windows PCs running windows for each participant. The system performance (i.e., response time) was exactly representative to what actual users would experience in a field implementation.

TEST FORMS AND TOOLS

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

1. Informed Consent

2. Moderator's Guide
3. Post-test Questionnaire (SUS)

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

The participant's interaction with the ScriptSure Cloud v2.0 was captured and recorded digitally with screen capture software running on the test machine.

PARTICIPANT INSTRUCTIONS

Participants were first asked to confirm their demographic information:

- Gender
- Age
- Education/Role
- Specialty
- ScriptSure Experience
- Assistive Tech Needs

The proctor explained the goals for the session, emphasizing the participant's role, urging them to comment without concern for our feelings. The test administrator also reviewed the agenda for the session with the participant prior to beginning the tasks.

The test proctor explained that the participant was going to be asked to complete a series of tasks, quickly, without help from the proctor and without; comments could be made if the tester felt it was necessary. The following instruction was provided:

- a. *"Thank you for participating in this study. Your input is very important. Our session today will last about 60 minutes. 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. Any information you provide will be kept confidential and your name will not be associated with your comments at any time. The screen and audio may be recorded. 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. You will be asked to rate on a scale of 1 to 5 the tasks where 1 was Very Easy/Efficient and 5 was Very Difficult/Inefficient. We are using fictitious users and patient names for the testing. We will provide a series of task scenarios for you to complete unaided by us. You should try to perform the task as quickly and as efficiently as possible. I will record the progress and results.”

Participants were then given 19 total tasks to complete. Tasks are listed in the moderator’s guide in the Appendix 4. The participant was then asked to begin. The Proctor recorded time to complete, errors, and deviations from the optimal path. Any comments that the participant shared during the tasks were recorded.

After each task the participant was asked to rate the ease of use for the task and the task efficient on a Likert scale from 1 to 5 where 1 represented “very easy” / “very efficient” respectively, and 5 represented “very difficult” and “very inefficient,” respectively. Testers were given a maximum of 60 minutes for the combined test/tasks.

Participants were given the SUS questionnaire (See Appendix 5) at the conclusion of the test.

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 ScriptSure Cloud v2.0 by measuring participant success rates and errors;
2. Efficiency of ScriptSure Cloud v2.0 by measuring the average task time and path deviations;
3. Satisfaction with ScriptSure Cloud v2.0 by measuring ease of use ratings.

The following were recorded:

- 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

DATA SCORING

The following table details how tasks were scored, errors evaluated, and the time data analyzed.⁶

MEASURE	RATIONALE & SCORING ^{7 8}
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 some factor [e.g., 1.25] that allows some time buffer because the participants are presumably not trained to expert performance. Thus, if expert, optimal performance on a task was [x] seconds then allotted task time performance was [x * 1.25] 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 “Failures.” No task times were taken for errors. The total number of errors was calculated for each task and then divided by the total number of times that task was attempted. Not all deviations would be counted as errors. This should also be expressed as the mean number of failed tasks per participant. On a qualitative level, an enumeration of errors and error types should be collected.
Efficiency: Task Deviations	The participant’s path (i.e., steps) through the application was recorded. Deviations occur if the participant, for example, went to a wrong screen, clicked on an incorrect menu item, followed an incorrect link, or interacted incorrectly with an on-screen control. This path was compared to the optimal path. The number of steps in the observed path is divided by the number of optimal steps to provide a ratio of path deviation.
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.

⁶ Tullis, T. & Albert, W. (2008). *Measuring the User Experience*. Burlington, MA: Morgan Kaufman. Also see www.measuringusability.com

⁷ See Tedesco and Tullis (2006) for a comparison of post-task ratings for usability tests. Tedesco, D. & Tullis, T. (2006) A comparison of methods for eliciting post-task subjective ratings in usability testing. *Usability Professionals association Conference*, June 12 – 16, Broomfield, CO.

⁸ The SUS survey yields a single number that represents a composite measure of the overall perceived usability of the system. SUS scores have a range of 0 to 100 and the score is a relative benchmark that is used against other iterations of the system.

	<p>Common convention is that average ratings for systems judged easy to use should be 3.3 or above.</p> <p>To measure participants' confidence in and likeability of the ScriptSure Cloud v2.0 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 5.</p>
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Table RESULTS. Details of how observed data were scored.

RESULTS

DATA ANALYSIS AND REPORTING

The results of the usability test were calculated according to the methods specified in the Usability Metrics section above. There were several participants that did not understand the test instructions and therefore the results for those participants do not reflect the ideally results for the usability test. Test participants who did not follow the task instructions have their results excluded from this report; none of the participants deviated. There was some misunderstanding that the proctor tried to clarify. Tasks were given 240 seconds max to complete to ensure completion of the test on time. All tests were done prior to the expiration of this time.

Effectiveness

The tasks were completed effectively based on the task completion rates. Only 2 tasks proved to be problematic for users. Error rates were low and given there is often the same path to completion, the deviations were low. In terms of general use of the product the users found ScriptSure effective and easy to use.

Efficiency

ScriptSure Cloud v2.0 efficiency can benefit from the placement of setup features that may be consulted often and based on the difficulty users had in changing CPOE items, the efficiency of the product can be improved. The time to complete many tasks was within the range of normal deviation from expert. Some tasks, while performed quickly were impacted by users seeing so much on screen, that they did not understand or see what was asked or what the next step was.

Satisfaction

Participants were overall satisfied with the ScriptSure Cloud v2.0 features based on the comments and the results of the SUS questionnaire. The medication portion testing was particularly satisfying for most users, particularly those with experience with other EHRs. There were no errors due to hardware or software. The screens moved quickly and as expected. There was no interruption in internet service. Overall, the participants demonstrated satisfaction with the application.

During and after the tasks, participants commonly commented that the system was easy to use for most tasks. Overall, almost all users found ScriptSure Cloud v2.0 to be easy to use and usable without training. Nearly all participants found that tasks like changing items after entered in the system was difficult. In addition to the performance data, the following qualitative observations were made:

Major findings

All participants responded well to the prescribing and medication process and were for the most part quick with the tasks. While nearly all participants were current users of previous versions of ScriptSure software, they were asked to test functionality that did not involve many of their individual daily activities. There was a high success rate for all tasks. Two tasks proved to be difficult for participants; revolving around changing items. The testing time to complete tasks was variable.

The results from the System Usability Scale scored the subjective satisfaction with the system based on performance with these tasks to be: 92.0⁹

Areas for improvement

The ability to *change* orders, medications, proved difficult for some to understand. After a prescription is sent electronically for example, there is not a way to modify that prescription. The sent prescription can be cancelled or archived and a new one created or removed from chart and new prescription created. That is a workflow process that ScriptSure software has implemented, so understanding the *changing* a prescription as a new user after it is created is not that simple. Re-prescribing the same medication is, but changing an existing one is not. A shortcut to the tolerances settings for drug alerts should be done. We will continue to monitor the ease of use and apply these testing principles to future functional changes and additions to improve the product overall.

Recording Issues on SUS Questionnaire

The age range on the questionnaires that the moderator used were in 10 year increments starting at 21-30, instead of 10-29. This did not matter for the users as none of the ages of those tested fell on age that started or ended in the age range break. This did not affect the outcome of the testing. The moderator was able to select a proper age range and this is reflected in the participant summary data.

⁹ Broadly interpreted, scores under 60 represent systems with poor usability; scores over 80 would be considered above average. See Tullis, T. & Albert, W. (2008). Measuring the User Experience. Burlington, MA: Morgan Kaufman (p. 149). <http://www.measuringu.com/sus.php>

Tasks	Measures	Assigned Participant ID#	Task Success 1="yes" 0="no"	Optimal Number of Steps	Number of Path Deviations	Optimal	Time to Perform Task (in Seconds)	Errors	Task Ratings (1-Very Easy/Effective 5-"Very difficult/Inefficient")	
1. Electronically Record Medication Order		1	1	6	0	40	44.1	0	1	
		2	1	6	1	40	42.8	0	1	
		3	1	6	0	40	41	0	1	
		4	1	6	0	40	43.3	0	1	
		5	1	6	0	40	55.4	0	3	
		6	1	6	0	40	44.4	0	1	
		7	1	6	0	40	46.4	0	1	
		8	1	6	0	40	54.1	0	2	
		9	1	6	1	40	49.1	0	2	
		10	1	6	1	40	38	0	1	
		Mean		1	60	0.3	40	45.86	0	1.4
		STD Dev		0	0	0.483045892	0	5.540196547	0	0.699205899
	2. Electronically Change Medication Order		1	1	5	0	35	33	0	3
		2	1	5	0	35	38.4	0	2	
		3	1	5	1	35	41	1	4	
		4	1	5	1	35	42.1	1	5	
		5	1	5	0	35	36.4	0	3	
		6	1	5	0	35	35.7	0	1	
		7	1	5	0	35	40	0	1	

	8	1	5	0	35	39.4	0	3
	9	1	5	0	35	34.6	0	1
	10	1	5	0	35	32	0	1
Mean		1	50	0.2	35	37.26	0.2	2.4
STD Dev		0	0	0.421637021	0	3.445834845	0.421637	1.429840706
3. Electronically View Medication Order	1	1	2	0	4	4	0	1
	2	1	2	0	4	4.1	0	1
	3	1	2	0	4	4.9	0	1
	4	1	2	0	4	4.5	0	1
	5	1	2	0	4	4	0	1
	6	1	2	0	4	6	0	1
	7	1	2	0	4	4.2	0	1
	8	1	2	0	4	6.7	0	1
	9	1	2	0	4	4.8	0	1
	10	1	2	0	4	4.1	0	1
Mean		1	20	0	4	4.73	0	1
STD Dev		0	0	0	0	0.926222915	0	0
2. § 170.315 (a)(4) (Drug-drug, drug-allergy interaction checks);								
1. Enter a medication order for a patient that is an allergy.	1	1	6	0	35	38.1	0	1

	2	1	6	0	35	39.8	0	1
	3	1	6	0	35	42.4	0	2
	4	1	6	0	35	42.1	0	2
	5	1	6	0	35	39.4	0	1
	6	1	6	0	35	37.44	0	1
	7	1	6	0	35	45.1	0	3
	8	1	6	1	35	40.1	0	3
	9	1	6	0	35	33	0	1
	10	1	6	0	35	34.5	0	2
Mean		1	60	0.1	35	39.194	0	1.7
STD Dev		0	0	0.316227766	0	3.6439789	0	0.823272602
2. Adjust the tolerance/severity settings of drug-drug checks and drug allergy checks	1	1	5	1	28	25	0	2
	2	1	5	1	28	24.7	0	3
	3	1	5	1	28	25.55	1	2
	4	1	5	1	28	29.1	0	2
	5	1	5	2	28	35.1	0	3
	6	1	5	2	28	30.9	0	3
	7	1	5	1	28	28	0	2
	8	1	5	1	28	27.7	0	2
	9	1	5	1	28	28	0	2
	10	1	5	2	28	38	0	3
Mean		1	50	1.3	28	29.205	0.1	2.4
STD Dev		0	0	0.483045892	0	4.365168318	0.316228	0.516397779

3. View the warning on-screen	1	1	3	0	7	8.7	0	1
	2	1	3	0	7	8.5	0	1
	3	1	3	0	7	7.4	1	1
	4	1	3	0	7	5.9	0	1
	5	1	3	0	7	6.68	0	1
	6	1	3	0	7	8.4	0	1
	7	1	3	0	7	10.5	0	1
	8	1	3	0	7	7.96	0	1
	9	1	3	0	7	8.45	0	1
	10	1	3	0	7	8.7	0	1
Mean		1	30	0	7	8.119	0.1	1
STD Dev		0	0	0	0	1.25675 4639	0.316 228	0
1. Create New Patient	1	1	4	0	80	89	0	1
	2	1	4	0	80	110.8	0	1
	3	1	4	0	80	80.6	1	1
	4	1	4	0	80	75	1	1
	5	1	4	0	80	86.2	0	1
	6	1	4	0	80	90.4	0	2
	7	1	4	0	80	79	0	1
	8	1	4	0	80	127.4	0	1
	9	1	4	0	80	84.2	0	1
	10	1	4	0	80	79.4	0	1
Mean		1	40	0	800	90.2	0.2	1.1
STD Dev		0	0	0	0	16.4213 9526	0.421 637	0.31622776 6
2. Change Patient demographics	1	1	4	0	6	7.9	0	1
	2	1	4	0	6	8.4	0	1

	3	1	4	0	6	8.1	0	1
	4	1	4	0	6	5.4	0	1
	5	1	4	0	6	4.5	0	1
	6	1	4	0	6	6.8	0	1
	7	1	4	0	6	6.9	0	1
	8	1	4	0	6	9.7	0	1
	9	1	4	0	6	7.6	0	1
	10	1	4	0	6	7.8	0	1
Mean		1	40	0	6	7.31	0	1
STD Dev		0	0	0	0	1.49699 6994	0	0
3. Display Patient Demographics	1	1	2	0	4	3.9	0	1
	2	1	2	0	4	4.1	0	1
	3	1	2	0	4	4.4	0	1
	4	1	2	0	4	5.7	0	1
	5	1	2	0	4	4.9	0	1
	6	1	2	0	4	4.6	0	1
	7	1	2	0	4	4.7	0	1
	8	1	2	0	4	5.7	0	1
	9	1	2	0	4	4.9	0	1
	10	1	2	0	4	4	0	1
Mean		1	20	0	4	4.69	0	1
STD Dev		0	0	0	0	0.63848 7797	0	0
1. Enter a ICD-10 for a patient	1	1	6	0	13	10.7	0	1
	2	1	6	0	13	12.5	0	1
	3	1	6	0	13	30.5	0	5
	4	1	6	0	13	13.4	0	1

	5	1	6	0	13	13.9	0	1
	6	1	6	1	13	22.5	0	2
	7	1	6	1	13	26.4	0	2
	8	1	6	0	13	15.4	0	1
	9	1	6	0	13	13.8	0	1
	10	1	6	0	13	12.5	0	1
Mean		1	60	0.2	13	17.16	0	1.6
STD Dev		0	0	0.421637021	0	6.80003268	0	1.264911064
2. Change ICD-10	1	1	8	0	18	16.4	0	1
	2	1	8	0	18	19.1	0	1
	3	1	8	0	18	22	1	5
	4	1	8	0	18	16.7	0	1
	5	1	8	1	18	22.4	0	2
	6	1	8	0	18	28.4	0	1
	7	1	8	0	18	26.4	0	1
	8	1	8	0	18	30.1	0	4
	9	1	8	0	18	19.4	0	1
	10	1	8	0	18	17.8	0	1
Mean		1	80	0.1	18	21.87	0.1	1.8
STD Dev		0	0	0.316227766	0	4.923650407	0.316228	1.475729575
3. View ICD-10	1	1	3	0	4	4.5	0	1
	2	1	3	0	4	5	0	1
	3	1	3	0	4	4.9	1	1
	4	1	3	0	4	4.8	0	1
	5	1	3	0	4	5.4	0	1
	6	1	3	0	4	5.1	0	1
	7	1	3	0	4	5.7	0	1
	8	1	3	0	4	6.1	0	1

	9	1	3	0	4	7.1	0	1
	10	1	3	0	4	4.5	0	1
Mean		1	30	0	4	5.31	0.1	1
STD Dev		0	0	0	0	0.80753 3969	0.316 228	0
1. Electro nically Record Patient Active Med List	1	1	8	0	25	21	0	1
	2	1	8	0	25	24.4	0	1
	3	1	8	0	25	28.7	0	1
	4	1	8	0	25	26.88	0	1
	5	1	8	0	25	30.1	0	1
	6	1	8	0	25	24.5	0	1
	7	1	8	0	25	31	0	1
	8	1	8	1	25	40.9	0	1
	9	1	8	0	25	31.8	0	1
	10	1	8	0	25	30.7	0	1
Mean		1	80	0.1	25	28.998	0	1
STD Dev		0	0	0.31622 7766	0	5.45226 1101	0	0
2. Electro nically Change Patient Active Med List	1	1	8	0	20	22.1	1	1
	2	0	8	3	20	39.7	2	5
	3	1	8	0	20	22.7	0	1
	4	1	8	1	20	26.8	0	1
	5	1	8	0	20	22.4	0	1
	6	1	8	0	20	17.8	0	1
	7	1	8	0	20	31.1	0	2

	8	0	8	1	20	49	0	5
	9	1	8	0	20	32.4	0	1
	10	1	8	0	20	24.9	0	1
Mean		0.8	80	0.5	20	28.89	0.3	1.9
STD Dev		0.421637	0	0.971825316	0	9.476807948	0.674949	1.663329993
3. Electronically View Patient Active Med List and Historical Meds	1	1	2	0	4	4.5	0	1
	2	1	2	0	4	5	0	1
	3	1	2	0	4	4.9	0	1
	4	1	2	0	4	4.8	0	1
	5	1	2	0	4	5.4	0	1
	6	1	2	0	4	5.1	0	1
	7	1	2	0	4	5.7	0	1
	8	1	2	0	4	6.1	0	1
	9	1	2	0	4	7.1	0	1
	10	1	2	0	4	4.5	0	1
Mean		1	20	0	4	5.31	0	1
STD Dev		0	0	0	0	0.807533969	0	0
1. Electronically Record Patient Active Med Allergy List	1	1	6	0	18	14.4	0	1
	2	1	6	0	18	18.7	0	1
	3	1	6	0	18	20.3	0	2
	4	1	6	0	18	18.1	0	1
	5	1	6	0	18	15.1	1	1

	6	1	6	0	18	18.17	0	1
	7	1	6	1	18	22.22	0	1
	8	1	6	1	18	28.8	0	3
	9	1	6	0	18	16.8	0	1
	10	1	6	0	18	14.4	0	1
Mean		1	60	0.2	18	18.699	0.1	1.3
STD Dev		0	0	0.421637021	0	4.360826756	0.316228	0.674948558
2. Electronically Change Patient Active Med Allergy List	1	1	5	0	14	18.4	0	1
	2	0	5	1	14	17.9	1	5
	3	1	5	1	14	22.4	1	3
	4	1	5	1	14	32.4	1	3
	5	0	5	1	14	44	1	3
	6	1	5	1	14	12.5	1	2
	7	1	5	0	14	14.9	0	1
	8	0	5	1	14	30.1	1	5
	9	1	5	1	14	19.11	1	2
	10	1	5	0	14	13.7	0	1
Mean		0.7	50	0.7	14	22.541	0.7	2.6
STD Dev		0.483046	0	0.483045892	0	10.01485169	0.483046	1.505545305
3. Electronically View Patient Active Med Allergy List	1	1	3	0	4	4.6	0	1
	2	1	3	0	4	5.5	0	1
	3	1	3	0	4	4.8	0	1
	4	1	3	0	4	6	0	1

	5	1	3	0	4	4.9	0	1
	6	1	3	0	4	6.4	0	1
	7	1	3	0	4	5.47	0	1
	8	1	3	0	4	4.1	0	1
	9	1	3	0	4	4.36	0	1
	10	1	3	0	4	4.3	0	1
Mean		1	30	0	4	5.043	0	1
STD Dev		0	0	0	0	0.76970 485	0	0
Create new prescription	1	1	6	0	25	34.5	0	1
	2	1	6	0	25	31.2	0	1
	3	1	6	0	25	27.84	0	1
	4	1	6	0	25	28.7	0	1
	5	1	6	0	25	27.65	0	1
	6	1	6	1	25	40.8	0	1
	7	1	6	0	25	29.54	0	1
	8	1	6	0	25	29.1	0	1
	9	1	6	0	25	27.7	0	1
	10	1	6	0	25	30.1	0	1
Mean		1	60	0.1	25	30.713	0	1
STD Dev		0	0	0.31622 7766	0	4.10211 3412	0	0
Change prescription (dosage or duration)	1	1	6	0	30	25	0	1
	2	1	6	0	30	32.7	0	1
	3	1	6	0	30	29.35	0	1
	4	1	6	0	30	31	0	1
	5	1	6	0	30	29.4	0	1
	6	1	6	0	30	31.6	0	1

	7	1	6	0	30	30.7	0	1
	8	1	6	0	30	34	0	1
	9	1	6	0	30	29.8	0	1
	10	1	6	0	30	28	0	1
Mean		1	60	0	30	30.155	0	1
STD Dev		0	0	0	0	2.51489 452	0	0
Cancel prescription	1	1	6	0	5	5	0	1
	2	1	6	0	5	6	0	1
	3	1	6	0	5	5.2	0	1
	4	1	6	0	5	5.8	0	1
	5	1	6	0	5	4.8	0	1
	6	1	6	0	5	8	0	1
	7	1	6	0	5	4.9	0	1
	8	1	6	0	5	5.6	0	1
	9	1	6	0	5	5.7	0	1
	10	1	6	0	5	5.1	0	1
Mean		1	60	0	5	5.61	0	1
STD Dev		0	0	0	0	0.93505 793	0	0
Refill Prescription	1	1	6	0	5	6.8	0	1
	2	1	6	0	5	7.1	0	1
	3	1	6	0	5	5.9	0	1
	4	1	6	0	5	5.8	0	1
	5	1	6	0	5	6.4	0	1
	6	1	6	0	5	8.1	0	1
	7	1	6	0	5	5.4	0	1
	8	1	6	0	5	5.7	0	1
	9	1	6	0	5	6	0	1
	10	1	6	0	5	7.4	0	1

Mean		1	60	0	5	6.46	0	1
STD Dev		0	0	0	0	0.866923039	0	0
Receive Fill status Notification	1	1	6	0	5	4	0	1
	2	1	6	0	5	4.5	0	1
	3	1	6	0	5	4.7	0	1
	4	1	6	0	5	4	0	1
	5	1	6	0	5	4.5	0	1
	6	1	6	0	5	3	0	1
	7	1	6	0	5	3.7	0	1
	8	1	6	0	5	6	0	1
	9	1	6	0	5	3.5	0	1
	10	1	6	0	5	3.8	0	1
Mean		1	60	0.1	5	4.17	0	1
STD Dev		0	0	0	0	0.821989457	0	0
Request and receive medication history information	1	1	6	0	4	3	0	1
	2	1	6	0	4	3.7	0	1
	3	1	6	0	4	3.9	0	1
	4	1	6	0	4	5	0	1
	5	1	6	0	4	3.8	0	1
	6	1	6	0	4	4.8	0	1
	7	1	6	0	4	4.5	0	1
	8	1	6	0	4	4.9	0	1
	9	1	6	0	4	3.1	0	1
	10	1	6	0	4	3.1	0	1
Mean		1	60	0	4	3.98	0	1

STD Dev		0	0	0	0	0.77860 2737	0	0
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Appendices

The following appendices include supplemental data for this usability test report:

[Appendix 1: SAMPLE 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 Participants

Hello, my name is Adam Forman, I am calling from ScriptSure Cloud v2.0. 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. Can I ask you a few questions?

[If not obvious] Are you male or female? _____

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

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] _____

Which of the following best describes your age? [21 to 30, 31-40, 41-50, 51-60, 61-70, 71-80 and older] [Recruit Mix] _____

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

What is your current occupation/role?

_____ RN: Specialty _____

_____ Physician: Specialty _____

_____ Administrative Staff

_____ Other _____

How long have you held this position? _____

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

About how many months of experience have you had with computers? [Recruit according to the demographics of the intended users, e.g., 0 to 10, 11 to 25, 26+ hours per week]

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

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

How many months or years have you used an electronic health record?

Those are all the questions I have for you. Your background matches the people we're looking for.

Can you participate now? If not, would you be able to participate on [date, time]?

Name of participant: _____

Address: _____

City, State, Zip: _____

Daytime phone number: _____

Evening phone number: _____

Alternate [cell] phone number: _____

Email address: _____

This study will take place remotely in many instances. 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?

USER ID ASSIGNMENT: _____

Appendix 2: PARTICIPANT DEMOGRAPHICS

Following is a high-level overview of the participants in this study. All selected participants match the previously stated description of the intended users above: primary ScriptSure Cloud v2.0 users are secretarial staff, RNs, physicians and other users. Total of 10 participants (Men: 2 Women: 8)

Gender	Number	Percentage of Total
Men	2	20%
Women	8	80%

Education:	Number	Percentage of Total
High School/Some College	4	40%
RN/APRN	4	40%
College	1	10%
MD/DO	1	10%

Participant Identifier	Participant Gender	Participant Age	Participant Education	Participant Occupation/Role	Participant Professional Experience	Participant Computer Experience	Participant Product Experience	Participant Assistive Technology Needs
ID1	Male	80-89	Doctorate degree (e.g., MD, DNP, DMD, PhD)	MD	480	250	14	No
ID2	Female	40-49	Some college credit, no degree	Front desk	220	150	5	No
ID3	Female	40-49	Bachelor's Degree	Nurse	120	120	5	No
ID4	Female	50-59	Bachelor's Degree	Nurse	150	120	12	No
ID5	Female	50-59	High school graduate, diploma or the equivalent (for example: GED)	Front Desk	200	160	5	No
ID6	Female	40-49	Some college credit, no degree	Administrator	0	120	0	No
ID7	Female	80-89	High school graduate, diploma or the equivalent (for example: GED)	Office Manager	450	120	12	No
ID8	Male	40-49	Bachelor's Degree	Support	36	100	0	No
ID9	Female	40-49	Bachelor's Degree	Nurse	70	150	3	No
ID10	Female	60-69	Bachelor's Degree	Nurse	180	180	12	No

Appendix 3: NON-DISCLOSURE AGREEMENT AND INFORMED CONSENT FORM

Non-Disclosure Agreement/Consent Form for ScriptSure Cloud v2.0 Test Cases

THIS AGREEMENT is entered into as of the date listed below, between

_____ (“the Participant”) and Daw Systems, Inc. located at 585 Troy-Schenectady Rd, Latham, NY 12110

The Participant acknowledges 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 Test Company, 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 Test Company 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 Form For ScriptSure Cloud v2.0 Test Cases

Daw Systems, Inc. would like to thank you for deciding to participate 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 60 minutes.

Agreement

I understand and agree that as a voluntary participant in the present study conducted by Daw Systems, 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 the Daw Systems, Inc.

I understand and agree that the purpose of this study is to make software applications more useful and usable in the future and that my test results can be used. I understand there may be screen shots or recordings of our interactions.

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

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

Please check one of the following:

- YES, I have read the above statement and agree to be a participant.
- NO, I choose not to participate in this study.

Proctor: Adam Forman

Signature: _____ Date: _____

Appendix 4: MODERATOR'S GUIDE & TESTING PROCEDURE

Moderator should complete the below for each participant and record findings on the excel document for recording data results.

Administrator and Data Logger: Adam Forman

Date: _____ Time: _____

Assigned Participant #: _____ Location: Bomgar session/Daw corporate office

PRE-TEST SETUP

1. Login to fictitious ScriptSure user John Patient user on version ScriptSure Cloud v2.0
2. Ensure ScriptSure environment functioning correctly
3. Setup presentation mode on Bomgar
4. Record Results on excel

Pre-Test and Participant Instructions:

1. Complete a Setup sheet for the participant to be able to correctly identify the data recorded – assign a user #.
2. Record date of test.
3. Record the test with Camtasia Studio
4. Begin with participant
 - a. Read following greeting statement to Participant to orient the user and explain our goals:
“Thank you for participating in this study. Your input is very important. Our session today will last about 60 minutes. 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. Any information you provide will be kept confidential and your name will not be associated with your comments at any time. The screen and audio may be recorded. 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. You will be asked to rate on a scale of 1 to 5 the tasks where 1 was Very Easy/Efficient and 5 was Very Difficult/Inefficient. We are using fictitious users and patient names for the testing. We will provide a series of task scenarios for you to complete unaided by us. You should try to perform the task as quickly and as efficiently as possible. I will record the progress and results."

5. ASK: Do you have any questions or concerns?
6. ASK: Record participant demographics:
 - a. Ask gender if not obvious on phone.
 - b. What is your age range:
 - i. 20-29?
 - ii. 30-39?
 - iii. 40-49?
 - iv. 50-59?
 - v. 60-69?
 - vi. 70-79?
 - vii. 80+
 - c. What is your education level and role at the practice?
 - d. Ask occupation/role?
 - e. What is your professional experience if any?
 - f. How often do you use a computer on a weekly basis – computer experience?
 - g. How long have you used ScriptSure Cloud v2.0?
 - h. Do you need any assistive tech needs to complete the testing?
7. Record time to complete, errors, and deviations from the optimal path on spreadsheet. Any comments that the participant shared during the tasks were recorded.
8. Read each task according to the script provided:

SPECIFIC PARTICIPANT INSTRUCTIONS FOR TASKS

The following is table to be asked in order to participants: Results are to be recorded on the USABILITY TESTING SPREADSHEET – LOG OF RESULTS. For each participant record results directly onto results log in excel.

Task Success 1="yes" 0="no"	Number of Path Deviations	Time to Perform Task (in Seconds)	Task Ratings (1-Very Easy/Efficient 5-"Very difficult/Inefficient"	Comments
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TABLE OF TASKS

TASK #	TASK DESCRIPTION	INSTRUCTIONS TO PARTICIPANT	CORRECT PATH
170.315(a)(1) – 1	Record medication via CPOE	Select “John Patient” and access the Drug tab and prescribe Amoxicillin 250 mg Cap	Select patient, click drug Tab, search for Amoxiicillin double click the drug, select 250mg Cap from drop down and then click Print/pharmacy direct/Save only from preview window
170.315(a)(1) – 2	Change medication via CPOE	Access “John Patient” chart and remove Amoxil 250mg Cap and prescribe Amoxicillin to 500mg Tab	Right click on the drug row for Amoxil 250mg Cap and click delete – enter comment. Prescribe new medication Amoxil 500mg tab.
170.315(a)(1) – 3	Display changed CPOE medication order	View medication history for the patient	Select a patient and be sure on prescription tab of chart
170.315(a)(4) – 1	Using CPOE, trigger a drug-drug interaction by entering a new medication order	Select John Patient and then select Coumadin Oral to prescribe – any strength (this is a known allergy) Do you see warning?	Select patient, click Drug tab, find Coumadin and select it. Drug allergy Warning shows.
170.315(a)(4) – 2	Using CPOE, trigger a drug-allergy interaction by entering a new medication order	Using John Patient, change the drug-drug interaction check tolerances in the setup Menu from undetermined severity to Severe interaction	Click Setup menu, click Drug tolerances, in the drop down change from undetermined severity to Severe Interaction
170.315(a)(4) – 3	Adjust the severity level of a displayed drug-drug interaction	Enter a Medication order for Penicillin	Verify the drug allergy warning shows up for Penicillin at tolerance level set
§ 170.315(a)(5) – 1	Record a patient's preferred language, date of birth, birth sex, race, ethnicity, sexual orientation, gender identity, preliminary cause of death (inpatient only), and preliminary date of death (inpatient only)	Record a patient's preferred language, date of birth, birth sex, race, ethnicity, sexual orientation, gender identity, preliminary cause of death (inpatient only), and preliminary date of death (inpatient only)	Verify can find button easily
§ 170.315(a)(5) – 2	Change the patient's preferred language, date of birth, birth sex, race, ethnicity, sexual orientation, gender identity, preliminary cause of death (inpatient only),	Change the patient's preferred language, date of birth, birth sex, race, ethnicity, sexual orientation, gender identity, preliminary cause of death (inpatient only), and preliminary date of death (inpatient only)	Verify changes saved

	and preliminary date of death (inpatient only)		
§ 170.315(a)(5) – 3	Display the patient's changed preferred language, date of birth, birth sex, race, ethnicity, sexual orientation, gender identity, preliminary cause of death (inpatient only), and preliminary date of death (inpatient only)	Display the patient's changed preferred language, date of birth, birth sex, race, ethnicity, sexual orientation, gender identity, preliminary cause of death (inpatient only), and preliminary date of death (inpatient only)	Verify all data on static demographics screen
§ 170.315(a)(6) - 1	Record a problem to the problem list	Record a problem to the problem list: Diabetes Mellitus	Verify recorded
§ 170.315(a)(6) - 2	Change a problem on the problem list	Change a problem on the problem list	Verify Changed
§ 170.315(a)(6) – 3	Display the active & historical problem list	Display the active and historical problem list	Verify can view active and Hx
§ 170.315(a)(7) – 1	Record a medication to the medication list	Record medication to the medication list: Prescribe Crestor 10mg Change a medication on the medication list	Verify recorded
§ 170.315(a)(7) - 2	Change a medication on the medication list	Change a medication on the medication list – Cancel Crestor or Archive it and create a new drug to prescribe – Lipitor 10mg	Verify Changed
§ 170.315(a)(7) - 3	Display the active & historical medication list	Display the active medication list and historical meds (same screen)	Verify can view active
170.315(a)(8) – 1	Record a medication allergy	Select John Patient – Click allergies tab and add penicillamine group as an allergy. Do not enter comment or severity level.	Select patient, Click allergies, click add, search for “penicillamine” click select, click OK.
170.315(a)(8) – 2	Change a medication allergy	From the allergy part of chart, click the icon to modify Penicillamine allergy. Add a comment “Hives.”	Click edit button enter hives and click ok.
170.315(a)(8) – 3	Display the active medication allergy list	Select patient, click Allergy tab	Select patient, click Allergy tab.
170.315(b)(3) - 1	1. Create new prescription	Select “John Patient” and access the Drug tab and prescribe Nexium form favorite list - 40 mg Cap. Click E-Prescribe and select from the practice common the test pharmacy	Select “John Patient” and access the Drug tab and prescribe Nexium form favorite list - 40 mg Cap. Click E-Prescribe and select from the practice common the test pharmacy
170.315(b)(3) – 2	2. Change prescription (dosage or duration)	Select John patient and Create a new prescription of the same Nexium with a different dose	Select patient and change dose and click save

170.315(b)(3) – 3	3. Cancel prescription	Cancel the Nexium prescription	Go to chart, click gear next to drug row then Cancel and Ok
170.315(b)(3) – 4	4. Refill prescription	Go to chart and refill Nexium	Go to patient chart, click PRESCRIBE button to re-prescribe it
170.315(b)(3) -5	5. Receive fill status notification	Check patient chart for fill icon	Go to chart and check icon on the row
170.315(b)(3) – 6	6. Request and receive medication history information	Check patient chart	Select patient and view the dashboard of prescription for the patient

Final Questions (5 Minutes)

1. Back up all video and documents and log file
2. Administer the SUS questionnaire
3. End session recordings when complete

Appendix 5: SYSTEM USABILITY SCALE QUESTIONNAIRE

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

Assigned Participant #: _____

APPENDIX 6: SUS RESULTS

<http://www.measuringu.com/sus.php>

SUS Questionnaire Results

5 - Strongly Agree

1- Strongly Disagree

Participants	QUESTIONNAIRE										Totals	SUS Score
	q1	q2	q3	q4	q5	q6	q7	q8	q9	q10		
ID1	5	1	5	4	5	1	5	1	5	4	36	
<i>Scaled to 0-4</i>	4	4	4	1	4	4	4	4	4	1	34	85
ID2	5	1	5	1	5	1	5	1	5	1	30	
<i>Scaled to 0-4</i>	4	4	4	4	4	4	4	4	4	4	40	100
ID3	5	1	5	2	5	1	5	1	5	2	32	
<i>Scaled to 0-4</i>	4	4	4	3	4	4	4	4	4	3	38	95
ID4	5	2	4	2	5	1	4	2	4	4	33	
<i>Scaled to 0-4</i>	4	3	3	3	4	4	3	3	3	1	31	77.5
ID5	4	1	4	3	5	1	4	2	4	3	31	
<i>Scaled to 0-4</i>	3	4	3	2	4	4	3	3	3	2	31	77.5
ID6	5	1	5	1	5	1	5	1	5	1	30	
<i>Scaled to 0-4</i>	4	4	4	4	4	4	4	4	4	4	40	100
ID7	5	2	4	2	5	1	4	1	4	2	30	
<i>Scaled to 0-4</i>	4	3	3	3	4	4	3	4	3	3	34	85
ID8	5	1	5	1	5	1	5	1	5	1	30	
<i>Scaled to 0-4</i>	4	4	4	4	4	4	4	4	4	4	40	100
ID9	5	1	5	1	5	1	5	1	5	1	30	
<i>Scaled to 0-4</i>	4	4	4	4	4	4	4	4	4	4	40	100
ID10	5	1	5	1	5	1	5	1	5	1	30	
<i>Scaled to 0-4</i>	4	4	4	4	4	4	4	4	4	4	40	100

<http://www.measuringu.com/sus.php>

Appendix 7: References

NISTIR 7741 - <https://nvlpubs.nist.gov/nistpubs/Legacy/IR/nistir7741.pdf>

NISTIR 7742 - [NISTIR 7742 Customized Common Industry Format Template for EHR Usability Testing](#).

SUS - Tullis, T. & Albert, W. (2008). Measuring the User Experience. Burlington, MA: Morgan Kaufman. <http://www.measuringu.com/sus.php>

ONC - 2015 Edition Certification Companion Guide Safety- Enhanced Design - 45 CFR 170.315(g)(3) 3/30/2016 ONC - 2015 Edition Certification - Test Procedure for §170.315(g)(3) Safety Enhanced Design

Tullis, T. & Albert, W. (2008). Measuring the User Experience. Burlington, MA: Morgan Kaufman. Also see www.measuringusability.com

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