

170.315(g)(3) Safety-Enhanced Design Usability Test Report of PowerChart Touch

Report based on NISTIR 7742 Common Industry Format for Usability Test Reports

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EXECUTIVE SUMMARY

A usability test of Cerner's PowerChart Touch was conducted on through in-person testing on March 1 - 22, 2018 by Cerner. 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, 16 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 tasks typically conducted on an EHR:

- Add, Remove and Edit the Problem List
- Add, Remove and Edit Physician Orders, and if relevant, route them to the patient's preferred pharmacy

During the 60-minute one-on-one usability test, each participant was greeted by the administrator and asked to review and provided a recorded verbal agreement to an informed consent/release form; they were instructed that they could withdraw at any time. Participants had prior experience with the EHR. The administrator introduced the test, and instructed participants to complete a series of tasks (given one at a time) using the EHRUT. During the testing, the administrator timed the test and recorded user performance data electronically. The administrator did not give the participant assistance in how to complete the task unless required for task workflow. Participant screens and audio were recorded for subsequent analysis.

The following types of data were collected for each participant:

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

All participant data was de-identified – no correspondence could be made 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.

The results from the System Usability Scale scored the subjective satisfaction with the system based on performance with these tasks to be: 55 for all clinicians.

In addition to the performance data, the following observations and recommendations based on those findings were made:

- Most of the deviations and task failures were related to a baseline level of lostness while working through tasks with new functional capabilities or due to configuration artifacts of the usability testing.
- The highest impact problem identified was in relation to Workflow 170.315(a)(1) CPOE Medications. The errors for one of these tasks pertained to additional steps required to perform the modification of a medication order. The clinician is required to discontinue the previous order and then order a new order when modifying the dose strength. Improving the CPOE and electronic prescribing steps to support a dose strength conversion or other order modification steps. The task failures seen for this task were identified as potential design mitigations for these errors.

INTRODUCTION

The purpose of this document is to report on summative testing performed by Cerner Corporation to evaluate the usability of its PowerChart electronic health record (EHR) software within the intended use of the product for specified workflows. To evaluate and provide evidence of the usability of this system, the effectiveness, efficiency and user satisfaction were measured by collecting success rates, error and deviation rates, time on task and user satisfaction ratings as reported in this document. The areas of improvement provide detailed information about the test results and recommendations for resolving problems. All testing artifacts used to perform the usability evaluations are included in the appendices.

METHOD

Participants

Recruited participants had a mix of backgrounds and demographic characteristics conforming to the solution and role tested. The following is a table of participants by characteristics, including demographics, professional experience, computing experience. Participant names were replaced with Participant IDs so that an individual's data cannot be tied back to individual identities in this report. The use of corrective lenses were not included in reporting the use of assistive technology.

A total of 16 participants were tested on PowerChart Touch software over the course of three weeks for 1 hour sessions. Participants in the test were clinical staff representing physician roles.

See Table 1 for the detailed participant information.

Table 1. All Participants Demographics.

#	ID #	Role	Specialty	Education	Gender	Age Range	Professional Exp. (Yrs.)	Computer Exp. (Yrs.)	EHR/ Product Exp. (Yrs.)	Comp. Prof.*	Assistive Tech. Needs
1	1393	MD	Endocrinology	Doctorate degree (e.g., MD)	Male	30-39	9	16	2	4	No
2	1520	MD	Family Medicine	Doctorate degree (e.g., MD)	Male	40-49	17	17	2	5	No
3	1521	MD	Family Medicine	Doctorate degree (e.g., MD)	Male	30-39	12	16	2	2	No
4	2230	MD	Internal Medicine	Doctorate degree (e.g., MD)	Male	30-39	8	10	1	4	No
5	2231	MD	Pediatric ED	Doctorate degree (e.g., MD)	Male	30-39	9	9	2	4	No
6	2232	MD	Pediatric ED/ Pediatric Inpt.	Doctorate degree (e.g., MD)	Male	40-49	22	22	0.5	5	No
7	2265	MD	Family Medicine	Doctorate degree (e.g., MD)	Male	40-49	15	15	0.5	4	No
8	2234	MD	Internal Medicine	Doctorate degree (e.g., MD)	Male	60-69	30	30	1	4	No
9	2235	MD	Pediatric Hospitalist	Doctorate degree (e.g., MD)	Male	40-49	14	14	1	5	No
10	2236	MD	Family Practice	Doctorate degree (e.g., MD)	Male	40-49	21	10	1	3	No
11	2237	MD	Internal Medicine	Doctorate degree (e.g., MD)	Female	50-59	30	8	0.5	4	No
12	2238	MD	Pediatrics	Doctorate degree (e.g., MD)	Male	30-39	12	10	2	5	No

13	2239	MD	Family Practice	Doctorate degree (e.g., MD)	Male	50-59	32	8	2	5	No
14	2240	MD	Family Medicine	Doctorate degree (e.g., MD)	Female	50-59	27	10	2	5	No
40.15	2266	MD	Gastroenterology	Doctorate degree (e.g., MD)	Male	40-49	17	17	0.5	4	No
146	2268	MD	Family Medicine	Doctorate degree (e.g., MD)	Male	30-39	9	13	1	4	No

*Computer proficiency is a self-reported rating of comfort with computers, where 5 – very comfortable.

Study Design

The objective of this test was to gather information about Cerner PowerChart Touch usability within the product's intended use in acute care or inpatient settings. For the purpose of this report, usability is defined as the efficiency, effectiveness and satisfaction of participants utilizing the system to complete specific task workflows. The results of this test will be used to provide Cerner product management staff with data to drive future requirements.

In an effort to adequately gauge true end user measures of usability in a clinical environment with the least burden to the clinicians involved, the test sessions were held at client sites with typical end users, in a segregated conference room setting on multiple dates.

Tasks and the supporting data setup were designed by Cerner in-house clinicians to simulate clinical practice and to cover the required safety-enhanced design workflows. These materials were then reviewed by a physician from a client site to further ensure their verisimilitude.

Artificiality factors were inadvertently inserted as a result of the data setup and these caused some challenges for the test participants. Examples of the data setup factors include poor or unrealistic organization of picklists; poor spelling or capitalization in the naming of items to be ordered. Additionally, as the environment was shared, data setup was complicated by conflicting configuration requirements so that the testing team encountered unexpected system behaviors at every site.

Tasks

Test tasks were designed to be realistic examples of the tasks a clinician would perform in an acute care setting. A clinical scenario was designed by Cerner in-house clinicians to provide the context or background for both sets of tasks. The tasks themselves were written to cover both the safety-enhanced design workflows required for system certification by the Office of the National Coordinator for Health Information Technology and additional safety features available within PowerChart Touch. The complete set of tasks and research questions covered in this usability test are included in Appendices A and B of this document.

Procedures

Test participants were scheduled for 60-minute test sessions and arrived as individual participants. Each participant was assigned a number to identify results while detaching the identity of the individual from the responses and observations. A moderator conducted each test and introduced the purpose of the testing and its procedures and instructions verbally. Participants completed an online demographic data collection form during the recruiting process as part of determining eligibility for the sessions.

Each participant was provided with a clinical scenario providing the background context for the task workflows. Each participant was given the chance to read the scenario and ask any questions, then began to perform the tasks required to achieve the desired outcome. Each session was recorded with the Morae software. The facilitator took notes on the participant's interaction with the system. Tasks were timed primarily via Morae, starting from the point when the participant clicked the "Start Task" button and ending when the participant clicked "End Task". In a few cases when participating physicians were obliged to interrupt a task in order to respond to patient care questions, timings were re-taken by stopwatch from the recording. After each task, the participant was asked to answer one subjective question related to the ease of completing the task.

Upon completing all of the tasks, the participant was asked to respond to standard System Usability Scale (SUS) questions. Finally, they were encouraged to respond to open-ended questions and describe any likes or dislikes in regards to the system and their interactions with it.

System Tested

The usability testing that was performed is representative of the state of the UI design as it existed at the time of the usability testing performed on March 1st through March 22nd, 2018.

Test Location and Environment

In-person sessions were held at healthcare facilities in Springfield, MO, River Falls, WI and Salt Lake City, UT. The test location included a quiet testing room, such as an office or conference room. Participants worked at a desk or table with a testing computer running the recording software, and an iPad running the tested solution connected through a wireless internet connection. The environmental controls were accessible to the users, and noise levels were kept to a minimum with the ambient temperature within a normal range. The participant's interaction with the EHR was captured and recorded digitally with screen capture software running on the test machine. A web camera recorded each participant's hand gestures synced with the screen capture, and verbal comments were recorded with a microphone.

Usability Metrics

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

The goals of the test were to assess:

1. Effectiveness by measuring participant success rates and errors.
2. Efficiency by measuring the participants' task time and path deviations.

3. Satisfaction by measuring ease of use ratings.

Test Forms and Tools

During the testing, the following forms and tools were used to present and collect data:

- The Demographics questionnaire collected as part of the recruiting process (See Appendix A)
- Morae Recorder was used to record each test session, time the tasks, and collect data from the subjective surveys. The online survey included System Usability Scale questionnaire. Data collected in Morae was later downloaded to an Excel spreadsheet for analysis and reporting.
- General Instructions to participant (See Appendix B)
- Scenario, Task instructions and Task Rating (See Appendix C & D)

Participant Instructions

Appendix B provides the script used by the test moderator when explaining the test procedures and the purpose of the usability testing.

Within the testing sessions when encountering an unfamiliar task workflow (e.g., one not typically used at the participant's facility), participants were instructed to try their best to figure it out. Only if they indicated verbally that they were stuck or needed help were participants prompted as to the use of the system. This provided useful insights on the intuitiveness and learnability of the user interface.

USABILITY SCORING

The quantitative information collected consisted of measurable results that we analyzed to determine how the test participants performed compared to established benchmarks. Some of the quantitative information we collected included time spent on task, the percentage of test participants succeeding or failing at tasks, and so on. The following table (Table 2) details how tasks were scored, errors evaluated, and the time data analyzed.

Table 2. Details of How Observed Data were scored.

Measure	Scoring
Effectiveness: Task Success	<p>A task was counted as “Passed” if the participant was able to achieve the correct outcome, without assistance. If the participant abandoned the task, did not reach the correct answer or performed it incorrectly the task was counted as “Failed”.</p> <p>The total number of successes were calculated for each task and then divided by the total number of participants that attempted. Successful tasks were evaluated on a threshold of 80% as successful.</p> <p>On a qualitative level, an enumeration of errors and error types were collected.</p>
Effectiveness: Deviation Rate	<p>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 identified for the task or solution tested.</p> <p>The deviation rate was calculated as the total number of errors over the total chance for errors across all participants based on the optimal path.</p>
Efficiency: Task Time	<p>Each task was timed from when the participant selected a “Start Task” button until the participant selected an “End Task” button. The task times were then recorded as part of the session recording based on the participant’s selection of the Start and End task button. Only task times for tasks that were successfully completed were included in the average task time analysis.</p> <p>The average time on task for all participants was used as the baseline.</p>
Satisfaction: System Usability Scale (SUS)	<p>Participant’s subjective impression of the ease of use of the application was measured by administering a standardized post-task questionnaire.</p>

	Scores under 60 represent systems with poor usability; scores over 80 would be considered above average.
Satisfaction: Single Ease of Use Question	At the end of each task, the participant was presented with the Single Ease of Use survey question. Using a Likert scale (with 1 as very difficult and 7 as very easy), they were asked to rate the difficulty of the task.

Some of the information collected was qualitative, consisting of subjective impressions and opinions about the solution. Some of the qualitative data collected included: facial expressions, verbal comments when participants “thought out loud”, spontaneous verbal expressions (comments), and miscellaneous activities performed by the participant during the test session. While much of the qualitative commentary was collected during testing, qualitative feedback was also gathered in the questionnaires and post-test interviews.

To prioritize area(s) of improvement, a categorization of problem severity classification will be used in the analysis of the data collected during evaluation activities. The approach treats problem severity as a combination of three factors: the frequency of users experiencing the problem during the evaluation (likelihood of occurrence), the probability of detecting a problem based on the total number of participants’ evaluated (likelihood of detection), and the likelihood that harm would occur (severity). The combination of these three factors can be used to identify a Risk Priority Number (RPN).

Critical – RPN values representing high impact problems that prevent a user from correctly completing one or more product functions and may be of serious risk to patient safety.

High – RPN values representing moderate to high impact problems that often prevent a user from correctly completing one or more product functions and may be frequent, persistent, or affect many users.

Medium – RPN values representing moderate frequency problems with low to moderate impact that causes users moderate confusion or irritation.

Low – RPN values representing low frequency problems with low impact that cause users mild confusion or irritation. These may include minor inconsistencies that cause hesitation or small aesthetic issues.

RESULTS

The results of the usability test were calculated according to the methods specified in the Usability Metrics section above. The data should yield actionable results that, if corrected, produce a material, positive impact on user performance. The quantitative and qualitative summary of responses is indicated for each task below.

Workflow 170.315 (a) (1) CPOE Medications

Participating physicians were assigned three tasks (see tasks MD2, MD3, and MD7) in which they ordered medications or revised existing medication orders.

Table 3. Task-based results for physician tasks.

	MD2	MD3	MD7
Task Success Rate	100%	94%	81%
Task Failure Rate	0%	6%	19%
Deviation Rate	26%	21%	6%
Mean Time on Task	164.46	61.93	201.63
Average User Rating	2.9	5.4	3.6

Usability Results for Task

Cerner PowerChart Touch provides configuration options for the end-user personally and for the facility generally. Participants were warned not to expect to find their personal favorites or even the departmental picklists that they were accustomed to using in their daily practice. As a result, they worked a bit slower than usual while learning how medication orders were organized in the testing environment. Participating physicians did not encounter any difficulties in either finding or ordering the patient's medications.

The task failures seen for Task MD2 were due to placing duplicate orders that were not resolved through the duplicate order alert to remove the duplicate order or did not place an order that modified the dose strength and frequency. In fact, three additional physicians were observed placing duplicate orders, all of which caught the mistake and corrected it before signing the orders. These failures are due to the nature of the workflow requiring the clinician to first discontinue the previous order and add a new order when modifying the dose strength of a medication.

The remaining errors represented users attempting to proceed with incomplete order detail information. This error is already mitigated through design in the form of an alert that prevents a user from signing orders with incomplete required information.

Usability Findings for Task

1. **Low Priority:** Provide actions matching the clinical mental model for modifying the strength of a medication on the order profile. [\[TABLE 6. Finding ID 1.\]](#)

Workflow 170.315 (a) (2) CPOE Imaging

Participating physicians were asked to order two different imaging studies (see task MD4): chest x-ray and transthoracic echocardiogram (TTE).

	MD4
Task Success Rate	100%
Task Failure Rate	0%
Deviation Rate	9%
Mean Time on Task	140.85
Average User Rating	4.3

Usability Results for Task

The most common deviations were around finding the correct orders through search as a chest x-ray is commonly abbreviated in a manner that was not set-up as part of the configuration. Additional errors were associated with completing the order details before signing the order.

Usability Findings for Task

No recommendations – no usability issues discovered.

Workflow 170.315 (a) (3) CPOE Labs

Participating physicians were asked to order a lab test(s) for diagnostic purposes related to the reason for visit as represented in the clinical scenario (see task MD5). Physicians were provided recommended lab tests only upon request to the facilitator and could include any of the following: Troponin I/T, Creatinine Kinase – Total and MB, and/or Electrocardiogram (EKG).

	MD5
Task Success Rate	100%
Task Failure Rate	0%
Deviation Rate	9%
Mean Time on Task	62.73
Average User Rating	5.7

Usability Results for Task

The most common error was around potential delays in care by not including a STAT priority for the lab order. Alternatively, two physicians were observed selecting a Point of Care orderable or Timed Study status for the lab.

Usability Findings for Task

No recommendations – no usability issues discovered.

Workflow 170.315 (a) (6) Problem List

Participating physicians were asked to both update an existing problem as resolved (see task MD1) and to add two new problems (see task MD6).

	MD1	MD6
Task Success Rate	69%	94%
Task Failure Rate	31%	6%
Deviation Rate	42%	13%
Mean Time on Task	49.16	92.17
Average User Rating	3.7	5.4

The most common error identified for task MD1 was due to the concept of resolving or marking a problem as inactive. Both physicians indicated that the concept of marking a problem as inactive is not an activity that they would normally do within their workflow. However, one of the physicians indicated the concept of resolved through a comment associated with the problem.

The most common error identified for task MD6 was for physicians to have difficulty finding Hyponatremia within the problem pick list. Additionally, while one of the physicians was observed adding a duplicate problem, the UI presented this step as a modification to the existing problem. This design mitigation prevented duplicate problem creation and reduced workload for the physician to clean-up the problem list.

Usability Findings for Task

2. **Low Priority:** Provide additional status change options face-up so that they are easier to find and access. [\[TABLE 6. Finding ID 2.\]](#)

Workflow 170.315 (b) (3) Electronic Prescribing

Participating physicians were asked to prescribe medications and ensure that any new prescriptions would be sent to the patient's preferred pharmacy.

	MD3	MD7
Task Success Rate	94%	81%
Task Failure Rate	6%	19%
Deviation Rate	21%	6%
Mean Time on Task	61.93	201.63

Average User Rating	5.4	3.6
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Usability Results for Task

All of the participating physicians completed the task of routing to the patient’s preferred pharmacy as part of the overall ordering tasks for Workflow 170.315(a)(1) CPOE Medication. None of the errors observed for these tasks were related to the electronic prescribing steps. All of the physicians recognized that they would need to add the preferred pharmacy while placing the order.

Usability Findings for Task

No recommendations – no usability issues discovered.

Summary of Measures by Task

Table 4. Effectiveness, Efficiency, and Satisfaction Scores for PowerChart Touch.

Task Description	n	Task Success % (SD)	Path Deviations (Obs./Optimal)	Mean Optimal Task Time in sec. (SD)	Mean Deviation Task Time (Obs./Optimal)	Errors (SD)	Task Ratings (SD)
MD1. (a)(6) Problem List	16	69 (48)%	27 / 4	49.16 (49.93)	9.05	1.69 (1.25)	3.7 (1.9)
MD2. (a)(1) CPOE - Modify	16	100 (0)%	20 / 6	164.46 (133.89)	2.96	1.25 (1.24)	2.9 (1.5)
MD3. (a)(1) CPOE & (b)(3) eRx	16	94 (25)%	11 / 4	61.93 (51.16)	2.96	0.69 (0.60)	5.4 (1.1)
MD4. (a)(3) CPOE Img	16	100 (0)%	9 / 8	140.85 (63.41)	1.00	0.56 (0.73)	4.3 (1.0)
MD5. (a)(2) CPOE Labs	16	100 (0)%	12 / 7	62.73 (34.17)	2.44	0.75 (0.68)	5.7 (1.0)
MD6. (a)(6) Problem List - Add	16	94 (25)%	4 / 5	92.17 (57.04)	0.43	0.25 (0.45)	5.4 (1.4)
MD7. (a)(1) CPOE & (b)(3) eRx	16	81 (41)%	28 / 8	201.63 (150.95)	0.50	1.75 (1.69)	3.6 (2.2)

Overall Satisfaction Ratings

The results from the SUS (System Usability Scale) scored the subjective satisfaction with the system based on performance with these tasks. You can be very pleased if you get an average SUS score above 83 (which is the 94th percentile of this distribution).

Table 5. System Usability Survey Scores by Nurse and Physician.

Population	Score
Average Score Overall	55

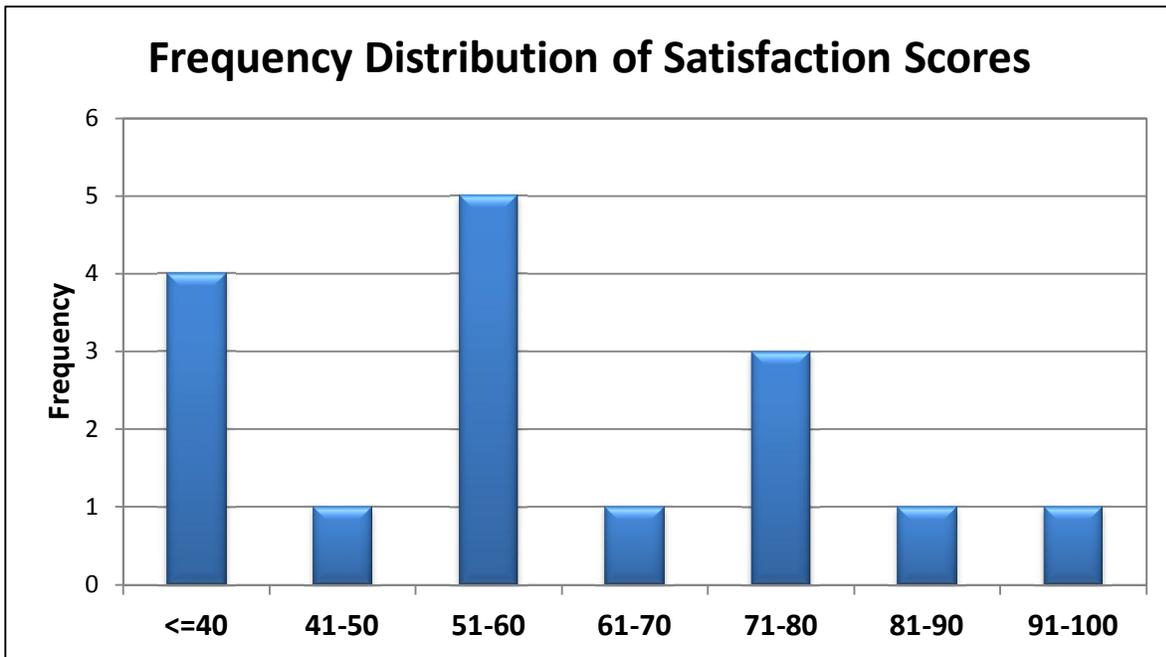


Figure 1. Satisfaction Scores from SUS (16 participants).

MAJOR FINDINGS

Most of the deviations and task failures were related to a baseline level of lostness while working through tasks with new functional capabilities or due to configuration artifacts of the usability testing. The main problems identified through this testing are related to tasks and workflow associated with Workflow 170.315(a)(1) CPOE Medications.

The highest impact problem identified was in relation to Workflow 170.315(a)(1) CPOE Medications. The errors for one of these tasks pertained to additional steps required to perform the modification of a medication order. The clinician is required to discontinue the previous order and then order a new order when modifying the dose strength. Improving the CPOE and electronic prescribing steps to support a dose strength conversion or other order modification steps were identified as potential design mitigations for these errors.

Participant Comments

Relevant physician comments regarding the workflows described:

"I do like how when you stop a medicine you can refill or discontinue it still shows it with strike thru font and I really like that cause you can see what you did." (170.315(a)(1))

"Changing the Lasix prescription, having to discontinue and re-order is frustrating." (170.315(a)(1))

"This visit, chronic and resolved would have been nice, rather than having to open it and edit it, which takes four steps to get rid of it." (170.315(a)(6))

"I loved the map search for prescriptions." (170.315(b)(3))

AREA(S) FOR IMPROVEMENT

Table 6. Summary of Prioritized Area(s) for Improvement.

	Priority	Criteria	Usability Finding
<u>1</u>	Low	(a)(1) CPOE Medications	Provide actions matching the clinical mental model for modifying the strength of a medication on the order profile.
<u>2</u>	Low	(a)(6) Problem List	Provide additional status change options face-up so that they are easier to find and access.

APPENDIX A: DEMOGRAPHICS SURVEY

Please complete the following questionnaire to determine your eligibility to participate in the research session.

1. The research session will be a 60-minute long, one-on-one recorded session where you will interact with a system that you may or may not have used before and be asked to answer questions about your experience. Are you comfortable participating in that type of research session? Yes No
2. Have you participated in a research study with us before? Yes No
3. If you remember what the study was for, please describe it briefly below.

4. Background Information

Name: _____
Clinic or Hospital of Employment: _____
Medical Specialty: _____
Job Title: _____
Email Address: _____

Background Information

5. What is your age?
20 to 29
30 to 39
40 to 49
50 to 59
60 to 69
70 or older
6. What is your Highest level of education attained?
Trade/Technical/Vocational Training
Associate Degree
Bachelor's Degree
Master's Degree
Doctorate Degree
7. Do you currently work with Cerner PowerChart or FirstNet? Yes No
8. In your current role, how frequently do you see patients (both inpatient and outpatient)?
Daily
Multiple times a week
Once a week
Less than once a week
Never

9. How long have you been working with Cerner PowerChart or FirstNet?

Less than 1 year

1-5 years

6-10 years

Greater than 10 years

10. How comfortable are you using computers for Cerner PowerChart or FirstNet?

Not very comfortable	Somewhat uncomfortable	Neutral	Somewhat comfortable	Very comfortable
1	2	3	4	5

11. How frequently do you use a computer for Cerner PowerChart or FirstNet?

Daily	Several times/week	Weekly	Monthly	Never
1	2	3	4	5

12. How many years have you been in practice (NOT including medical school)?

13. How many years have you used an electronic health record (including medical school)?

APPENDIX B: PARTICIPANT BRIEFING/DEBRIEFING

PARTICIPANT BRIEFING

CONSENT FORM CONTENT

I'd like to remind you that your participation is entirely voluntary and you are free to end our session at any time. This session is being videotaped so that I can capture your hand gestures while using the prototype. Your name will not be associated with the recording, and will not be directly associated with any of your comments.

SESSION PROCEDURES

Our session today is scheduled for 60 minutes but shouldn't take that long. During that time, you will take a look at an electronic health record system. This study will consist of a series of tasks to perform with this system. You will be asked to complete these tasks on your own trying to do them as quickly as possible with the fewest possible errors or deviations. However, I want to remind you that we are testing the system not you or your abilities. If there are situations where you would seek HELP indicate those to me as the facilitator. Please save your detailed comments until the end of the session as a whole when we can discuss freely.

The instructions for each task will be displayed prior starting the task. Once you are ready, select the Start Task button and work through the task. When you think you are done with a task select the End Task button. The instructions for each task can be hidden and shown at any point while working through the tasks by selecting the Instructions button. As you work through the activities for our session today you may notice that some of the data is incomplete compared to what you might usually encounter as we have only included the minimal information to complete the activities in the patient charts.

We are recording the audio and screenshots of our session today. All of the information that you provide will be kept confidential and your name will not be associated with your comments at any time. Recording the session allows me to focus more on talking with you and less on taking notes because I can review the tape if necessary.

Do you have any questions before we begin?

PARTICIPANT DEBRIEFING

That covers all of the specifics today - do you have any general questions or comments about this software or this session that you'd like to share?

Administer the System Usability Scale.

APPENDIX C: TEST SCRIPT FOR PHYSICIANS

Scenario: A 65-year-old male was admitted to the ICU for increased difficulty with breathing and signs of volume overload. The patient reported that he has developed worsening dyspnea on exertion (only able to walk ½ block before becoming short of breath). He has gained 5 lbs. recently and is experiencing ankle swelling at night. He also reports decreased appetite. He says he has not missed any of his medications or made any recent changes to his diet. Additionally, he denies chest pain, fevers, palpitations, ICD shocks, or increased orthopnea.

You will be starting out by opening <Patient Name's> chart. Confirm that you have opened the correct patient. When was the patient admitted?

Optimal Path: Select patient from physician list > View demographics banner

1. **(170.315(a)(6) Problem List)** During your discussion the patient informed you that he no longer has insomnia. Review and update the problem list.

Optimal Path: View problems > Select Resolve next to Insomnia

2. **(170.315(a)(1) CPOE Medications - Modify)** The patient informs you that at his last check-up his physician increased his Lasix prescription. Change the Lasix prescription to 80mg oral tablet BID.

Optimal Path: Select Orders > Click Lasix > make changes

3. **(170.315(a)(1) CPOE Medications – Add & 170.315(b)(3) Electronic Prescribing)** You have decided to treat the patient's GERD with Protonix 40mg oral tablet Q12H. Add an order for Protonix 40mg and ensure that it has been electronically routed to the nearest pharmacy to the patient's home.

Optimal Path: From the Add Order Search window, search for Protonix 40mg > Select medication name > complete dose (40mg IV Q12h) and route (oral) details.

4. **(170.315(a)(3) CPOE Imaging)** You would like to evaluate the patient's condition further. Order the following imaging studies: XR Chest 2 Views and TTE

Optimal Path: Using the Add Order Search window > search for and add to the scratchpad by selecting the order name from the search results > Ensure that the order details conform to the information provided > Click Sign

5. **(170.315(a)(2) CPOE Labs)** Order labs to determine if patient is having a heart attack.

Optimal Path: Up to user to determine which labs. If user requests which labs to order, prompt with Creatinine Kinase – Total and MB, Troponin I/T, Electrocardiogram (EKG) > In Add Order Search window > search for and add to the scratchpad by selecting the

order name from the search results > Ensure that the order details conform to the information provided > Click Sign

Scenario: Heart Mate II LVAD insertion procedure has now been performed and the patient has returned for a follow-up visit.

6. **(170.315(a)(6) Problem List)** You need to add to the patient's problem list following the procedure. Add Anemia due to blood loss and Hyponatremia with a comment of "Trend, volume overloaded. No further bolus."

Optimal Path: Enter problem in Search field > Anemia > Enter details (status = active; Onset = postoperative) > Done > Enter problem in Search field > Hyponatremia > Enter details (Status = Active; Onset = postoperative; Comment: Trend, volume overloaded. No further bolus.)

7. **(170.315(a)(1) CPOE Medications & 170.315(b)(3) Electronic Prescribing)** Add the following warfarin regimen and confirm that it has been electronically routed to the nearest pharmacy to the patient's home:

- Coumadin 5 mg daily on Mon, Wed, Fr
- Coumadin 7.5 mg daily on Sun, Tue, Thur, and Sat

Optimal Path: Orders > Click Medication Reconciliation > Select Discharge > Click Add All medications to prescription > Click Sign