

EHR Usability Test Report of BlueEHS

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

BlueEHS Version 2.0

Date of Usability Tests: March 18th,2020-March
27th,2020 & April 22nd,2020

Date of Report: March 30th,2020
Updated April 22nd,2020

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Usability Centered Design

Introduction:

The main reason for applying usability techniques when developing a software system is to increase user efficiency and satisfaction and, consequently, productivity. According to ISO 9241, Part 11, usability is “the extent to which a product can be used by specified users to achieve specific goals with effectiveness, efficiency, and satisfaction in a specified context of use.” We use Cognitive System Design to achieve usability in blueEHR.

Before we start building our tasks, we collect information about the people who will use the tool:

- Who are the system users?
- What will they need to accomplish?
- What will they need from the system to accomplish this?
- How should the system supply what they need?

We use the following methods in our development process to increase usability of the application.

- Analysis
- Design
- Prototyping
- Evaluation

Analysis:

There are two methods to analyze the requirements, user perspective and task perspective.

User analysis - Our team will analyze the end users who will be using the system. This will be done either by directly visiting the user or through online meetings. We will observe their current system and how they are using the system. The most important thing about user analysis is to record, structure, and organize the findings. We will be documenting their method of usage and the drawbacks of the current system.

Task analysis - Next step is task analysis. We analyze tasks because we can use the located tasks to drive and test UI design throughout the product development cycle. Task analysis ends when we evaluate the discovered task set, which is best done collaboratively with users. We

suggest prioritizing the set of tasks by importance and frequency to get a small task set. This approach guarantees that you'll build the most important functionalities into the system

Usability Design:

Once we have analyzed the tasks our system will support, we can make a first attempt at the UI's conceptual design.

Conceptual design - During the conceptual design phase, we define the basic user–system interaction and the objects in the UI and the contexts in which interaction takes place. The findings of the user and task analysis are the basis for the conceptual design. The deliverables from this phase are typically wire frames or screen mockups, and a specification, which describes the UI's behavior.

Visual design - Having completed the conceptual design, the final step in our process is visual design, where we define the UI's appearance. This covers all details, including the layout of screens and dialog boxes, use of colors and widgets, and design of graphics and icons.

Prototyping:

Prototypes are built based on the visual designs. Prototype built will have all the working components. Prototypes built will be shared with end users. On constant discussion with the end users, any changes will be made in the prototype to further increase the usability of the application. End users will come up with suggestions and difficulties they faced in the prototype. The corrections will be made according to the input from the end users. Once the prototype is approved we move on to the next phase which is the actual development process. Most of the usability issues will be taken into account in these steps. But there can be still some changes during the development process. There will be a final usability evaluation once the development is completed and tested for any issues.

Usability evaluation:

Usability evaluation is a central activity in the usability process. It can determine the applications' usability level and whether the design works.

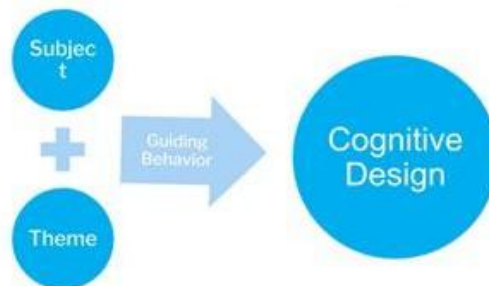
Usability testing - Usability testing will be conducted by end users. Once the application is completed and tested, a beta version of the application will be released to the end users. Beta version might not be used by all the end users. A team of developers, end users, application or domain experts will conduct usability testing. Apart from efficiency,

one advantage is that people with multiple perspectives and expertise examine the test object. Another advantage is that the participating developers build skills and know-how about how to make software more usable.

COGNITIVE DESIGN

What is Cognitive Design ?

- Cognitive design is defined as the crafted impact a piece of writing has on its audience. Central to this design are the **subject** and **theme** of the work. The subject is what the work is about. The theme is the attitude the author has taken toward the subject or the perspective on that subject.
- A modern Design movement which seeks to put the latest findings of cognitive science to work and translate them into design experiences that offer personal transformation by guiding behavior.



Cognitive Science

The study of thought, learning, and mental organization, which draws on aspects of psychology, linguistics, philosophy, and computer modeling.



Cognitive Load

Cognitive load refers to the total amount of mental effort being used in the working memory.

Types of Cognitive Load

- **Intrinsic**

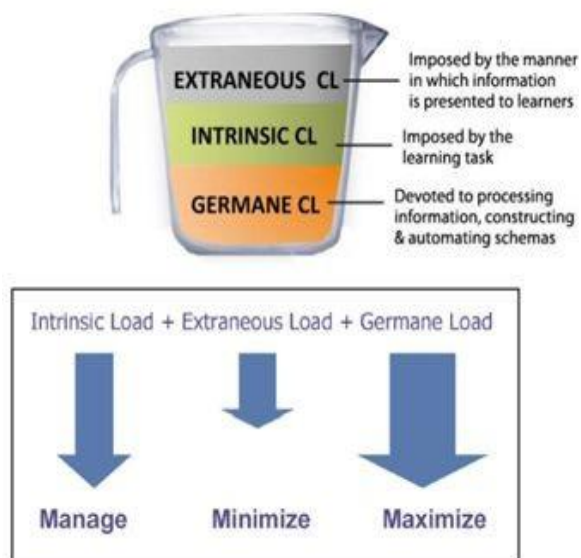
This is the complexity that is inherently involved in certain tasks or materials. Simply put, some activities are harder to learn and to master than others. If they are more difficult, then they have the potential to cause an intrinsic cognitive overload.

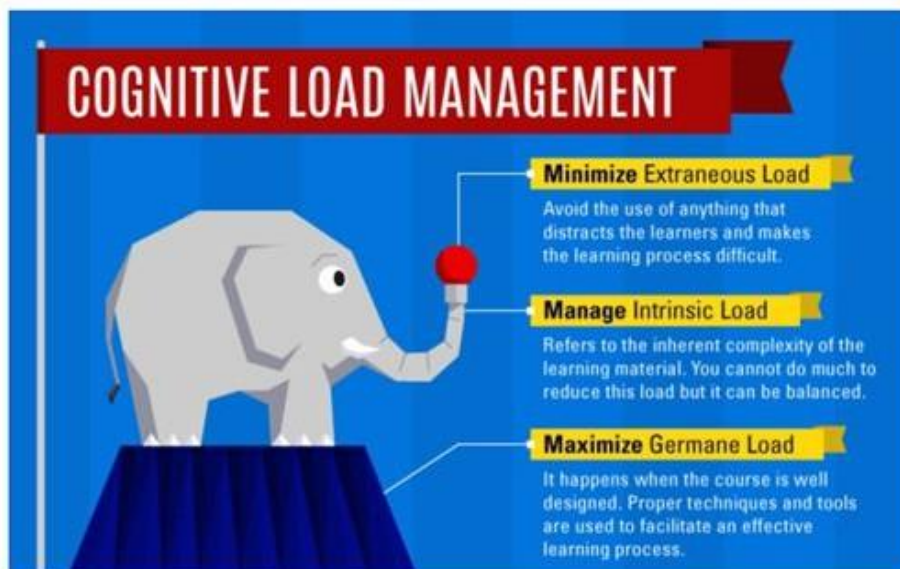
- **Extraneous**

This form of cognitive load consists of non-relevant, unimportant elements, such as activities or instructional materials that make the learners use their mental processes. For example, if you use a graph that requires extra information processing, but isn't really necessary, this would be an example of extraneous cognitive overload.

- **Germane**

These elements enable the learners to devote their cognitive mental resources to the learning process and help to facilitate the development of a learner's knowledge base.





Cognitive Load Theory

Cognitive Load theory states that each person has a mental 'schema', which is a series of structures that enable us to solve problems and think.

Cognitive Load Theory suggests that learners can absorb and retain information effectively only if it is provided in such a way that it does not "overload" their mental capacity. In other words, our short term memory, or working memory, can only retain a certain amount of information simultaneously (rather than an infinite supply of data).

Memory

The two main types of memory are **short-term memory** and **long-term memory**; however, short-term memory has become better understood to be working memory.

Short Term Memory (working memory)

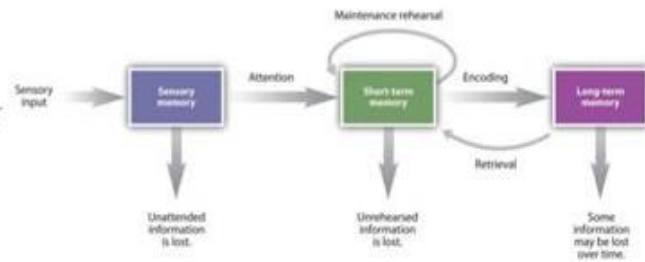
defined as the ability to remember information in the face of distraction. The famously known capacity of memory of **7 plus or minus 2** is a combination of both memory in working memory and long term memory.

Long Term Memory

information can be stored for long periods of time. While short-term and working memory persists for only about **18 to 30 seconds**, information can remain in long-term memory **indefinitely**.

How do we Process Information?

Information from your sensory memory passes into your working memory, where it is either processed or discarded. Working memory can generally hold between five and nine items (or chunks) of information at any one time. This is central to Cognitive Load Theory, as you will see.



When your brain processes information, it categorizes that information and moves it into long-term memory, where it is stored in knowledge structures called "schemas." These organize information according to how you use it. So, for example, you have schemas for different concepts such as dog, cat, mammal, and animal.

You also have behavioral schemas for actions like hitting a ball, riding a bicycle, ordering food at a restaurant and so on. The more practiced you become at using these schemas, the more effortless these behaviors become. This is called "automation." Schemas are also significant to Cognitive Load Theory. Let's find out why.

Cognitive Barriers



&

Cognitive Load



Cognitive Barriers

1. Number of steps

Understand that it's equally important to know when to add steps as it is when to remove them. Five easy, short steps often impose a lower cognitive barrier than one long, difficult step.



2. Length of steps

Design pragmatic step lengths based on how motivated the user is to achieve his goal. Users will spend longer with sites, tools, apps, and products they enjoy than they will with ones they're simply required to interact with. Users tend to prefer short steps that only ask them to resolve the immediate issue they're faced with.



3. Difficulty of steps

Don't create unnecessarily difficult steps, but don't immediately discount adding difficulty to limit conversion and increase the quality of the converted. Remember, users will be more likely to complete difficult steps if they understand why the step needs to be so difficult.



2. Length of steps

Design pragmatic step lengths based on how motivated the user is to achieve his goal. Users will spend longer with sites, tools, apps, and products they enjoy than they will with ones they're simply required to interact with. Users tend to prefer short steps that only ask them to resolve the immediate issue they're faced with.



Cognitive Design Guidelines

1. Screen readability and image quality
2. Manipulation and input devices
3. Supporting accurate mental model formation
4. Learning by doing
5. Minimizing attentional and cognitive load
6. Using images and icons

Methods For Reducing Cognitive Load

1. Avoid unnecessary elements
2. Leverage common design patterns
3. Eliminate unnecessary tasks
4. Minimize choices
5. Display choices as a group
6. Strive for readability
7. Use iconography with caution

Executive Summary

Ten usability tests of BlueEHS Version 2.0 EMR application were conducted starting on March 18th,2020 and ending on March 27th,2020 with a total of ten testers. An additional testing day was set up for April 22nd,2020 to accommodate for 2 more tasks.

The test users had a variety of roles in the medical field; Certified Nursing Assistants,Licensed Practical Nurses,Medical Office Receptionists,Medical Assistants and Care Coordinators .

The purpose of this test was to test and validate the usability of the current user interface, and provide evidence of the current user interface and provide evidence of usability in the EHR Under Test(EHRUT).

During the usability test, 10 healthcare workers served as participants and used the EHR in simulated, but representative tasks. This study collected performance data on 11 tasks typically conducted on an EHR.

- 170.315 (a)(1) Computerized provider order entry (CPOE) – medications
- 170.315 (a)(2) Computerized provider order entry (CPOE) – laboratory
- 170.315 (a)(3) Computerized provider order entry (CPOE) – diagnostic imaging
- 170.315 (a)(4) Drug-drug, drug-allergy interaction checks for CPOE
- 170.315 (a)(5) Demographics
- 170.315 (a)(6) Problem list
- 170.315 (a)(7) Medication list
- 170.315 (a)(8) Medication allergy list
- 170.315 (a)(14) Implantable device list
- 170.315(a)(9) Clinical Decision Support
- 170.315(b)(2) Reconciliation

Prior to the usability test participants were asked to review and sign an informed consent/release form(included in Appendix 3); they were instructed that they could withdraw at any time.

Participants were also instructed to watch training videos prior to the usability test. These videos were provided by ZH Healthcare, and gave an overview of how to conduct each test. Each participant had prior experience with the EHR as they all use it on a daily basis.

During each one-on-one usability test, the participant was greeted by the facilitator. The facilitator introduced the test and recorded user performance data on paper and electronically. The facilitator did not give the participant assistance in how to complete the task. A screen video capture of each testing session was recorded and provided to the team at ZH Healthcare.

The following types of data were collected for each participant:

- Number of tasks successfully completed without assistance
- 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.

Tasks	Performance Evaluation		
	Effectiveness	Efficiency	Satisfaction
CPOE-Medications	Yes	4	Excellent
CPOE-Laboratory	Yes	3	Good
CPOE-Diagnostic Imaging	Yes	3	Good
Drug-drug, drug-allergy interaction checks for CPOE	Yes	5	Excellent
Demographics	Yes	5	Excellent
Problem List	Yes	4	Excellent
Medication List	Yes	4	Excellent
Medication Allergy List	Yes	4	Excellent
Implantable Device List	Yes	4	Excellent
Clinical Decision Support	Yes	5	Excellent
Reconciliation	Yes	5	Excellent

The results from the SUS (System Usability Scale) scored the **subjective satisfaction** with the system based on performance with these tasks in the table below. Broadly interpreted, scores under 60 represent systems with poor usability; scores over 80 would be considered above average.

DISCUSSION OF THE FINDINGS

The following is a discussion of the major areas in which the EHRUT was evaluated (a detailed list of findings from the testing and recommendations may be found in the Results section on pg. 11).

EFFECTIVENESS

Overall effectiveness was above average. Most tasks were completed by all testers . Some of the instructions provided were not clear enough but the testers were able to figure out what to do to make sure they completed the task.

EFFICIENCY

Overall efficiency was high although there were some path deviations on some of the tasks performed. The EHRUT was verbally reported to be user friendly by all testers. Specifically testers found that the UI was very intuitive and mentioned that the EMR is one of the easiest that they have used. In testing there were some process inefficiencies such as: missing terms after entering in prompt, allergies not included in the allergy list, some medications not showing in the medication list through the rx link, etc. Minor improvements and additional changes are recommended to be addressed related to quality, time, and user interface for this platform to be more efficient. As stated before, the testers main complaint was that some of the instructions provided were not clear.

SATISFACTION

Satisfaction rating was evaluated for all ten testers. All of them evaluated the EHRUT on the SUS questionnaire with scores over 80. Information from this test should be taken into consideration when undertaking future testing and system development.

INTRODUCTION

The EHRUT tested for this study was BlueEHS Version 2.0. Designed to present medical information to healthcare providers in all facility types. In this case, a Pulmonary medicine medical office was used for testing purposes. The EHRUT consists of demographics, vitals, medication prescribing and management, medical device management. The usability testing attempted to represent realistic exercises and conditions. The purpose of this study was to test and validate the usability of the current user interface, and provide evidence of usability in the EHR Under Test (EHRUT). To this end, measures of effectiveness, efficiency and user satisfaction, such as time to complete tasks, number of deviations from tasks and overall impression of tasks were captured during the usability testing.

METHOD

PARTICIPANTS

A total of 10 participants were tested on the EHRUT(s). Participants in the test were medical professionals with experience using Electronic Medical Record software. Participants were recruited by the testing team, participation was voluntary with no incentive given to participants. In addition, participants had no direct connection to the development of or organization producing the EHRUT(s). Participants were given the opportunity to have the same orientation and level of training as the actual end users would have received. Recruited participants had a mix of backgrounds and demographic characteristics. The following is a table of participants by characteristics, including demographics, professional experience, computing experience and user needs for assistive technology. Participant names were replaced with Participant IDs so that an individual's data cannot be tied back to individual identities.

Demographics	Tester 1	Tester 2
Gender	Male	Female
Age Range	20-29	20-29
Race/ Ethnicity	Latino	Caucasian
Occupation/Role	Medical Assistant	Medical Assistant
Professional Experience	18 months	4 months
Computer/ HIT Experience	48 months	24 months
Experience with similar software	48 months	24 months
Assistive Technologies used	N/A	N/A
Usability Testing Experience	None	None

Demographics	Tester 3	Tester 4
Gender	Female	Female
Age Range	40-49	40-49
Race/ Ethnicity	Caucasian	Caucasian
Occupation/Role	Licensed Practical Nurse	Medical Assistant/CNA
Professional Experience	72 months	150 months
Computer/ HIT Experience	96 months	144 months
Experience with similar software	96 months	144 months
Assistive Technologies used	N/A	N/A
Usability Testing Experience	Yes, several years ago	None

Demographics	Tester 5	Tester 6
Gender	Female	Female
Age Range	30-39	40-49
Race/ Ethnicity	Caucasian	Caucasian
Occupation/Role	Medical Receptionist	Medical Receptionist
Professional Experience	24 months	150 months
Computer/ HIT Experience	24 months	144 months
Experience with similar software	24 months	144 months
Assistive Technologies used	N/A	N/A
Usability Testing Experience	None	None

Demographics	Tester 7	Tester8
Gender	Female	Male
Age Range	40-49	10-19
Race/ Ethnicity	Caucasian	Latino
Occupation/Role	Medical Biller/Coder	Care Coordinator
Professional Experience	144 months	18 months
Computer/ HIT Experience	144 months	18 months
Experience with similar software	144 months	18 months
Assistive Technologies used	N/A	N/A
Usability Testing Experience	None	None

Demographics	Tester 9	Tester 10
Gender	Male	Female
Age Range	20-29	50-59
Race/ Ethnicity	Latino	Caucasian
Occupation/Role	Care Coordinator	Respiratory Therapist
Professional Experience	12 months	120 months
Computer/ HIT Experience	12 months	120 months
Experience with similar software	12 months	120 months
Assistive Technologies used	N/A	N/A
Usability Testing Experience	None	None

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 1 EHR. Each participant used the system in a laptop or desktop and was provided with the same instructions. The system was evaluated for effectiveness, efficiency and satisfaction as defined by measures collected and analyzed for each participant:

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

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:

- 170.315 (a)(1) Computerized provider order entry (CPOE) – medications
- 170.315 (a)(2) Computerized provider order entry (CPOE) – laboratory
- 170.315 (a)(3) Computerized provider order entry (CPOE) – diagnostic imaging
- 170.315 (a)(4) Drug-drug, drug-allergy interaction checks for CPOE
- 170.315 (a)(5) Demographics
- 170.315 (a)(6) Problem list
- 170.315 (a)(7) Medication list
- 170.315 (a)(8) Medication allergy list
- 170.315 (a)(14) Implantable device list
- 170.315(a)(9) Clinical Decision Support
- 170.315(b)(2) Reconciliation

PROCEDURES

Prior to the test each participant reviewed and signed an informed consent form (See Appendix 2) as well as responded to a demographics questionnaire (See Appendix 1). The facilitator moderated the session including administering instructions and tasks. The facilitator also obtained post-task rating data. A second person served as the data logger and took notes on task success, path deviations, number and type of errors, and comments.

Participants were instructed to perform the tasks (see specific instructions below):

- As instructed by the facilitator. The facilitator read aloud the documented tasks step-by step
- . The tester was also provided with the written documentation of instructions.
- Without further assistance. The facilitator observed the tester, and did not give additional assistance unless the tester could not complete the test as specified by instructions.
- Complete the task as specified before commenting on functionality and ease of use.

For each task, the participants were given a written copy of the task. Task timing began once the facilitator introduced the question. The task time was stopped once the participant had successfully completed the task. Scoring is discussed below.

Following the session, the administrator gave the participant the post-test questionnaire (e.g., the System Usability Scale, see Appendix 3) and thanked each individual for their participation.

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

TEST LOCATION/ENVIRONMENT

The test was conducted on premises using ActivePresenter Screen Recording software which was used for its screen capturing features. All 10 participants were at 1038 W. North Blvd. Suite.102 Leesburg, FL 34748 which is a physician's office. The test facility was a quiet office which was used as a testing room. Only the participant and the facilitator were in the test room at the time of each testing session.

For testing, the computers used were a Dell Desktop running Windows 10 with the Mozilla Firefox/Google Chrome browser and a Lenovo laptop running Windows 10 with Mozilla Firefox/Chrome. The participants used the laptop's keyboard and trackpad or a wireless mouse provided when interacting with the EHRUT as well as an external monitor which was a Dell U2412M Color Profile, D6500 with a resolution of 1920 x 1200. A LAN network was used for connectivity purposes.

The test application was set up by the vendor ZH HealthCare according to the vendor's documentation describing the system set-up and preparation. The application itself was web-based using a test database. Technically, the system performance (i.e., response time) was representative to what actual users would experience in a field implementation. Additionally, participants were instructed not to change any of the default system settings (such as control of font size).

TEST FORMS AND TOOLS

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

1. Demographic Questionnaire
2. Informed Consent
3. System Usability Scale
4. G-3 Testing Workflows

PARTICIPANT INSTRUCTIONS

The facilitator reads the following instructions aloud to the each Participant:

Thank you for agreeing to participate in this study. Your input is very important. Our session today will last about 30-60 minutes. During that time you will use an instance of an electronic health record in a test database. I will ask you to complete a few tasks using this system and answer some questions. You should complete the tasks as I instruct you. Please try to complete the tasks in full before commenting on the system. 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. Overall, we are interested in how easy (or how difficult) this system is to use, what in it would be useful to you, and how we could improve it. I did not have any involvement in its creation, so please be honest with your opinions. All of the information that you provide will be kept confidential and your name will not be associated with your comments at any time. Should you feel it necessary you are able to withdraw at any time during the testing. This testing will be recorded so we can review the results at a later date.

Following the procedural instructions, participants were shown the EHR and given their first task, orally by the facilitator. Each task was done consecutively. Overall impressions of the EHR were also asked of each participant and recorded. Participants were then given 10 tasks to complete

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

DATA SCORING

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

Measures	Rational and Scoring
Effectiveness: Task Success	A task was counted as a “Success” if the participant was able to achieve the correct outcome, without assistance, within the time allotted on a per task basis. The total number of successes were calculated for each task and then divided by the total number of times the task was attempted. The results were provided as a percentage. Task times were recorded during both testing exercises.
Effectiveness: Task Failures	If the participants abandoned the task, did not reach the correct answer or performed it incorrectly, or reached the end of the allotted time before successful completion, the task was counted as a “Failure”. The total number of errors was calculated for each task and then divided by the total number of times that task was attempted. Not all deviations would be counted as errors. This should also be expressed as the mean number of failed tasks per participant. On a qualitative level, an enumeration of errors and error types should be collected.
Effectiveness: Task Deviations	The participant’s path (ie.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.
Effectiveness Errors	If the system did not perform as to be expected these errors in the system would be recorded and tallied.
Satisfaction: Task Rating	Participant's subjective impression of the ease of use of the application was measured by administering 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 Scale questionnaire in the Appendix.

RESULTS

DATA ANALYSIS AND REPORTING

The results of the usability test were calculated according to the methods specified in the Usability Metrics section above. Participants who failed to follow session and task instructions had their data excluded from the analyses. None of the participants failed to follow the session or task, so no data was excluded. The usability testing results for the EHRUT are detailed below:

Tasks	# of test ers	Task success Yes	Path Deviation s	Task Time(sec)	Task Time Deviations	Errors	Task Rating (5-easy)
		Mean/ SD	Observed/ Optimal	Mean/(SD)	Observed Secs/ Optimal Time for Task	Mean/ (SD)	Mean/ (SD)
CPOE-Medications	10	100 0	18 18	291s/ 5s	289s/280s	0 0	4.5 0.5
CPOE-Laboratory	10	100 0	26 23	382s/ 17.56s	388s/376s	0 0	4 0.4
CPOE-Diagnostic Imaging	10	100 0	21 18	233s/ 9.40s	224s/215s	0 0	3 0.45
Drug-drug,drug-allergy interaction checks for CPOE	10	100 0	14 14	181s/ 6.89s	185s/178s	0 0	4 0.4

Demographics	10	100 0	7 7	139s/ 7.40s	142s/137s	0 0	5 0
Problem List	10	100 0	11 11	292s/ 7.27s	296s/286s	0 0	4.5 0.5
Medication List	10	100 0	20 20	232s/ 9.59s	239s/228s	0 0	4.5 0.5
Medication Allergy List	10	100 0	15 15	228s/ 10.23s	221s/215s	0 0	4 0.4
Implantable Device List	10	100 0	7 7	132s/ 5.64s	132s/127s	0 0	4.5 0.5
Clinical Decision Support	10	100 0	10 8	168s/ 64.2s	167s/165s	0 0	5 0
Reconciliation	10	100 0	17 17	114s/ 32.31s	113s/110s	0 0	5 0

The results from the SUS (System Usability Scale) scored the **subjective satisfaction** with the system based on performance with these tasks in the table below. Broadly interpreted, scores under 60 represent systems with poor usability; scores over 80 would be considered above average.

Tasks		Overall Evaluation
System Usability Scale		86

MAJOR FINDINGS & RECOMMENDATIONS

-All participants mentioned that the UI was very easy to navigate and intuitive. No major complications during the testing.

-Some of the workflow documents were not too specific which caused some testers to spend more time than usual performing the specific task. Once they were able to realize what they were supposed to do, they completed the task as expected.

-All the testers mentioned that the demographic as well as the e-rx Medication modules were the easiest

-Although, we only tested 10 specific areas in the EMR. ALL users mentioned that they were very comfortable navigating the EMR and that it was easy to use.

-Overall, the testers presented little to no problems with the EMR while testing.

APPENDICES

APPENDIX 1: DEMOGRAPHICS QUESTIONNAIRE

Tester #1

Demographics Questionnaire:

1. What is your gender? **M**

2. Have you participated in a focus group or usability test in the past 6 months? **No**

3. Do you or anyone in your home, work in marketing research, usability research, web design (...etc.)? **No**

4. Do you, or does anyone in your home, have a commercial or research interest in an electronic health record software or consulting company? **No**

5. Which of the following best describes your age? (23 to 39; 40 to 59; 60 to 74; 75 and older) **23-39**

6. Which of the following best describes your race or ethnic group? (eg. Caucasian, Asian, Black/African American, Latino(a) or Hispanic. **Latino**

7. Do you require any assistive technologies to use a computer? (if so, please describe) **No**

8. What is your current position and title? **Medical assistant**

9. How long have you held this position? *1.5 years*

10. Describe your work location (or affiliation) and environment? *Medical office*

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

B.S degree

12. Besides reading email, what professional activities do you do on the computer? (e.g. access Electronic Medical Records, research, reading news, shopping/banking, digital pictures, programming, word processing.) *EMR*

13. About how many hours per week do you spend on the computer? *40 hours*

14. What computer platform do you usually use? (e.g. Mac, Windows, etc) *Windows*

15. What Internet Browser do you usually use? (e.g. Mac, Windows, etc.) *Chrome*

16. In the last month, how often have you used an electronic health record? *5 days/week*

17. How many years have you used an electronic health record? *4 years*

18. How many Electronic Health Records do you use or are familiar with? *1*

19. How does your work environment handle patient records? *electronically*

Tester #2

Demographics Questionnaire:

1. What is your gender?

Female

2. Have you participated in a focus group or usability test in the past 6 months?

no

3. Do you or anyone in your home, work in marketing research, usability research, web design (...etc.)?

no

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

no

5. Which of the following best describes your age? (23 to 39; 40 to 59; 60 to 74; 75 and older)

23 to 39

6. Which of the following best describes your race or ethnic group? (eg. Caucasian, Asian, Black/African American, Latino(a) or Hispanic.

white

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

no

8. What is your current position and title?

MA

9. How long have you held this position?

4 months

10. Describe your work location (or affiliation) and environment?

great, medical office

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

Asso. Degree

12. Besides reading email, what professional activities do you do on the computer? (e.g. access Electronic Medical Records, research, reading news, shopping/banking, digital pictures, programming, word processing.)

EMR

13. About how many hours per week do you spend on the computer?

10

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

Windows

15. What Internet Browser do you usually use? (e.g. Mac, Windows, etc.)

~~Chrome~~

Chrome

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

3 days a week.

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

2

18. How many Electronic Health Records do you use or are familiar with?

1

19. How does your work environment handle patient records?

electronically great

Tester #3

Demographics Questionnaire:

1. What is your gender?

Female

2. Have you participated in a focus group or usability test in the past 6 months?

No

3. Do you or anyone in your home, work in marketing research, usability research, web design (...etc.)?

No

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

No

5. Which of the following best describes your age? (23 to 39; 40 to 59; 60 to 74; 75 and older)

40 to 59

6. Which of the following best describes your race or ethnic group? (eg. Caucasian, Asian, Black/African American, Latino(a) or Hispanic.)

Caucasian

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

No

8. What is your current position and title?

Nurse-LPN

9. How long have you held this position?

6 yrs

10. Describe your work location (or affiliation) and environment?

Medical Office

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

LPH-ASN

12. Besides reading email, what professional activities do you do on the computer? (e.g. access Electronic Medical Records, research, reading news, shopping/banking, digital pictures, programming, word processing.)

Work

13. About how many hours per week do you spend on the computer?

20 hrs.

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

15. What Internet Browser do you usually use? (e.g. Mac, Windows, etc.)

Chrome

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

5/WK
days

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

8 yrs.

18. How many Electronic Health Records do you use or are familiar with?

3

19. How does your work environment handle patient records?

Electronically

Tester #4

Demographics Questionnaire:

1. What is your gender? *female*
2. Have you participated in a focus group or usability test in the past 6 months? *yes*
3. Do you or anyone in your home, work in marketing research, usability research, web design (...etc.)? *no*
4. Do you, or does anyone in your home, have a commercial or research interest in an electronic health record software or consulting company? *no*
5. Which of the following best describes your age? (23 to 39; 40 to 59; 60 to 74; 75 and older) *40-59*
6. Which of the following best describes your race or ethnic group? (eg. Caucasian, Asian, Black/African American, Latino(a) or Hispanic. *Caucasian*
7. Do you require any assistive technologies to use a computer? (if so, please describe) *no*
8. What is your current position and title? *Medical Assistant / CNA*

9. How long have you held this position? *4 months*

10. Describe your work location (or affiliation) and environment? *Clinical office*

11. Which of the following describes your highest level of education? (e.g., high school graduate/GED, some college, college graduate (RN,BSN), post graduate(MD/PhD), other) *Some College*

12. Besides reading email, what professional activities do you do on the computer? (e.g. access Electronic Medical Records, research, reading news, shopping/banking, digital pictures, programming, word processing.) *access Eme, research, reading, banking, music, word processing.*

13. About how many hours per week do you spend on the computer? *35 hrs*

14. What computer platform do you usually use? (e.g. Mac, Windows, etc) *windows*

15. What Internet Browser do you usually use? (e.g. Mac, Windows, etc.) *Chrome*

16. In the last month, how often have you used an electronic health record? 28 days

17. How many years have you used an electronic health record? 12 years

18. How many Electronic Health Records do you use or are familiar with? 2

19. How does your work environment handle patient records? electronically

Tester #5

Demographics Questionnaire:

1. What is your gender? F

2. Have you participated in a focus group or usability test in the past 6 months? No

3. Do you or anyone in your home, work in marketing research, usability research, web design (...etc.)? No

4. Do you, or does anyone in your home, have a commercial or research interest in an electronic health record software or consulting company? No

5. Which of the following best describes your age? 23 to 39; 40 to 59; 60 to 74; 75 and older)

6. Which of the following best describes your race or ethnic group? (eg. Caucasian, Asian, Black/African American, Latino(a) or Hispanic.

7. Do you require any assistive technologies to use a computer? (if so, please describe) No

8. What is your current position and title?

Front Desk

9. How long have you held this position? 2 years +

10. Describe your work location (or affiliation) and environment? Medical

Following describes your highest level of education? (e.g., high school
some college, college graduate (RN,BSN), post graduate(MD/PhD), other)

12. Besides reading email, what professional activities do you do on the computer? (e.g. access
Electronic Medical Records, research, reading news, shopping/banking, digital pictures,
programming, word processing.)

13. About how many hours per week do you spend on the computer? 40 hours

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

15. What Internet Browser do you usually use? (e.g. Mac, Windows, etc.) Chrome

16. In the last month, how often have you used an electronic health record? 5 days a week

17. How many years have you used an electronic health record? 2 years

18. How many Electronic Health Records do you use or are familiar with? 1

19. How does your work environment handle patient records? Electronically

Tester #6

Demographics Questionnaire:

1. What is your gender?

female

2. Have you participated in a focus group or usability test in the past 6 months?

no

3. Do you or anyone in your home, work in marketing research, usability research, web design (...etc.)?

no

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

no

5. Which of the following best describes your age? (23 to 39; 40 to 59; 60 to 74; 75 and older)

40 to 59

6. Which of the following best describes your race or ethnic group? (eg. Caucasian, Asian, Black/African American, Latino(a) or Hispanic.

Caucasian

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

no

8. What is your current position and title?

Front Desk - Customer Service Liaison

9. How long have you held this position?

1⁺yr

10. Describe your work location (or affiliation) and environment?

private office / Urban area

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

College Graduate A.A.

12. Besides reading email, what professional activities do you do on the computer? (e.g. access Electronic Medical Records, research, reading news, shopping/banking, digital pictures, programming, word processing.)

Med Records, scanning, printing, archiving,
create documents, Windows Suite

13. About how many hours per week do you spend on the computer?

40⁺

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

Windows Office 365

15. What Internet Browser do you usually use? (e.g. Mac, Windows, etc.)

Google Chrome

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

20 days

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

12+ years

18. How many Electronic Health Records do you use or are familiar with?

3

19. How does your work environment handle patient records?

electronically

Tester #7

Demographics Questionnaire:

1. What is your gender?

female

2. Have you participated in a focus group or usability test in the past 6 months?

NO

3. Do you or anyone in your home, work in marketing research, usability research, web design (...etc.)?

NO

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

NO

5. Which of the following best describes your age? (23 to 39; 40 to 59; 60 to 74; 75 and older)

6. Which of the following best describes your race or ethnic group? (eg. Caucasian, Asian, Black/African American, Latino(a) or Hispanic.

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

NO

8. What is your current position and title?

Medical Biller/coder

9. How long have you held this position?

12 yrs.

10. Describe your work location (or affiliation) and environment?

Medical office

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

Some college

12. Besides reading email, what professional activities do you do on the computer? (e.g. access Electronic Medical Records, research, reading news, shopping/banking, digital pictures, programming, word processing.)

13. About how many hours per week do you spend on the computer?

30 hrs

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

15. What Internet Browser do you usually use? (e.g. Mac, Windows, etc.)

Chrome or fire fox

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

5 days a week

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

12 yrs.

18. How many Electronic Health Records do you use or are familiar with?

3

19. How does your work environment handle patient records?

Electronically

Tester #8

Demographics Questionnaire:

1. What is your gender?

male

2. Have you participated in a focus group or usability test in the past 6 months?

no

3. Do you or anyone in your home, work in marketing research, usability research, web design (...etc.)?

no

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

no

5. Which of the following best describes your age? (23 to 39; 40 to 59; 60 to 74; 75 and older)

17

6. Which of the following best describes your race or ethnic group? (eg. Caucasian, Asian, Black/African American, Latino(a) or Hispanic.

Caucasian / Latino

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

no

8. What is your current position and title?

rpm

9. How long have you held this position?

1 year 6 months

10. Describe your work location (or affiliation) and environment?

Nice office
f family environment

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

high school vate

12. Besides reading email, what professional activities do you do on the computer? (e.g. access Electronic Medical Records, research, reading news, shopping/banking, digital pictures, programming, word processing.)

excel powerpoint
word rpm emr

13. About how many hours per week do you spend on the computer?

40

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

Window

15. What Internet Browser do you usually use? (e.g. Mac, Windows, etc.)

chrome

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

every work day

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

1 year and a half

18. How many Electronic Health Records do you use or are familiar with?

one

19. How does your work environment handle patient records?

electronically

Tester #9

Demographics Questionnaire:

1. What is your gender?

male

2. Have you participated in a focus group or usability test in the past 6 months?

NO

3. Do you or anyone in your home, work in marketing research, usability research, web design (...etc.)?

NO

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

No

5. Which of the following best describes your age? (23 to 39; 40 to 59; 60 to 74; 75 and older)

20

6. Which of the following best describes your race or ethnic group? (eg. Caucasian, Asian, Black/African American, Latino(a) or Hispanic.

Latino

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

No

8. What is your current position and title?

calling/CCM

9. How long have you held this position?

1yr

10. Describe your work location (or affiliation) and environment?

~~spokane, ntc~~

medical office

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

Ged

12. Besides reading email, what professional activities do you do on the computer? (e.g. access Electronic Medical Records, research, reading news, shopping/banking, digital pictures, programming, word processing.)

calling

13. About how many hours per week do you spend on the computer?

40

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

Windows

15. What Internet Browser do you usually use? (e.g. Mac, Windows, etc.)

Chrome

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

~~at all~~ 5 days a week

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

1

18. How many Electronic Health Records do you use or are familiar with?

1

19. How does your work environment handle patient records?

~~very well~~
electronically

Tester #10

Demographics Questionnaire:

1. What is your gender?

Female

2. Have you participated in a focus group or usability test in the past 6 months?

NO

3. Do you or anyone in your home, work in marketing research, usability research, web design (...etc.)?

NO

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

NO

5. Which of the following best describes your age? (23 to 39; 40 to 59; 60 to 74; 75 and older)

40-59

6. Which of the following best describes your race or ethnic group? (eg. Caucasian, Asian, Black/African American, Latino(a) or Hispanic.)

Caucasian

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

NO

8. What is your current position and title?

RT

9. How long have you held this position?

10 yrs

10. Describe your work location (or affiliation) and environment?

medical office

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

college

12. Besides reading email, what professional activities do you do on the computer? (e.g. access Electronic Medical Records, research, reading news, shopping/banking, digital pictures, programming, word processing.)

13. About how many hours per week do you spend on the computer?

20

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

Windows

15. What Internet Browser do you usually use? (e.g. Mac, Windows, etc.)

Chrome

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

5 days per wk

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

10 yrs

18. How many Electronic Health Records do you use or are familiar with?

2

19. How does your work environment handle patient records?

Electronically

TESTER	TIME SPENT
TESTER#1	1 hour 10 minutes and 31 seconds
TESTER#2	53 minutes 18 second
TESTER#3	40 minutes 53 seconds
TESTER#4	41 minutes 12 seconds
TESTER#5	33 minutes 03 seconds
TESTER#6	35 minutes 48 seconds
TESTER#7	35 minutes 51 seconds
TESTER#8	31 minutes 21 seconds
TESTER#9	32 minutes 45 seconds
TESTER#10	33 minutes 11 seconds

APPENDIX 2: INFORMED CONSENT FORM

Consent Form: Remote Usability Test (Adult)

Sample Consent Form

Please read and sign this form.

During this usability test I agree to participate in an online session using my computer or telephone. During the session I will be interviewed about the site, asked to find information or complete tasks using the site and asked to complete a questionnaire about the experience. I understand and consent to the use and release of the recording to the testing team for ZH Healthcare.

I understand that the information and recording are for research purposes only and that my name and image will not be used for any other purpose. I relinquish any rights to the recording and understand the recording may be copied and used by the testing team at ZH Healthcare without further permission.

I understand that participation is voluntary, and I agree to immediately raise any concerns I might have.

If you have any questions after today, please contact Pablo M. [Dapena\(pablodapena1992@gmail.com\)](mailto:Dapena(pablodapena1992@gmail.com))

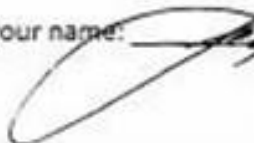
Please sign below to indicate that you have read and understand the information on this form and that any questions you might have about the session have been answered.

Date: 03/18/20

Please print your name: Ja

ro

Please sign your name:



Thank you!

We appreciate your participation!

APPENDIX 3: SYSTEM USABILITY SCALE QUESTIONNAIRE

Tester #1

Participant ID: [REDACTED]

Site: Blue EHR

Date: 03/18/20

①

System Usability Scale

Instructions: For each of the following statements, mark one box that best describes your reactions to the website *today*.

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

Please provide any comments about this website:

Tester #2

Participant ID: [REDACTED]

Site: Blue EHRDate: 03/20/20

(2)

System Usability Scale

Instructions: For each of the following statements, mark one box that best describes your reactions to the website *today*.

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

Please provide any comments about this website:

Tester #3

Participant ID: [REDACTED]

Site:

Blue EHR

Date: 03/23/20

(4)

System Usability Scale

Instructions: For each of the following statements, mark one box that best describes your reactions to the website *today*.

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

Please provide any comments about this website:

None

Tester #4

 3 Participant ID:  Site: Blue EHR
Date: 08/23/20

System Usability Scale

Instructions: For each of the following statements, mark one box that best describes your reactions to the website *today*.

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

Please provide any comments about this website:

Tester #5

Participant ID: Site: Blue EHRDate: 03/23/20

⑤

System Usability Scale

Instructions: For each of the following statements, mark one box that best describes your reactions to the website *today*.

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

Please provide any comments about this website:

Tester #6

Participant ID: Site: BlueEHRDate: 03/23/20

System Usability Scale

Instructions: For each of the following statements, mark one box that best describes your reactions to the website *today*.

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

Please provide any comments about this website:

Tester #7

Participant ID: [REDACTED]

Site: Buc EHRDate: 03/24/20

System Usability Scale

(X)

Instructions: For each of the following statements, mark one box that best describes your reactions to the website today.

	Strongly Disagree				Strongly Agree
1. I think that I would like to use this website frequently.	☐	☐	☐	☐	☒
2. I found this website unnecessarily complex.	☒	☐	☐	☐	☐
3. I thought this website was easy to use.	☐	☐	☐	☐	☒
4. I think that I would need assistance to be able to use this website.	☒	☐	☐	☐	☐
5. I found the various functions in this website were well integrated.	☐	☐	☐	☐	☒
6. I thought there was too much inconsistency in this website.	☒	☐	☐	☐	☒ <i>om</i>
7. I would imagine that most people would learn to use this website very quickly.	☐	☐	☐	☒	☐
8. I found this website very cumbersome/awkward to use.	☒	☐	☐	☐	☐
9. I felt very confident using this website.	☐	☐	☐	☒	☐
10. I needed to learn a lot of things before I could get going with this website.	☒	☐	☐	☐	☐

Please provide any comments about this website:

N/A

Tester #8

Participant ID: Site: BlueHillDate: 03/26/20

System Usability Scale

8

Instructions: For each of the following statements, mark one box that best describes your reactions to the website *today*.

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

Please provide any comments about this website:

Tester #9

Participant ID: Site: BlueFhrDate: 03/27/20

⑨

System Usability Scale

Instructions: For each of the following statements, mark one box that best describes your reactions to the website *today*.

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

Please provide any comments about this website:

Tester #10

Participant ID: Site: Blue EHRDate: 03/27/20

⑩

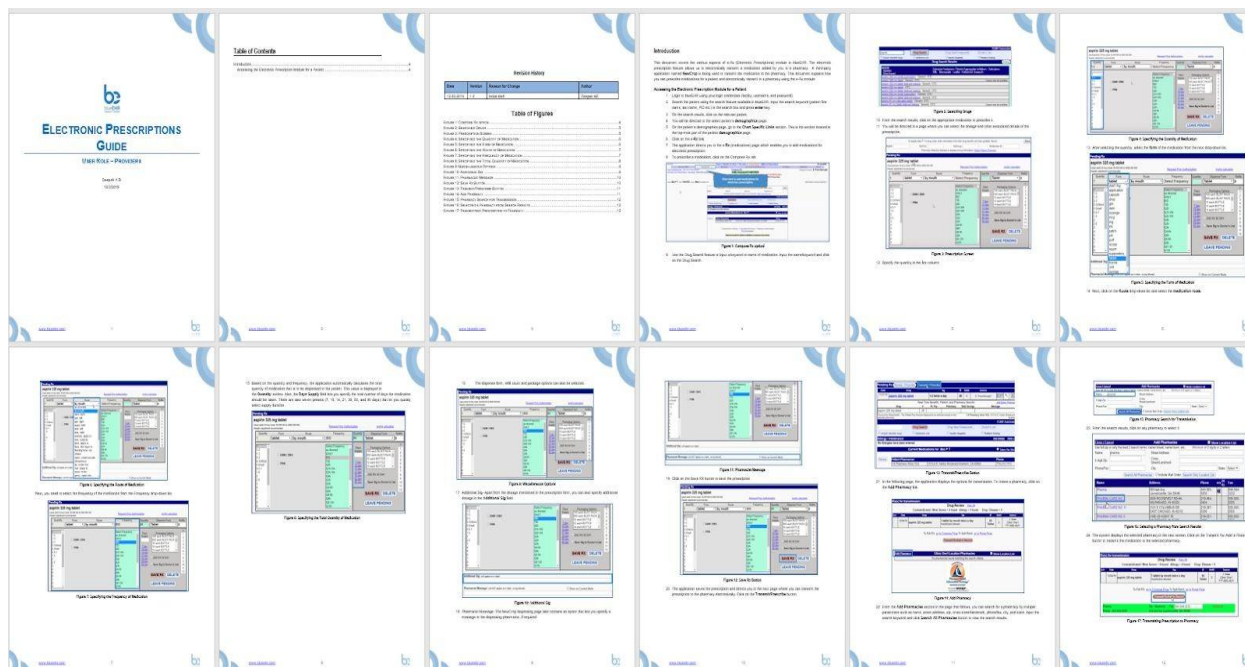
System Usability Scale

Instructions: For each of the following statements, mark one box that best describes your reactions to the website *today*.

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

Please provide any comments about this website:

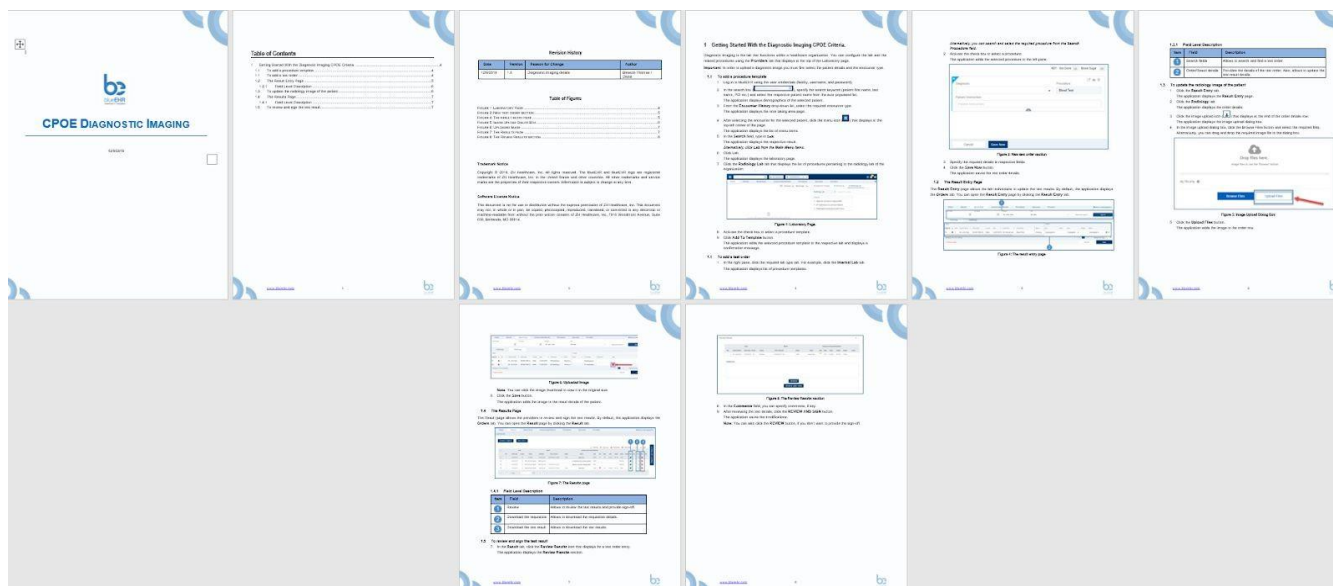
CPOE ELECTRONIC PRESCRIPTIONS WORKFLOW



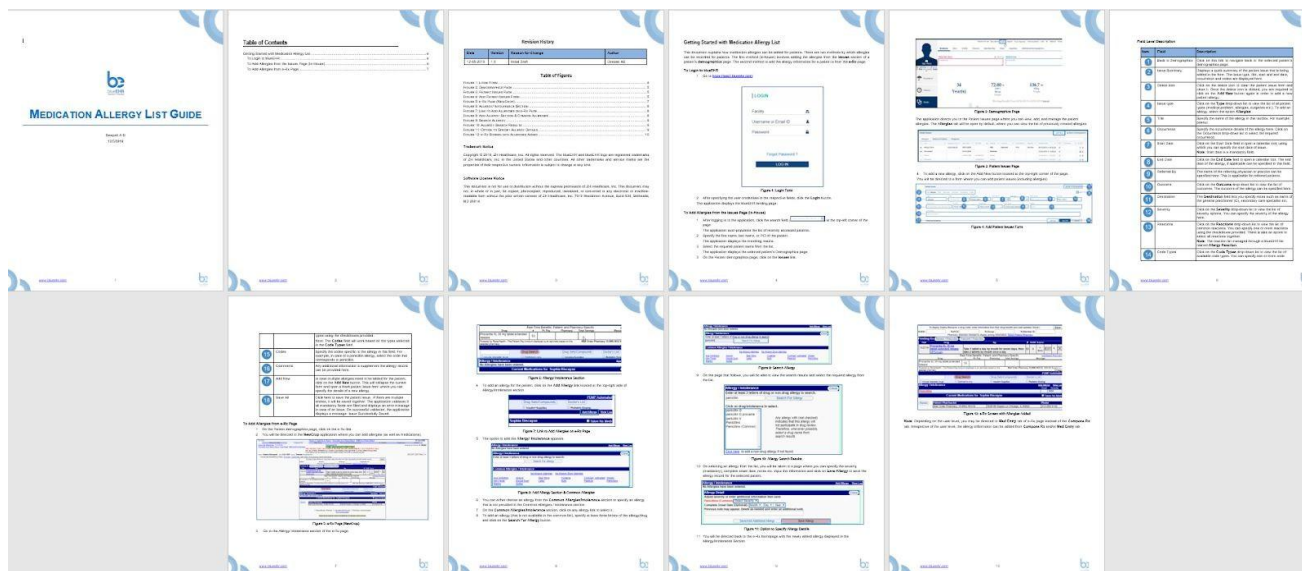
IMPLANTABLE DEVICE LIST WORKFLOW



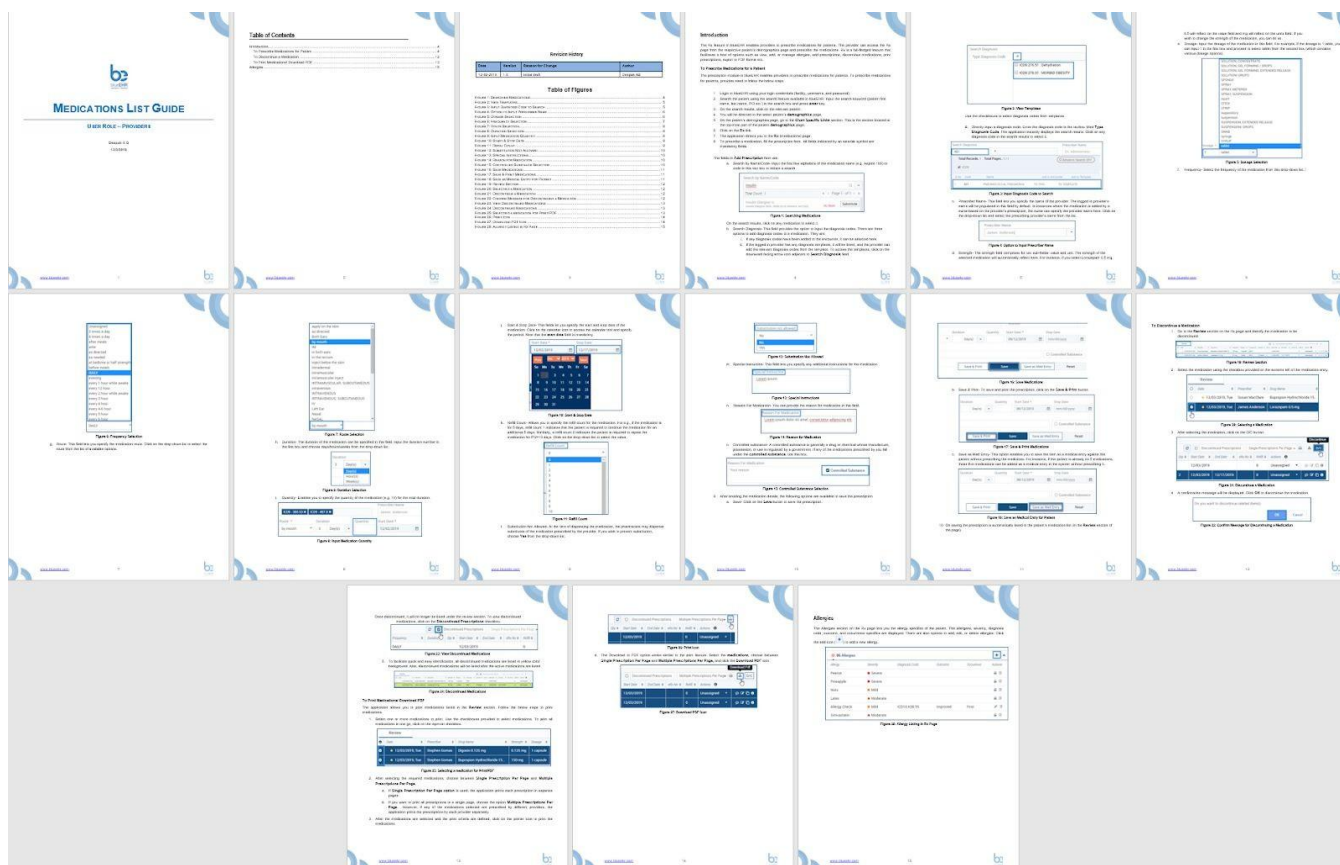
CPOE DIAGNOSTIC IMAGING WORKFLOW



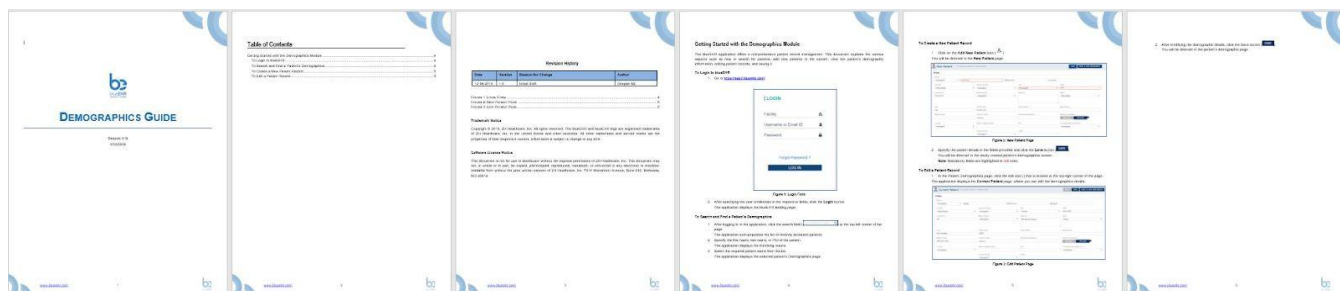
MEDICATION ALLERGY LIST GUIDE WORKFLOW



CPOE MEDICATION LIST GUIDE WORKFLOW



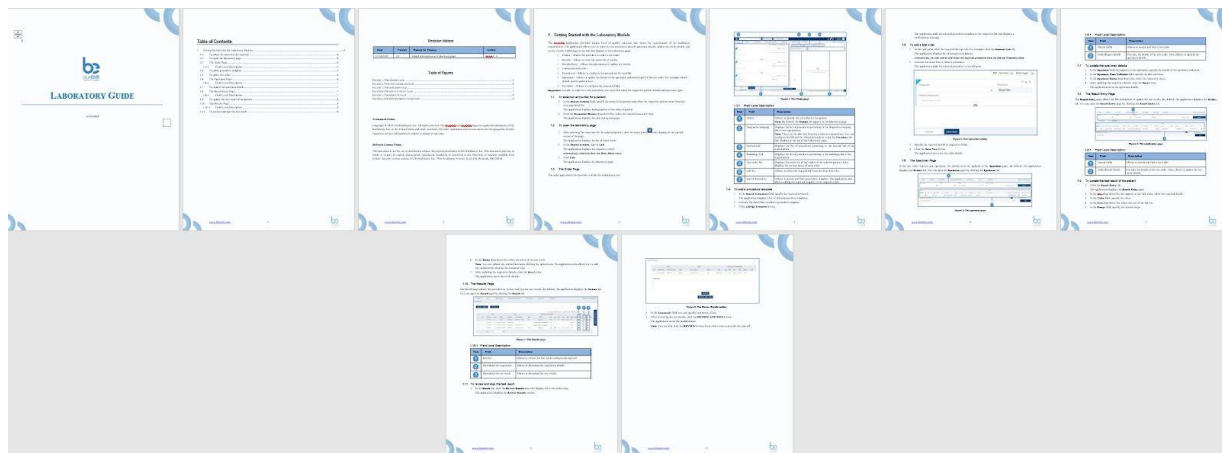
CPOE DEMOGRAPHICS WORKFLOW



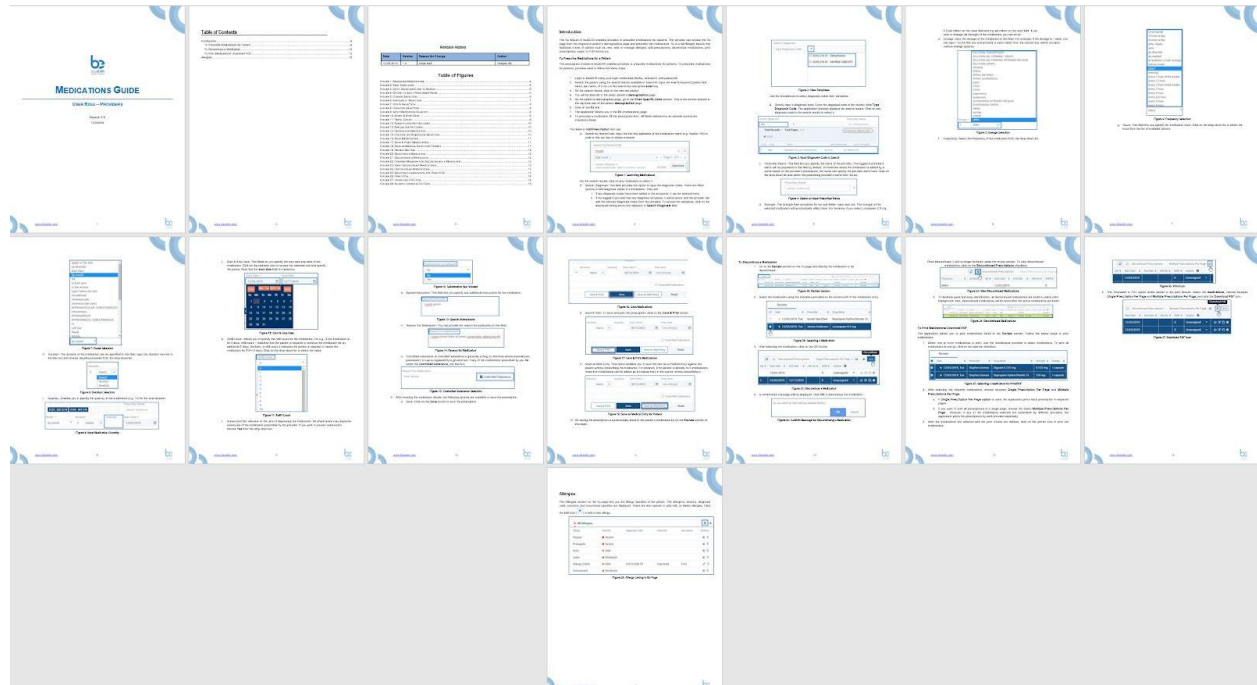
CPOE DRUG ALLERGY INTERACTION CHECKS WORKFLOW



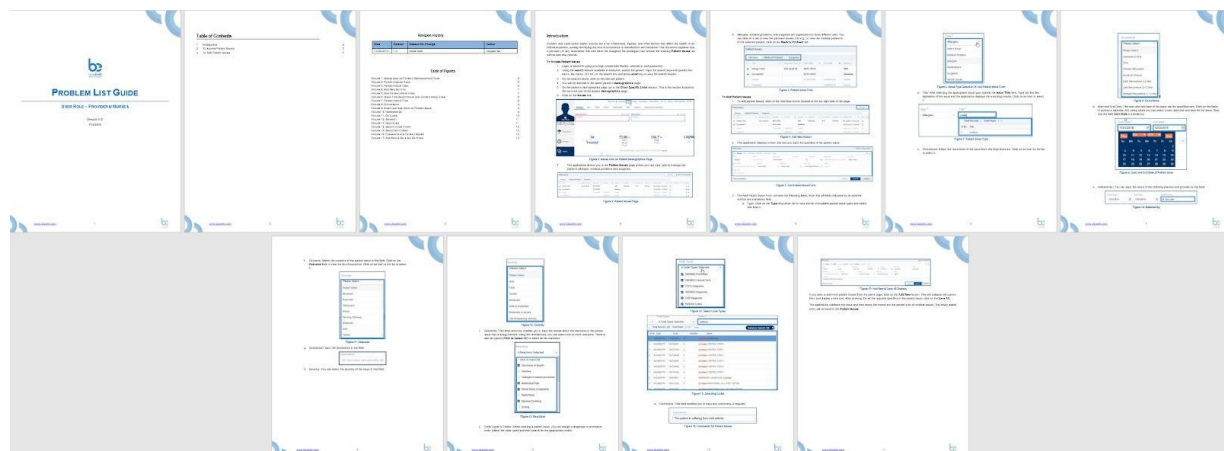
CPOE LABORATORY GUIDE WORKFLOW



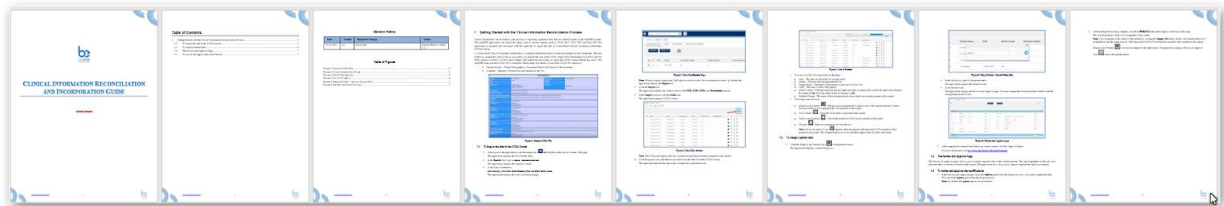
CPOE MEDICATIONS WORKFLOW



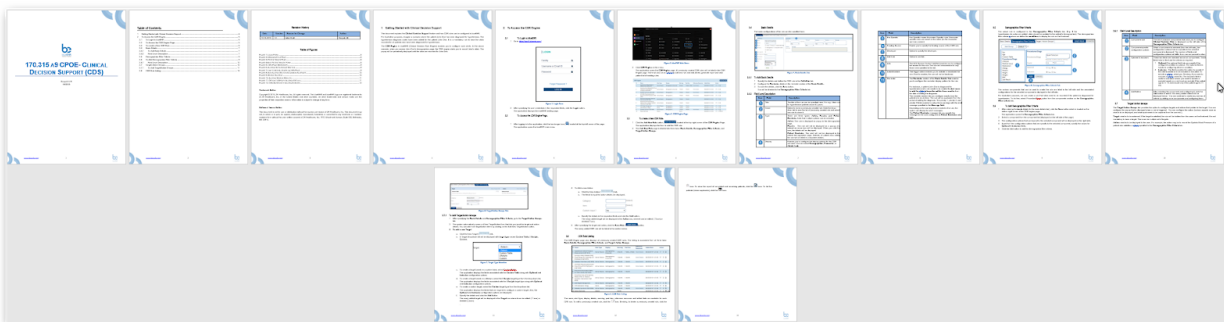
CPOE PROBLEM LIST WORKFLOW



CLINICAL INFORMATION RECONCILIATION AND INCORPORATION GUIDE



CPOE CLINICAL DECISION SUPPORT(CDS)



https://docs.google.com/document/d/18pC13eLH40wF_LbcCgpfFKB1d8u8cX8gI44bY1q/edit

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1. Tullis, T. & Albert, W. (2008). *Measuring the User Experience*. Burlington, MA: Morgan Kaufman (p. 149). Broadly interpreted, scores under 60 represent systems with poor usability; scores over 80 would be considered above average.
2. Tullis, T. & Albert, W. (2008). *Measuring the User Experience*. Burlington, MA: Morgan Kaufman. Also see www.measuringusability.com. Errors have to be operationally defined by the test team prior to testing.
3. Tedesco and Tullis (2006) for a comparison of post-task ratings for usability tests.
4. 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. 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.
5. Tullis, T. & Albert, W. (2008). *Measuring the User Experience*. Burlington, MA: Morgan Kaufman (p. 149).

Usability Test Report of 170.315(b)(11) Decision support interventions

Name and version of the product: blueEHR 3

The product evaluated during this usability assessment is blueEHR 3, a clinical electronic health record system that includes Clinical Decision Support (CDS) functionality designed to support provider workflows and intervention management.

UCD Method used:

The user-centered design (UCD) process applied to blueEHR 3 for 170.315(b)(11) was a custom process, the Cognitive Design Methodology. An industry or federal government UCD standard was not adopted in full; ISO 9241-11:2018 formed the basis of the custom process. NISTIR 7742 is referenced in this report only as the reporting template for the usability test results.

Name of the UCD process: Cognitive Design Methodology (custom process).

Industry standard that formed the basis of the custom process: ISO 9241-11:2018, Ergonomics of human-system interaction, Part 11: Usability: Definitions and concepts. International Organization for Standardization, 2018. <https://www.iso.org/standard/63500.html>

Short description of the process: The Cognitive Design Methodology is grounded in cognitive psychology principles and focuses on aligning the user interface with user's mental models, task flows, and clinical decision-making processes. Its objective is to reduce cognitive load, minimize use-related errors, and enhance efficiency and safety in healthcare environments where timely and accurate decisions are critical. It adopts the ISO 9241-11 definition of usability (effectiveness, efficiency, and satisfaction of specified users achieving specified goals in a specified context of use) as its evaluation framework.

Outline of the process:

1. Define the context of use: identify the intended users (physicians, nurses, medical assistants, referral managers, billing professionals, practice managers, and administrative staff), their goals, and the clinical decision support tasks they perform.
2. Analyze the tasks and user's mental models: map clinical decision-making workflows and identify points of high cognitive load and potential use-related error.
3. Design the user interface to fit the workflows: apply the findings to reduce cognitive load, clarify information presentation, and support safe decisions.
4. Evaluate with representative users: conduct usability testing against defined tasks and measure effectiveness (task success and errors), efficiency (time and path deviation), and satisfaction (post-task ratings and SUS).
5. Analyze results and iterate: review findings, including use-related errors and areas of difficulty, and feed them back into the design.

Reason an existing UCD standard was not used as-is: ISO 9241-11 defines usability and its measures but does not prescribe design activities. The process-oriented standards (for example ISO 9241-210, ISO 13407, ISO 16982, and ISO/IEC 62366) prescribe general or medical-device lifecycle activities that did not map directly to the blueEHR development workflow, which is organized around clinician cognitive workflows and the configuration and review of decision support interventions. Applying them in full would have required a separate parallel process and documentation lifecycle. The custom process therefore retains the ISO 9241-11 usability framework and applies it through activities specific to this product.

Date(s) and location of the test:

The usability testing was conducted between September 1 and September 15, 2026. All sessions were performed remotely using secure, HIPAA-compliant video conferencing platforms. A trained moderator was present during each session to provide standardized instructions, observe user interactions, and document performance metrics. The remote format enabled participation from geographically diverse

users while maintaining consistent testing conditions and documentation practices.

Test environment:

The usability testing for blueEHR 3 was conducted in a controlled remote environment with participants located across the United States and Costa Rica. Participants joined various professional settings including hospitals, outpatient clinics, administrative offices, and home workspaces. Each session was monitored in real time, and screen recordings were captured to enable detailed post-test analysis. These recordings supported the identification of navigation patterns, workflow deviations, and potential usability concerns. The remote testing approach ensures accessibility and flexibility while preserving consistency in task instructions, moderator oversight, and data collection procedures.

Description of the intended users:

The intended users of the blueEHR system include physicians, nurses, medical assistants, referral managers, billing professionals, practice managers, and other administrative healthcare staff. These users are responsible for reviewing and acting upon clinical decision support interventions, managing patient records, configuring rules within the CDS engine, and documenting intervention feedback. Users vary significantly in clinical background, professional experience, and familiarity with electronic health record systems. Therefore, the system is designed to accommodate both experienced clinicians and users with limited technical expertise, ensuring safe and effective use across diverse healthcare environments.

Total number of participants:

A total of eleven participants were involved in the usability testing of blueEHR 3. The participant group represented a range of roles commonly found in clinical and administrative healthcare settings. This sample size is consistent with formative usability testing best practices, which emphasize qualitative depth and performance measurement over large-scale statistical sampling.

Description of participants:

Demographics	Tester 1	Tester 2
Gender	Female	Female
Age Range	40 to 59	40 to 59
Race/ Ethnicity	Caucasian	Caucasian
Education	College	Postgraduate
Occupation/Role	Medical Billing Director	Supervisor
Professional Experience	180	240
Computer/ HIT Experience	180	240
Experience with similar software	180	120
Experience with certified product	180	120
Assistive Technologies used	N/A	N/A
Usability Testing Experience	None	None

Demographics	Tester 3	Tester 4
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Gender	Female	Female
Age Range	23 to 39	23 to 39
Race/ Ethnicity	Latina	Latina
Education	BSN	College degree
Occupation/Role	Clinical Nurse	Systems Analyst
Professional Experience	84	24
Computer/ HIT Experience	84	12
Experience with similar software	84	12
Experience with certified product	36	12
Assistive Technologies used	N/A	N/A
Usability Testing Experience	None	Yes

Demographics	Tester 5	Tester 6
Gender	Male	Female
Age Range	23 to 39	23 to 39
Race/ Ethnicity	Latino	Latino
Education	College graduate	College graduate
Occupation/Role	Systems Engineer	Medical Billing Account Manager
Professional Experience	36	24
Computer/ HIT Experience	36	36
Experience with similar software	36	36
Experience with certified product	36	24
Assistive Technologies used	N/A	N/A
Usability Testing Experience	None	None

Demographics	Tester 7	Tester 8
Gender	Male	Female
Age Range	23 to 39	23 to 39
Race/ Ethnicity	Latino	Latino
Education	College graduate	College graduate
Occupation/Role	IT Platform Manager	Customer Service

Professional Experience	24	12
Computer/ HIT Experience	12	12
Experience with similar software	12	12
Experience with certified product	12	12
Assistive Technologies used	N/A	N/A
Usability Testing Experience	None	None

Demographics	Tester 9	Tester 10
Gender	Female	Female
Age Range	40 to 49	23 to 39
Race/ Ethnicity	Black	Caucasian
Education	College	College Graduate
Occupation/Role	Medical Analyst	Licensed marital family therapist
Professional Experience	180	36
Computer/ HIT Experience	180	240
Experience with similar software	180	240
Experience with certified product	60	None
Assistive Technologies used	N/A	N/A
Usability Testing Experience	None	None

Demographics	Tester 11	
Gender	Male	
Age Range	40 to 49	
Race/ Ethnicity	Latino	
Education	College Graduate	
Occupation/Role	IT Platform Manager	
Professional Experience	36	
Computer/ HIT Experience	18	
Experience with similar software	18	
Experience with certified product	None	
Assistive Technologies used	N/A	

Usability Testing Experience	None	
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Description of the user tasks:

A set of tasks was created to reflect realistic and representative activities that a user might perform with this EHR, including:

- 170.315(b)(11) Decision support interventions
 - Create a new Evidence based Decision Support Intervention with applicable attributes.
 - Review the attributes and other relevant information associated with an evidence-based DSI.
 - Trigger a Decision Support Intervention (DSI) for an eligible patient and review the information presented by the DSI.
 - Submit feedback for a Decision Support Intervention.
 - Review previously submitted feedback for a Decision Support Intervention.
 - Create a new Predictive Decision Support Intervention with applicable source attributes.
 - Edit an existing Predictive DSI and modify its applicable source attributes.

Measurement metrics:

Consistent with the ISO 9241-11 definition of usability and the NISTIR 7742 reporting template, usability was evaluated across three primary dimensions: effectiveness, efficiency, and satisfaction. Effectiveness was measured by task success rate and error occurrence. Efficiency was measured through task completion time and path deviations compared to the optimal workflow. Satisfaction was measured using post-task ratings and the System Usability Scale (SUS). These metrics collectively provide a structured evaluation of performance and user perception within the defined context of use.

Test results:

All eleven participants successfully completed the assigned tasks, resulting in a task success rate of 100 percent and zero recorded failures. Mean total time to complete all seven tasks was 437 seconds with a standard deviation of 170 seconds. Task 1 showed 13 observed steps against an optimal 7, indicating minor additional navigation. All other tasks were completed on the optimal path. No critical errors were observed during testing. The mean task rating was 3.89, reflecting generally positive user perception.

Task	# of participants	Task Success	Path Deviation	Task Time		Errors	Task Ratings
		Mean (SD)	Deviations (Observed / Optimal)	Mean (SD)	Deviations (Observed / Optimal)	Mean (SD)	Mean (SD)
Create a new Evidence based Decision Support Intervention with applicable attributes	11	100%(0)	13 7	257 56	57 40	0% 0%	3.18 1.4
Review the attributes and other relevant information associated with an evidence-based DSI	11	100%(0)	4 4	35 7	10 5	0% 0%	3.73 1.01
Trigger a Decision Support Intervention (DSI) for an eligible patient and review the	11	100%(0)	5 5	35 9	6 6	0% 0%	3.82 1.72

information presented by the DSI							
Submit feedback for a Decision Support Intervention	11	100%(0)	4 4	34 9	9 5	0% 0%	3.55 1.37
Review previously submitted feedback for a Decision Support Intervention	11	100%(0)	4 4	24 5	4 4	0% 0%	3.73 1.56
Create a new Predictive Decision Support Intervention with applicable source attributes	11	100%(0)	8 8	36 8	6 6	0% 0%	3.55 1.57
Edit an existing Predictive DSI and modify its applicable source attributes	11	100%(0)	8 8	29 6	9 4	0% 0%	3.18 1.25

Results and Data Analysis Narrative:

The usability testing results indicate that the system performed effectively overall. All participants were able to complete the assigned tasks independently, demonstrating good usability and learnability of the CDS configuration workflow. Completion times remained relatively consistent among participants, reflecting a reliable and efficient process. Some users took additional navigation, highlighting areas where the workflow could be streamlined. Overall feedback was positive, with most participants describing the system as intuitive and easy to use. A few users experienced brief confusion during rule configuration, suggesting that certain interface elements could be made clearer. Overall, the findings confirm that the core workflow is functional and effective, with opportunities for further usability improvements.

Major Findings:

Task 1 – Create Evidence-Based DSI: Participants found the initial configuration screen information-heavy. Grouping fields or using collapsible sections could improve readability. The frequency field was also unclear to some users, causing minor delays and additional navigation.

Tasks 2–3 – Review and Trigger Evidence-Based DSI: Participants were able to review DSI attributes and trigger the intervention for an eligible patient without significant difficulty. The information presented by the DSI was generally clear and easy to understand.

Tasks 4–5 – Submit and Review DSI Feedback: Participants easily located the in-context feedback option and completed the feedback process. Specific feedback categories, including Clinical Relevance, Evidence Currency, and Functional Appropriateness, helped reduce ambiguity.

Task 6 – Create Predictive DSI: Participants were able to create a Predictive DSI and provide the required source attributes. The workflow was generally understandable, with no significant usability barriers reported.

Task 7 – Edit Predictive DSI: All participants completed the task on the optimal path with no deviations. Participants were able to locate and modify the source attributes of an existing Predictive DSI without difficulty.

Overall: All participants completed the tasks successfully. The main opportunities for improvement are reducing information density, clarifying specific fields, and making certain configuration options easier to

discover.

Effectiveness:

Effectiveness was assessed using task completion, accuracy, and error rates. All participants completed the assigned tasks within the given time, with no failures or critical errors reported. The 100% completion rate demonstrates that the system effectively supports CDS configuration, intervention review, and feedback activities.

Efficiency:

Efficiency was evaluated based on task completion time and navigation patterns. Participants completed the tasks within a consistent time range, with minor navigation deviations observed in some sessions. These were mainly related to information-heavy screens and uncertainty around certain configuration fields. Overall, the workflow remained efficient and performed consistently across participants.

Satisfaction:

User satisfaction was assessed through post-task ratings and the System Usability Scale questionnaire. Overall, participants found the system easy to use and suitable for their needs. Overall ratings ranged from 3.4 to 4.3, with higher ratings linked to clear navigation and intuitive interactions. Lower ratings were mainly related to workflow complexity. Overall, participants were comfortable using the system and showed confidence in its functionality.

Areas for Improvement:

User Interface and Navigation: Improve the CDS configuration interface by reducing information density, grouping related fields, and clarifying inputs such as frequency. Additional guidance and direct navigation links can also improve discoverability and reduce unnecessary navigation.

How Effectiveness and Efficiency were evaluated

Measures	Rational and Scoring
Effectiveness: Task Success	A task was counted as a “Success” if the participant was able to achieve the correct outcome, without assistance, within the time allotted on a per task basis. The total number of successes were calculated for each task and then divided by the total number of times the task was attempted. The results were provided as a percentage.
Effectiveness: Task Failures	A task was classified as a 'Failure' if a participant abandoned the task, provided an incorrect response, or did not arrive at the correct outcome. The total number of errors was calculated divided by the total number of task attempts to determine the error rate. It is important to note that not all deviations from the optimal path were considered errors. The mean number of failed tasks per participant was also reported to provide a participant-level error metric. Additionally, a qualitative analysis was conducted to identify and categorize the types of errors observed during testing.

Efficiency: Task Deviations	The deviation in task performance time was calculated by measuring the additional time each participant took beyond the expected optimal time defined for the task. This difference represents the individual time variance for each participant. The percentage deviation was derived by expressing the standard deviation as a proportion of the average task time, providing a clear indicator of the variability in performance relative to the mean
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	Participants’ subjective impressions regarding the application's ease of use were assessed using the System Usability Scale (SUS) questionnaire, administered following task completion. The complete SUS questionnaire can be found in the Appendix.

Measures of effectiveness, efficiency, and satisfaction for each participant:

Participants	# of tasks successfully completed	Time to complete the tasks	Number & types of errors	Path deviations	Participant’s verbalizations	Participant’s satisfaction
#1	7	9min	None	7	Easy and straightforward	3.9
#2	7	5min	None	6	Some tasks were difficult	3.7
#3	7	4min	None	4	Clear and easy	4.1
#4	7	6min	None	4	Easy to navigate	3.9
#5	7	9min	None	3	Generally easy to use	4.1
#6	7	7min	None	6	Easy to navigate	3.9
#7	7	9min	None	10	Some workflows were confusing	3.4
#8	7	6min	None	8	Some tasks took longer	3.5
#9	7	5min	None	5	Good overall experience	4.1
#10	7	5min	None	4	Easy and intuitive	4.3
#11	7	5min	None	5	Tasks were straightforward	3.9

Appendices:

Appendix 5: DEMOGRAPHICS QUESTIONNAIRE

Sample Demographics Questionnaire

Demographics questionnaire for participants

- 1 What is your gender?
- 2 Have you participated in a focus group or usability test in the past 6 months?
- 3 Do you, or does anyone in your home, work in marketing research, usability research, web design [...etc.]?
- 4 Do you, or does anyone in your home, have a commercial or research interest in an electronic health record software or consulting company?
- 5 Which of the following best describes your age? [23 to 39; 40 to 59; 60 to 74; 75 and older]
- 6 Which of the following best describes your race or ethnic group? (e.g., Caucasian, Asian, Black/African-American, Latino/a or Hispanic)
- 7 Do you require any assistive technologies to use a computer? (If so, please describe)
- 8 What is your current position and title?
- 9 How long have you held this position?
- 10 Describe your work location (or affiliation) and environment?
- 11 Which of the following describes your highest level of education? (e.g., high school graduate/GED, some college, college graduate (RN, BSN), postgraduate (MD/PhD), other)
- 12 Besides reading email, what professional activities do you do on the computer? (e.g., access EHR, research; reading news; shopping/banking; digital pictures; programming/word processing)
- 13 About how many hours per week do you spend on the computer?
- 14 What computer platform do you usually use? (e.g., Mac, Windows, etc.)
- 15 What Internet browser(s) do you usually use? (e.g., Firefox, Chrome, etc.)
- 16 In the last month, how often have you used an electronic health record?
- 17 How many years have you used an electronic health record?
- 18 How many EHRs do you use or are you familiar with?
- 19 How does your work environment manage patient records?

Appendix 6: SYSTEM USABILITY SCALE QUESTIONNAIRE

Sample Usability Scale Questionnaire

System usability scale questionnaire

Tester #

Participant ID:

Site:

Date:

System Usability Scale

Instructions: For each of the following statements, mark one box that best describes your reactions to the website today.

#	Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	I think that I would like to use this website frequently.	☐	☐	☐	☐	☐
2	I found this website unnecessarily complex.	☐	☐	☐	☐	☐
3	I thought this website was easy to use.	☐	☐	☐	☐	☐
4	I think that I would need assistance to be able to use this website.	☐	☐	☐	☐	☐
5	I found the various functions <u>in</u> this website were well integrated.	☐	☐	☐	☐	☐
6	I thought there was too much inconsistency in this website.	☐	☐	☐	☐	☐
7	I would imagine that most people would learn to use this website very quickly.	☐	☐	☐	☐	☐
8	I found this website very cumbersome/awkward to use.	☐	☐	☐	☐	☐
9	I felt very confident using this website.	☐	☐	☐	☐	☐

Appendix 7: Usability tasks

Task 1 - Create a new Evidence based Decision Support Intervention with applicable attributes

Scenario: You are a clinical user responsible for configuring decision support for your practice. Your organization wants a new evidence-based Decision Support Intervention (DSI) that alerts clinicians when a patient meets specified demographic criteria. Create a new rule in the CDR Engine, enter its basic details and evidence-based attributes, define the demographic filter criteria and the target/action, and save the rule.

1. In the application, click the left menu. The application displays the main menu.
2. Click CDR Engine. The application displays the CDR Engine page.
3. In the CDR Engine page, click Add New Rule. The application displays the Basic Details page.
4. Enter the details in the Basic Details page.
5. Click the Demographics Filter Criteria tab. The Demographics Filter Criteria page appears. Enter the details and click SAVE RULE.
6. Click the Target section, enter the required details. Click Save.
7. Click on Save Rule on the top right of the screen.

Task 2 - Review the attributes and other relevant information associated with an evidence-based DSI

Scenario: Before relying on an existing evidence-based DSI, you want to confirm how it is configured. Open the CDR Engine, select one of the listed rules, and review all of the attributes and other relevant information associated with the DSI.

1. In the application, click the left menu. The application displays the main menu.
2. Click CDR Engine. The application displays the CDR Engine page.
3. Click on any of the rule listed in the CDR Engine.
4. View all the attributes that are added for the rule.

Task 3 - Trigger a Decision Support Intervention (DSI) for an eligible patient and review the information presented by the DSI

Scenario: A patient who meets the criteria of a configured DSI is being seen. Open the patient's facesheet, locate the intervention alert, open it, and review the information presented by the DSI. Record the date/time and completion status and save.

1. Open the facesheet page of the required patient. The application displays the intervention alerts above the quick links.
2. On the patient facesheet page, click the alert. The list of active intervention alerts appears.
3. Click the required intervention alert. The details of the intervention appear below.
4. In the Date/Time field, select a date using the date picker.
5. From the Completed dropdown list, select the completion status and click on Save.

Task 4 - Submit feedback for a Decision Support Intervention

Scenario: After reviewing a DSI, you want to give feedback on it. Open the CDR Engine, open the Intervention Feedback for the intervention, and add feedback, including the action taken and location, then save.

1. Open the CDR Engine page.
2. Click the Intervention Feedback icon for the required intervention. The Intervention feedback slide-in page appears.
3. In the Intervention Feedback page, click Add Feedback. The application displays the Feedback, Action Taken, and Location fields.
4. Enter the details in the fields provided. Click Save.

Task 5 - Review previously submitted feedback for a Decision Support Intervention

Scenario: You want to see what feedback has been recorded for a DSI. Open the CDR Engine, open the Intervention Feedback for the intervention, and review the previously submitted feedback listed for

the rule. Edit if required and save.

1. Open the CDR Engine page.
2. Click the Intervention Feedback icon for the required intervention. The Intervention feedback slide-in page appears.
3. All the feedbacks for the corresponding rule will be listed.
4. Edit any of the rules if required and save.

Task 6 - Create a new Predictive Decision Support Intervention with applicable source attributes

Scenario: Your organization wants a new Predictive DSI driven by a predictive model. Create a new rule in the CDR Engine, enter its basic details and the predictive source attributes, define the demographic filter criteria and the target/action, and save the rule.

1. In the application, click the left menu. The application displays the main menu.
2. Click CDR Engine. The application displays the CDR Engine page.
3. In the CDR Engine page, click Add New Rule. The application displays the Basic Details page.
4. Enter the details in the Basic Details page.
5. In the PDSI Source Attributes section, enter the required details. Click Save.
6. Click the Demographics Filter Criteria tab. The Demographics Filter Criteria page appears. Enter the details and click SAVE RULE.
7. Click the Target section, enter the required details. Click Save.
8. Click on Save Rule on the top right of the screen.

Task 7 - Edit an existing Predictive DSI and modify its applicable source attributes

Scenario: The source information for an existing Predictive DSI has changed. Open the CDR Engine, edit the existing Predictive DSI, modify its basic details and predictive source attributes as needed, update the filter criteria and target if required, and save the rule.

1. In the application, click the left menu. The application displays the main menu.
2. Click CDR Engine. The application displays the CDR Engine page.
3. In the CDR Engine page, click edit icon in any of the interventions. The application displays the Basic Details page.
4. Modify the details in the Basic Details page if required.
5. Modify the details in the PDSI Source Attributes section if required. Click Save.
6. Click the Demographics Filter Criteria tab. The Demographics Filter Criteria page appears. Modify the details if required and click SAVE RULE.
7. Click the Target section, modify the required details. Click Save.
5. Click on Save Rule on the top right of the screen.

Conclusion:

The usability evaluation of the 170.315(b)(11) DSI functionality in blueEHR 3 showed positive results. All 11 participants successfully completed all seven tested tasks without failures or critical errors, achieving a 100% success rate. Participants generally found the system easy to use and completed tasks independently. Minor improvements were identified in the CDR Engine data entry screen, but these did not affect task completion. Overall, the DSI workflow was effective, efficient, and user-friendly.