



WRS Health Web EHR and Practice Management System - Version 6.0/MU 2015

User Centered Design Overview & Summative Usability Test Report

§170.315(g)(3) Safety Enhanced Design

Report based on – NIST 7742

Common Industry Format for Usability Test Reports

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Part I: User Centered Design (UCD) Overview

Part I: User Centered Design Plan Overview

Overview

WRS Health is extremely fortunate to have a knowledgeable and diverse provider community. As such, we consider the “user perspective” an extremely valuable resource and leverage it in all phases of our software development process. Providers are continually and systematically engaged in our operational processes, forming the nucleus of our user centered design process. This process helps to ensure that WRS Health can meet the highest standards in EHR safety, efficiency and usability. The product is intended for medical practice healthcare providers and supporting staff in an ambulatory setting (medical office, clinic, therapy center, ambulatory surgical center, urgent care and others).

Plan Selection

WRS Health continues to use a “homegrown” User Centered Design Plan (UCD). Our UCD plan is a blend of industry standards and internally-developed processes that we have continually updated, evaluated and refined during our 18+ years of EMR software development.

At the heart of our UCD Plan is a highly-engaged and proactive provider user community. The use of our familiar, established UCD Plan assists in maintaining consistency across our internal teams and our provider user community. Our provider user community is actively involved in all pf our software planning, implementation, support and development efforts, so we make every effort to keep UCD processes familiar and intuitive. This helps us promote user engagement and participation on all levels.

Description

Per the ONC Meaningful Use Stage requirements, user centered design procedures and processes have been specifically applied during the design and development of all EHR technology specified in the ONC MU 2015 Certification Criteria **§170.315(g)(3) Safety-Enhanced Design** as follows:

- § 170.315 (a)(1) Computerized Provider Order Entry (CPOE) – medications
- § 170.315 (a)(2) CPOE – laboratory
- § 170.315 (a)(3) CPOE – diagnostic imaging
- § 170.315 (a)(4) Drug-drug, Drug-allergy Interaction Checks for CPOE
- § 170.315 (a)(5) Demographics
- § 170.315 (a)(6) Problem List
- § 170.315(a)(7) Medication List
- §170.315(a)(8) Medication allergy list
- § 170.315 (a)(9) Clinical Decision Support
- § 170.315 (a) (14) Implantable Device List
- § 170.315 (b)(2) Clinical Information Reconciliation and Incorporation
- § 170.315 (b)(3) Electronic Prescribing

Underlying Principles

Our UCD process is based on recognized software industry practices to promote usability. The table below outlines accepted UCD principles, as outlined in NIST-7741, and the corresponding WRS Health activities performed to support these principles:

UCD Principles (NIS)	WRS Health – Actions & Activities
<p>Understand user needs, workflows and work environments</p>	<p>WRS has an experienced team of Subject Matter Experts (SMEs). This team is trained and certified in their respective clinical domains. All team members are real world professionals with substantial amounts of field experience in clinical environments similar those of our end users.</p> <p>WRS Executive Management is comprised of experienced medical professionals and software design experts. The team is actively engaged in medical practice operations and software design for this environment.</p>
<p>Engage users early and often</p>	<p>WRS User Community actively offer suggestions, needs and feedback and clients are engaged in reoccurring and meaningful dialogue during the development process.</p> <p>Meaningful interactions occur through user groups, company visits, onsite training visits, electronic ticketing, webinars, and performance analysis/milestone meetings within our Account Management Program.</p>
<p>Set user performance objectives</p>	<p>WRS documents performance objectives are part of the User Requirement and Functional Specification stages (below). The success of each objective is measured and benchmarked with desired and definable outcomes.</p> <p>User responses are collected and processed as actionable items during the development and refinement stages. The Implementation Queue is used to track progress and usage of functionality.</p>
<p>Design the user interface from known human behavior principles and familiar user interface models</p>	<p>WRS employs experienced web UX designers who work directly with clients, subject matter experts and developers throughout all stages of product development.</p> <p>The primary goal of the WRS Development Team is to facilitate usability, safety and efficiency throughout the design, development and refinement phases of product development, release and post-release support.</p>
<p>Conduct usability tests to measure how well the interface meets user needs</p>	<p>WRS performs standardized EHRUT with participants that are representative of the application’s overall user population. Measure all items for safety, efficiency, and usability.</p>

<p>Adapt design plans frequently and iteratively test with users until performance objectives are met</p>	<p>WRS performs field and usability testing during the design, development and roll out of products during and after release. Results and feedback are collected from users and supplied back to the internal work team after each stage, promoting additional rounds of design and development.</p> <p>This process continues until the all results and feedback are addressed. Functionality is considered “final” after being unilaterally accepted by developers, designers, SMEs and end users.</p>
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Process Design

A user centered approach to in the selection of people, process, and tools is the basis of all development efforts. Our process of listening to users in meaningful dialogue and using the information gathered in the creation of functionality is a highly iterative process as follows:

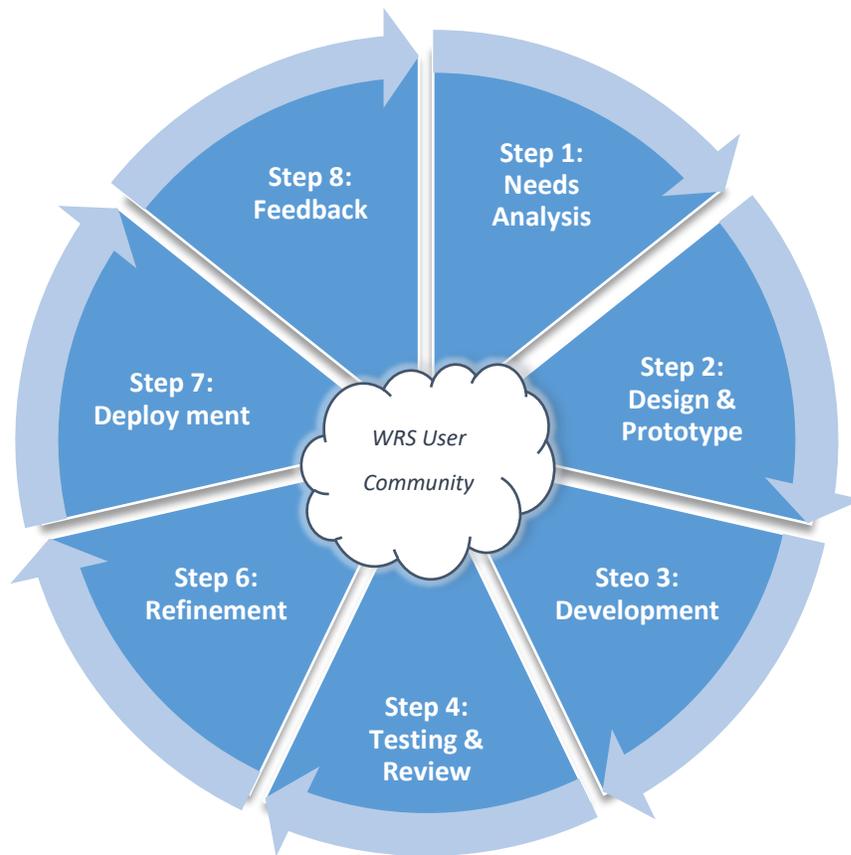
Requirements & Analysis

- *Requirements Gathering* – Research on user needs is collected over time using interviews, user groups, practice visits, practice analysis sessions, support ticketing, and other client touch points.
- *User Requirements* – Subject Matter Experts (SME) review user data gathered and turn these into a written requirement. This data includes definition of performance objectives and measurements. This phase defines explicitly what the user needs and how it will be integrated into their workflow.

Design & Prototype

Through a combination of user data and established design/development principles, the team (designers, developers and SMEs) works collaboratively to create a functional specification and design prototype. These artifacts form a model for the intended functionality:

- *Functional Specification* – a written document that includes a functional development proposal, required workflow, context of current application and design considerations. This document serves as the primary development and test plan, giving developers and



designers a comprehensive overview before design and coding begins.

- *Visual Prototype* – a series of visual images is prepared as a representation of proposed UI design (series of screen illustrations). These are interpreted from details of User Requirements and Functional Specification. This stage puts face and form on the proposed functionality.
- *SME & User Review* – SMEs review functional specification and prototype, and represent the users, giving feedback and guidance to the development team.
- *Refinement* – results of review are documented. Changes to specifications and prototypes are made based on SME feedback.

Development

Once the functional specification and visual prototypes are finalized, the development process begins within the following process:

- Functional Specification Review with programmer and team lead
- Software is coded and reviewed in a series of development environments
 - Programming follows all internal guidelines and accepted conventions
 - Code is documented, versioned and stored
 - Code is de-bugged and optimized
 - Unit testing is performed by the programmer

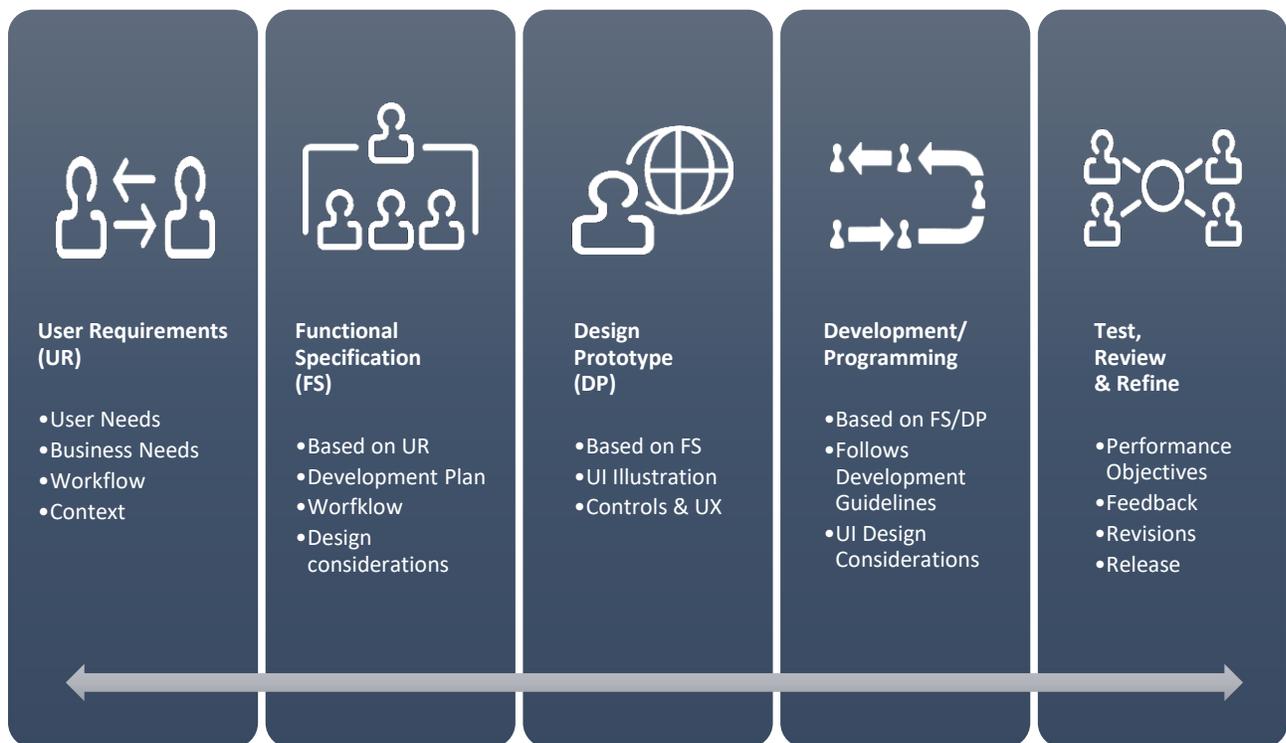
Testing & Review

Review and testing occurs throughout development and release processes. Design prototypes and specifications are reviewed by expert users and feedback is solicited.

- Expert/SME Testing

- Users – preview and release
- Functional testing (SME, QA, field testing)
- Automated Testing
- Usability Testing – efficiency, effectiveness

User Centered Design - Deliverables



Refinement

UCD is an iterative process that serves to continually improve our application. For each iteration of development, SMEs and users review and supply feedback to identify critical points and potential

issues. Feedback is reviewed and addressed by the development team and implemented in a subsequent release. This is a dynamic process.

Deployment

Functionality becomes a release candidate and moves from development to staging to testing. Once accepted by all stakeholders, the release is moved to the live environment. Client feedback is monitored in the form of support interactions, electronic tickets, training Q&A, and usage as follows:

- Release – Written and video release notes are distributed to all active clients. These include step-by-step instructions and context for new functionality.
- Training – New and upgraded functionality is part of self-guided and live training courses.
- Support – Responses to client tickets contain details on new/upgraded functionality.

Feedback

Constant sources of new ideas and ongoing feedback from end users is collected and reviewed on a regular and constant basis. These methods include:

- User Group Meetings & User Visits to WRS
- Support Encounters – Telephone and Electronic Ticketing
- Practice Performance Analysis
- Webinars – open discussion
- Login Screen Announcements, Newsletters and Surveys
- Account Management Interviews & Interactions

Part II: Summative Usability Testing Report



WRS Health Web EHR and Practice Management System -

Version 6.0/MU 2015

Summative Usability Test Report

§170.315(g)(3) Safety Enhanced Design

Executive Summary

WRS Health is a Practice Management and Electronic Medical Record System used in ambulatory medical practice settings throughout the United States and Puerto Rico. Our provider community includes healthcare providers of many types, including: MD, DO, PA, NP and other healthcare professionals. WRS Health serves many specialties, including: Internal Medicine, Family Practice, Ob-Gyn, Pediatrics, ENT, Cardiology, Neurology, Mental Health, etc.

Usability Testing (EHRUT) is a core component of the user centered design process. As such, WRS Health conducted a series of summative usability tests of WRS Health Web Based EHR – Version 6.0. Testing focused on the ONC §170.315(g)(3) Safety-enhanced design criteria. In each of the tests, users were asked to perform a series of representative tasks. Performance results were measured for effectiveness, efficiency and satisfaction with each of the criteria based on predetermined data scoring procedures.

Usability testing was conducted from September 30, 2018 to November 1, 2018. Participants were a representative sample of the WRS Health Provider Community (MD, DO, NP). All were current users of WRS Health EHR software. Participants had a broad mixture of demographic characteristics and they varied in previous amounts of educational, clinical and EMR experience. Testing was conducted remotely at participant and test staff locations, respectively. After the study, participants were given a \$100 Amazon Gift Card as compensation for their time.

The Test Administrator carefully screened participants prior to selection for the testing program. Great care was taken to assemble a group of participants who were representative of the application's current user base. All 10 participants were certified healthcare providers (doctors, nurse practitioners, physician's assistant) with varying amount of clinical experience (84 mos. To

516 mos.), computer experience (120 mos. to 300 mos.) and WRS Health product usage (12 mos. to 108 mos.).

During the testing process, participants used the EHRUT (WRS Health EHR Version 6.0) to conduct simulated, representative tasks. The test time was limited to one hour in duration and all sessions were conducted remotely (online) with the use of GoTo Meeting Software. Testing focused on the collection of performance data within a series of 12 tasks. Tasks were designed to be directly representative of tasks that would typically be part of the clinical workflow that is covered under ONC MU 2015 Safety Enhanced Design Criteria. This includes:

1. § 170.315 (a)(1) Computerized Provider Order Entry (CPOE) – medications
2. § 170.315 (a)(2) CPOE – laboratory
3. § 170.315 (a)(3) CPOE – diagnostic imaging
4. § 170.315 (a)(4) Drug-drug, Drug-allergy Interaction Checks for CPOE
5. § 170.315 (a)(5) Demographics
6. § 170.315 (a)(6) Problem List
7. § 170.315(a)(7) Medication List
8. §170.315(a)(8) Medication allergy list
9. § 170.315 (a)(9) Clinical Decision Support
10. § 170.315 (a) (14) Implantable Device List
11. § 170.315 (b)(2) Clinical Information Reconciliation and Incorporation
12. § 170.315 (b)(3) Electronic Prescribing

Where applicable, participants used a group of pre-made sample “patients” to facilitate testing workflow. These sample “patients” contained only basic demographic information and none of the information was duplicative of test tasks covered in the *§170.315(a)(5) Demographics* Test and related tasks.

At the beginning of each test session the test administrator explained the test criteria and instructed participants to complete a series of tasks with use of the EHRUT.

During the testing session, which lasted approximately 60 minutes per session, participants were greeted by the test administrator and their individual agreement for informed consent/release was confirmed. Participants were advised that they could withdraw from testing at any time.

During each test session the administrator carefully logged the test start and end times (observed times), all path deviations, completion status and satisfaction ratings for each participant in each test. The administrator offered no assistance on the completion of tasks and/or no feedback on individual performance in any of 12 tests for any of the 10 participants.

The following types of data were collected for each participant:

- Time of test duration (in seconds)
- Path deviations (alternates navigation) used, if any
- Participant's verbalizations during each test, if any
- Participant's satisfaction ratings for each of the tested functions/criteria

All participant data was de-identified allowing individual test scores to be anonymous. At the completion of the testing participants were compensated with \$100 Amazon Gift Card for their time.

Summary of Summative Usability Test Results - Tests 1 through 12.

Measure / Task Description	N (users)	Task Success Mean % (SD)	Task Path Deviation Observed (Optimal)	Task Time Mean seconds (SD)	Task Time Deviations Observed/ Optimal	Task Errors Mean % (SD)	Task Ratings (5=easy) Mean/SD
§ 170.315 (a)(1) Computerized Provider Order Entry (CPOE) – medications	10	90% (31.62%)	23 (22)	134 (28)	148 (114)	10% (31.62%)	4.6 (1.03)
§ 170.315 (a)(2) CPOE – laboratory	10	100% (31.33%)	18 (15)	126 (40)	126 (96)	0% (0%)	4.6 (1.03)
§ 170.315 (a)(3) CPOE – diagnostic imaging	10	100% (31.30%)	16 (15)	130 (41)	130 (103)	0% (0%)	4.6 (1.03)
§ 170.315 (a)(4) Drug-drug, Drug-allergy Interaction Checks for CPOE	10	90% (43.87%)	28 (24)	142 (17)	140 (107)	10% (43.87%)	4.9 (0.63)
§ 170.315 (a)(5) Demographics	10	90% (41.97%)	23 (17)	102 (41)	102 (89)	10% (41.97%)	3.7 (1.90)
§ 170.315 (a)(6) Problem List	10	100% (31.33%)	16 (16)	193 (58)	192 (123)	0% (0%)	4.7 (0.97)
§ 170.315(a)(7) Medication List	10	90% (41.95%)	21 (20)	141 (22)	141 (112)	10% (41.95%)	4.9 (0.63)
§170.315(a)(8) Medication allergy list	10	90% (41.97%)	16 (10)	142 (27)	142 (100)	10% (41.97%)	5.0 (0.00)
§ 170.315 (a)(9) Clinical Decision Support	10	80% (48.96%)	12 (8)	144 (62)	144 (83)	20% (48.96%)	4.1 (1.14)
§ 170.315 (a) (14) Implantable Device List	10	100% (33.06%)	21 (12)	75 (28)	75 (59)	0% (0%)	3.7 (2.50)
§ 170.315 (b)(2) Clinical Information Reconciliation and Incorporation	10	90% (41.95%)	20 (20)	326 (73)	326 (278)	10% (41.95%)	3.8 (1.58)
§ 170.315 (b)(3) Electronic Prescribing	10	90% (41.97%)	20 (20)	149 (24)	149 (112)	10% (41.97%)	4.8 (0.42)

Discussion of Findings

WRS Health found that four tests resulted in nearly-perfect participant performance. All others were above average. Satisfaction ratings on all tests demonstrated that new functionality was welcomed by participants and it performed as intended. The test results did not yield any evidence of potential patient safety issues.

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

- **Maintains Workflow Integrity** – workflows for updated functionality was based on existing processes. Maintaining that consistency easily allowed users to integrate new functions into their existing “familiar” workflow.
- **Options for Navigation** – path deviations occurred, but participants were still able to complete tasks, even with an alternate path was chosen (right click, mouse over, menu selection). The EMR has been designed to allow users a choice of navigation options and testing showed evidence that these alternatives increased user’s ability to complete the tasks.
- **Enhanced UI Redesign** – Optimizations in User Experience and Interface were met with favorable reviews from participants.
- **Positive User Observations** – Overall items were met with satisfaction from users. Participants offered positive comments during testing. “This is a great”. And “Very useful” were typical comments during the test sessions.

Types of errors made during testing overall:

- **Slight Path Deviations** – None of the tests conducted showed significant path deviations when performing the required actions. We believe that since all tested functionality was designed to conform to our established navigation methods the users were already familiar with those options and they were able to navigate with relative ease.
- **Excessive Task Time** – Users averaged approximately 20% above optimal (expert) task time. Since many of the test areas were recently updated for MU 2015 and it concluded that users would benefit from additional experience with newer functions.
- **Re-Training & Outreach** – Additional training and client outreach are needed on functions. This will be done by the additional of new live webinar courses, self-guided videos and a newly designed e-learning virtual classroom.

Introduction

The EHRUT tested for this study was WRS Health Web Based EHR – Version 6.0, a cloud-based, integrated software program designed to facilitate workflow in an ambulatory, medical practice setting. The program includes customized clinical content and services 32 major specialties. Clinical functionality includes charting, e-prescribing, order entry and tracking, and clinical decision support. The usability testing employed scripted test scenarios and conditions created to represent the realistic use of the product in a clinical setting.

The study tested the WRS Health Web-based EHR Version 6.0 and provides evidence of usability in this EHRUT. To this end, testing attempted to measure effectiveness, efficiency and user satisfaction of the product, focusing on ease of use, intuitiveness, and efficiency from a user perspective.

Method

Participants

A total of 10 participants were tested on the EHRUT(s). Participants in the test included 8 physicians (MD, DO), 1 therapist and 1 physician’s assistant. Participants represented a variety of clinical specialties, including Internal Medicine, Otolaryngology, Family Practice, and Cardiology.

During the recruitment process members of the WRS Health User Community were invited to participate in the testing. Participants then volunteered for the project and were given a \$100 gift card to compensate for their time. All participants were current end users of the WRS Health EHR product.

Participants had varying levels of previous clinical, EMR and product experience. Participants also had a mix of backgrounds and demographic characteristics as conforming to participant screening requirements. 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.

Summative Usability Testing - Participant Demographics

ID	Gender	Age	Education Level	Title	Participant Experience (In Months)			Assistive Tech. Need(s)
					Professional	Computer	Product	
A01	Male	50-59	Doctorate Degree	MD	360	240	96	No
A02	Male	30-39	Doctorate Degree	MD	228	180	72	No
A03	Male	40-49	Doctorate Degree	MD	492	120	96	No
A04	Female	70-79	Doctorate Degree	MD	300	120	12	No
A05	Female	60-69	Doctorate Degree	MD	396	120	60	No
A06	Female	40-49	Master's Degree	NP	516	192	48	No
A07	Female	50-59	Doctorate Degree	MD	420	240	96	No
A08	Male	30-39	Doctorate Degree	MD	204	192	24	No
A09	Male	50-59	Doctorate Degree	MD	408	300	84	No
A10	Female	30-39	Master's Degree	PA	84	192	108	No
Total/ Average	F = 5 M = 5	50 yrs. Average Age	Doctorate 8 Master's 2	MD =8 NP+PA =2	341	190	70	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.

- § 170.315 (a)(1) Computerized Provider Order Entry (CPOE) – medications
- § 170.315 (a)(2) CPOE – laboratory
- § 170.315 (a)(3) CPOE – diagnostic imaging
- § 170.315 (a)(4) Drug-drug, Drug-allergy Interaction Checks for CPOE
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- § 170.315 (a)(9) Clinical Decision Support
- § 170.315 (a) (14) Implantable Device List
- § 170.315 (b)(2) Clinical Information Reconciliation and Incorporation
- § 170.315 (b)(3) Electronic Prescribing

During testing participants interacted with WRS Health Web-based EHR Version 6.0. Each participant used the system remotely from their locations. All were provided with the same instructions. All tests were conducted by the same Test Administrator the same test machine. Controls were given to the user to take all needed actions on the Test Administrator’s machine. 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 allotted time, without assistance

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- Time to complete the tasks
 - Number and types of errors
 - Path deviations
 - Participant’s verbalizations (comments)
 - Participant’s satisfaction ratings of the system

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

Tasks

Tasks were constructed to be representative of the kinds of activities a user might do with this EHR, including:

- Computerized Provider Order Entry (CPOE) – medications
- CPOE – laboratory
- CPOE – diagnostic imaging
- Drug-drug, Drug-allergy Interaction Checks for CPOE
- Demographics
- Problem List
- Medication List
- Medication allergy list
- Clinical Decision Support
- Implantable Device List
- Clinical Information Reconciliation and Incorporation
- Electronic Prescribing

All tasks were created and scripted taking the required MU 2015 objectives into direct consideration.

Procedure

Participants and test administrators logged into their computers and GoToMeeting remotely. Upon “arrival” participants were greeted; their identity was verified and matched with a name on the participant schedule. Participants were then assigned an anonymous participant ID. This ID was then used for the remainder of the testing process and in the creation of this report.

To ensure that the test ran smoothly, two staff members participated in this test, a usability test administrator and a test proctor, who also acted as the data logger. The Test Administrator is an experienced clinician with over 25 years of experience as a registered nurse and twelve years of experience in use of this software product in a clinical setting.

Each participant reviewed and signed an informed consent and release form (*See Appendix A*). A representative from the test team witnessed the participant’s consent and it was recorded for later reference.

The Test Administrator moderated each session, including explaining clinical instructions and required tasks. The Administrator also monitored task times, obtained post-task functionality rating data, and took notes on participant comments, including path deviations, number and type of errors, and comments. The Test Administrator collected all demographic and consent information; and administered and recorded results of the LIKERT Survey. The Test Administrator was also responsible for collecting and archiving all documentation, recordings and results for all testing activities.

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

- As quickly as possible, making as few errors and deviations as possible
- Without assistance; administrators gave only immaterial guidance and clarification, but not instructions on use
- Activities were by the participants and thinking aloud was discouraged

For each task the timing began once the administrator finished reading the question. The task time stopped once the participant indicated they had successfully completed the task. Scoring is discussed below in Data Scoring section below.

Following the session, the Test Administrator gave the participant a post-test questionnaire (System Usability Scale, *see Appendix F*) and thanked everyone for their participation.

Participants' demographic information, task success rate, time on task, errors, deviations, verbal responses, and post-test questionnaire were recorded into an archived word-processed document for later review and reference.

Upon completion of the test session, WRS awarded each participant a \$100 Amazon Gift Code via email. Participants were then asked to sign a receipt and acknowledgement form (*See Appendix G*).

Test Location

All testing was conducted remotely using the web-based EHR product and GoToMeeting software. The test administrator, proctor and participants participated from their respective locations and connected via the Internet and telephone line (as needed). Users were advised of technical requirements prior to the administration of the test. Assistance in using GoToMeeting was given at the time of the session, as needed, to facilitate testing activities.

Test Environment

For testing, participants were able to use a personal computer of type (Mac, PC, Chromebook) as long as they were using the Google Chrome browser during the test session. The participants used a standard mouse and keyboard when interacting during the test. System user requirements include a minimum of 17" monitor with a SVGA resolution (1024x768) or higher. Additionally, participants were instructed to use default system settings (color, font size, zoom) during the test sessions.

Each user was given a login to the testing software environment. Users used these credentials to access to the testing environment. The application was set up by the WRS Health according to the WRS Health’s established user documentation for user software set-up. Testing was setup to simulate use of the web-based software application performing under standard conditions. Throughout all remote usability test sessions, the administrator ensured that conditions were representative of actual use in the “field” (e.g. medical office).

Test Forms & Tools

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

- 1) Informed Consent
- 2) Moderator’s Guide
- 3) Post-test Questionnaire
- 4) Incentive Receipt and Acknowledgment Form

Examples of these documents can be found in *Appendices A to G* in this document, respectively. The Moderator’s Guide was devised to be able to capture required data.

Participant Instructions

The test session was electronically transmitted to a nearby observation room where the data logger observed the test session.

The administrator reads the following instructions aloud to each participant (also see the full moderator’s guide in *Appendix D*).

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 WRS Health Version 6.0 by measuring participant success rates and errors
- 2) Efficiency of WRS Health Version 6.0 by measuring the average task time and path deviations
- 3) Satisfaction with WRS Health Version 6.0 by measuring ease of use ratings

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

Measures	Rationale and Scoring
Effectiveness: Task Success	<p>A task was counted as a “Success” if the participant was able to achieve the correct outcome, without assistance, within the allotted time, using only allowable number of path deviations or less.</p> <p>The total number of successes were calculated for each task and each user. These are presented in detail under the <i>Results</i> section of this document.</p> <p>Optimal Task Times were benchmarked</p>

Measures	Rationale and Scoring
	by users, under realistic conditions, in advance of any test sessions.
Effectiveness: Task Failures	If the participant abandoned the task, or did not perform the test incorrectly, the task was counted as a “Failure.”
Efficiency: Task Deviations	<p>The path that the participant followed in the software was recorded for each test and each participant.</p> <p>If the user was unable to navigate to the functional area to perform a given task, then it was counted as a Path Deviation.</p> <p>All Path Deviations were collected and subsequently compared to the Optimal Paths that were created and benchmarked in advance of any test sessions.</p>

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. There were no testing irregularities or issues that affected data collection or interpretation of the results.

The usability testing results for the EHRUT are detailed below table. The results should be seen considering the objectives and goals outlined in the Study Design mentioned above. The data yielded actionable results that, can have a positive impact on user performance.

Summary of Summative Usability Test Results - Tests 1 through 12.

Measure / Task Description	N (users)	Task Success Mean % (SD)	Task Path Deviation Observed (Optimal)	Task Time Mean seconds (SD)	Task Time Deviations Observed/Optimal	Task Errors Mean % (SD)	Task Ratings (5=easy) Mean/SD
§ 170.315 (a)(1) Computerized Provider Order Entry (CPOE) – medications <u>Task(s) Description:</u> Review patient-entered medications, archive medication, reconcile medication, add medication as current medication, add medication as prescribed medication (today's visit)	10	90% (31.62%)	23 (22)	134 (28)	148 (114)	10% (31.62%)	4.6 (1.03)
§ 170.315 (a)(2) CPOE – laboratory <u>Task(s) Description:</u> Add diagnosis, add lab as an order (pertinent to diagnosis) and match/modify order to the expected date of completion	10	100% (31.33%)	18 (15)	126 (40)	126 (96)	0% (0%)	4.6 (1.03)
§ 170.315 (a)(3) CPOE – diagnostic imaging <u>Task(s) Description:</u> Add diagnosis, add radiology as an order (pertinent to diagnosis) and match/modify order to the expected date of completion	10	100% (31.30%)	16 (15)	130 (41)	130 (103)	0% (0%)	4.6 (1.03)
§ 170.315 (a)(4) Drug-drug, Drug-allergy Interaction Checks for CPOE <u>Task(s) Description:</u> Review patient-entered allergies, archive allergy, reconcile allergy, add a medication as prescribed, note any drug-drug, drug-allergy, age-related interactions and contraindications	10	90% (43.87%)	28 (24)	142 (17)	140 (107)	10% (43.87%)	4.9 (0.63)
§ 170.315 (a)(5) Demographics <u>Task(s) Description:</u> Search/add a new patient, populate new gender identification and sexual orientation options	10	90% (41.97%)	23 (17)	102 (41)	102 (89)	10% (41.97%)	3.7 (1.90)
§ 170.315 (a)(6) Problem List <u>Task(s) Description:</u> Search patient, create new note, address problem list: previously added by patient, add a new problem, deactivate a problem, reconcile problem list, add a problem to active assessment	10	100% (31.33%)	16 (16)	193 (58)	192 (123)	0% (0%)	4.7 (0.97)
§ 170.315(a)(7) Medication List <u>Task(s) Description:</u> Review patient-entered medication list, reconcile medication or archive medication, add a current medication to list, reconcile entire list of medications	10	90% (41.95%)	21 (20)	141 (22)	141 (112)	10% (41.95%)	4.9 (0.63)

<p>§ 170.315(a)(8) Medication allergy list</p> <p><u>Task(s) Description:</u> Review patient-entered allergies, archive allergy, reconcile allergy, add a medication as prescribed, note any drug-drug, drug-allergy, age-related interactions and contraindications</p>	10	90% (41.97%)	16 (10)	142 (27)	142 (100)	10% (41.97%)	5.0 (0.00)
<p>§ 170.315 (a)(9) Clinical Decision Support</p> <p><u>Task(s) Description:</u> Review any outstanding orders, pending orders, orders "due" based on CDSR technology</p>	10	80% (48.96%)	12 (8)	144 (62)	144 (83)	20% (48.96%)	4.1 (1.14)
<p>§ 170.315 (a) (14) Implantable Device List</p> <p><u>Task(s) Description:</u> Navigate to Patient Management. On the Directives tab under IMPLATABLE DEVICES: add UID number provided and submit to add device from database</p>	10	100% (33.06%)	21 (12)	75 (28)	75 (59)	0% (0%)	3.7 (2.50)
<p>§ 170.315 (b)(2) Clinical Information Reconciliation and Incorporation</p> <p><u>Task(s) Description:</u> Navigate to EMR All Notes and select appropriate CCDA to "import" data for a new patient. Verify the patient has no clinical content on the Medication, Allergy and Problem List. Then, import the data. Verify that the data has been imported and is now available as in patient's EHR record.</p>	10	90% (41.95%)	20 (20)	326 (73)	326 (278)	10% (41.95%)	3.8 (1.58)
<p>§ 170.315 (b)(3) Electronic Prescribing</p> <p><u>Task(s) Description:</u> Prescribe a medication as directed, complete SIG, add pharmacy, review allergies/interactions/contraindications, electronically prescribe and send. Review availability of CANCEL eRx message (new functionality) and check Task Queue to review any pharmacy-requested CHANGE messages (new functionality)</p>	10	90% (41.97%)	20 (20)	149 (24)	149 (112)	10% (41.97%)	4.8 (0.42)

LIKERT Software Satisfaction Review

The results from the Likert scored relative satisfaction with the functionality and workflow presented in each of the 12 tests:

Measure/Function	Average Likert Rating (100% = 5/5 Pts)
{§170.315(a)(1)} CPOE MEDICATIONS	92%
{§170.315(a)(2)} CPOE LAB	92%
{§170.315(a)(3)} DIAGNOSTIC IMAGING	92%
{§170.315(a)(4)} DRUG-DRUG, DRUG-ALLERGY	98%
{§170.315(a)(5)} DEMOGRAPHICS	74%
{§170.315(a)(6)} PROBLEM LIST	94%
{§170.315(a)(7)} MEDICATION LIST	98%
{§170.315(a)(8)} MEDICATION ALLERGY LIST	100%
{§170.315(a)(9)} CDSR	82%
{§170.315(a)(14)} IMPLANTABLE DEVICE	74%
{§170.315(b)(2)} CLINICAL INFORMATION RECONCILIATION	76%
{§170.315(b)(3)} ELECTRONIC PRESCRIBING	96%
Total Average Satisfaction Rating (Likert)	89%

Discussion of the Findings

Overall, usability testing was an affirmation of our user centered design process. In all twelve of the tests, participant performance and satisfaction ratings were above average validating that the software functionality performs as intended and presents evidence that it meets user needs.

WRS Health found that all 12 tests resulted in above average performance and participant satisfaction ratings. We believe that this demonstrates that new functionality does perform as intended and was welcomed by test participants. Most importantly, testing results did not yield any evidence of potential patient safety issues.

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

- **Maintains Workflow Integrity** – workflows for updated functionality was based on existing processes. Maintaining that consistency easily allowed users to integrate new functions into their existing “familiar” workflow.
- **Options for Navigation** – path deviations occurred, and clients were able to navigate and complete the task regardless of the exact path chosen (right click, mouse over, menu selection). The EMR has been designed to allow users a choice of navigation options and testing showed evidence that these alternatives increased user’s ability to complete the tasks.
- **Enhanced UI Redesign** – Our enhanced user interface and user experience designs met with favorable reviews. A system-wide UI redesign is currently in progress and the user community is actively engaged in providing ongoing feedback as enhancements are carefully implemented to our provider user community.
- **Positive User Observations** – Overall items were met with excitement from users. Participants offered positive comments during testing. “This is a great”. And “Very useful.” were typical comments during the test sessions.

Types of errors made during testing overall:

- **Slight Path Deviations** – None of the tests conducted showed significant path deviations when performing the required actions. We believe that since all tested functionality was designed to conform to our established navigation methods the users were already familiar with those options and they were able to navigate with relative ease.
- **Excessive Task Time** – Users averaged approximately 20% above optimal (expert) task time. Since many of the test areas were recently updated for MU 2015 and it concluded that users would benefit from additional experience with newer functions.
- **Re-Training & Outreach** – Additional training and client outreach are needed on functions. This will be done by the additional of new live webinar courses, self-guided videos and a new context sensitive help system.

Satisfaction

Software Satisfaction Surveys were administered for each of the 12 tests. The overall combined average score was 8.9 (89%) on a Likert Scale of 10 (100%). The standard deviation of scores across all 12 tests combined was .98 (88.45%). User perspectives were highly positive. Many are excited to use new and enhanced functionality that has been developed for MU2 certification.

Areas for improvement

The following chart details each tested function with overall finding and areas of improvement for future usage and/or initial rollout.

Functionality Tested	Major Findings	Areas for Improvement
<p><u>{§170.315(a)(5)} DEMOGRAPHICS</u></p> <p>Participants were all providers. Due to the nature of their work most providers do not have cause to routinely navigate to the Patient Management module where patient demographics are recorded.</p> <p>Test participants were able to access this area with the use of various paths of navigation. All paths used were in acceptable deviations. Once in the correct areas, participants took time to review the data presented and easily navigated through the required task functionality.</p>	<p><u>Major Findings:</u> showed consistently that this module has less traffic from the providers standpoint.</p>	<p><u>Areas of Improvement:</u> module is very detailed, but it has many areas that users are forced to navigate to/from. A more-simplified demographics presentation could be helpful for users who are the role of “provider”</p>
<p><u>{§170.315(a)(6)} PROBLEM LIST</u></p> <p>This is a frequently used area of the EMR by providers, they access mostly using the note process and about half of the testers were unaware this is also accessible from patient management module (see above).</p> <p>All providers navigated through the module easily. Approximately 8 out of the 10 providers were unaware of some functionality (adding problems directly to</p>	<p><u>Major Findings:</u> providers voiced this as an “easy-to-use” module, and “liked” the ability to add problems directly to their assessment</p>	<p><u>Areas of Improvement:</u> most requested the ability for easier edit the problem list, currently, it “feels cumbersome”</p>

<p>assessment), but easily completed the task using accepted and current WRS functionality that applies to most pages of the note</p>		
<p><i>{§170.315(a)(2)} and {§170.315(a)(3)} CPOE LAB & CPOE DIAGNOSTIC IMAGING</i></p> <p>This is a very frequently used module of the EMR note process and all providers were well acquainted with the workflow. They all voiced that the workflow has improved since updates were made to their “super bill” module a few years ago.</p>	<p><u>Major Findings:</u> all providers were aware of the workflow and functioned in the module with ease. In only one case did the provider add the “orders” as a “procedure,” but voiced he was aware of the difference in WRS and it was an error on his part.</p>	<p><u>Areas of Improvement:</u> providers requested that the process of adding order could be made less cumbersome. Work is needed to increase efficiency when adding diagnoses.</p>
<p><i>170.315(a)(9)} CDSR</i></p> <p>This module was used by 50% of the providers tested, the remaining 50% were unaware of the module, or has used and found the module didn’t fulfill what they were attempting to accomplish. They were able to access and navigate through with minimal to no assistance.</p>	<p><u>Major Findings:</u> the module is underused, but when demonstrated; the providers were consistently interested in using it in the future.</p>	<p><u>Areas of Improvement:</u> Additional training and outreach should be conducted by WRS to expand the use of this feature and make users aware if its value.</p>
<p><i>{§170.315(a)(1)} and {§170.315(a)(4)} and {§170.315(a)(7)} and {§170.315(a)(8)} and {§170.315(b)(3)}: CPOE MEDICATIONS, DRUG-DRUG DRUG ALLERGY INTERACTIONS, MEDICATION LIST, MEDICATION ALLERGY LIST, ELECTRONIC PRESCRIBING</i></p> <p>The Medication Page/ERx Module is frequently used by providers and all accessed and navigated easily. WRS had introduced updated functionality earlier in the year and reviewed during usability. 75% of the providers were actively using</p>	<p><u>Major Findings:</u> this is an often-used module and providers were able to access it easily, although they do voice some areas of needed improvement</p>	<p><u>Areas of Improvement:</u> Providers need the ability to manually update “provider frequently ordered” list and edit it. Also, completion of the SIG when loading prescriptions, including correct/exact match of dosing to dispensing qualifiers.</p>

<p>the “Patient Entered medications and Allergies” module. Of that demographic, 25% were not using the full capability and were very happy to fully understand. The 25% that were unfamiliar indicated they liked the functionality and would implement (understanding their patient’s need to access the portal).</p>		
<p><i>{§170.315(b)(2)} and {§170.315(a)(14)}:</i> <i>CLINICAL INFORMATION RECONCILIATION, IMPLANTABLE DEVICE</i></p> <p><u>New functionality:</u> “Implantable Device” was reviewed, and providers used the same knowledge from accessing patient management to navigate through the module.</p>	<p><u>Major Findings:</u> most providers voiced this was not an area they would use frequently</p>	<p><u>Areas of Improvement:</u> WRS Health should educate clients about the availability of this functionality and benefits that its use can offer when use is applicable.</p>
<p><i>{§170.315(b)(2)} and {§170.315(a)(14)}:</i> <i>CLINICAL INFORMATION RECONCILIATION, IMPLANTABLE DEVICE</i></p> <p><u>Established functionality:</u> Clinical Information Reconciliation was used by 25% of the tested providers; the remaining 75% were unaware of the module. They were, however, very impressed with the functionality and most indicated they would implement this within their practice. For those that were introduced to the module, they navigated the area easily, using established WRS actions. All providers were updated to the new ability of importing multiple CCDA documentation.</p>	<p><u>Major Findings:</u> for those providers not participating in MIPS and/or MU, they were unaware of the module and functionality but found it could be very beneficial to their practice.</p>	<p><u>Areas of Improvement:</u> the ability to import multiple CCDA has been introduced. WRS Health needs to promote the benefit and use of this feature to all clients</p>



PART III: APPENDICES

Appendix A – Recruitment Letter



Invitation for Usability Testing

WRS is pleased to invite you to be a part of our first clinical usability study. The study is being conducted from September 30 to November 1, 2018. Test sessions will explore the use of MU2 functionality in collect data on usability in design. Note that due to the nature of the study, participation is related to providers only (MD, DO, NP, PA).

Participation will require one, pre—scheduled 60 to 90-minute remote session. During this time, you will get a chance to try out new Meaningful Use functionality and offer your thoughts on these development items. Upon completion of the session you will be compensated with a \$100 Amazon Gift Card for your time.



Receive a \$100 Amazon Gift Card as our Thank You!

Sessions will be conducted and recorded via GoToMeeting. During the session, an administrator will ask you to perform seven brief clinical functions and offer any opinion you have on the functionality associated with each. All test data will be completely anonymous.

Opportunity to participate in the study is extremely limited. Please respond to this email as soon as possible to reserve your spot. Appointments will be given on a first—come, first—served basis. WRS will make every effort to schedule these sessions to accommodate provider schedules, including before and/or after business hours. Feel free to reach out to me if you have any questions

Thank You,

Resa Barbalich, RNC

Test Administrator

rbarbalich@wrshealth.com, 866-977-4367



Appendix B – Demographic Questionnaire



Participant Screening Survey

Thank you for your interest in the WRS Clinical Usability Study. Please take a few minutes to complete the information below. This will be used to qualify your participation in the Study. All questionnaire and testing data is anonymous.

Demographics

Are you male or female?

Have you participated in a focus group or usability test in the past 3 months?

Do you, or anyone in your home, work in marketing, usability research or web design?

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

Which best describes your age range?

- 20 to 29
- 30 to 39
- 40 to 49

- 50 to 59
- 60 to 69
- 70 to 79
- 80 to 89
- 90 and Older

Do you require any assistive technologies to use a computer?

Professional Demographics

1) What is your current position and title? (Must be healthcare provider)

- Physician (MD, DO)
- Nurse Practitioner
- Physician Assistant

Other title (please list): _____

How long have you have you been in medicine?

Computer Experience

- 1) How long have you been using a computer?
- 2) How many years have you used an electronic health record?
- 3) How many EHRs do you use or are you familiar with?

Contact Information

Those are all the questions I have for you. Your background matches the people we're looking for. [If you are paying participants or offering some form of compensation, mention] For your participation, you will be paid a \$100 Amazon Gift Card.

- 4) Will you be able to schedule and commit to a 60-90 Minute GoToMeeting session on a weekday sometime during the period from September 30 to November 1, 2018?

Appendix C: Participant Demographics

ID	Gender	Age	Education Level	Title	Participant Experience (In Months)			Assistive Tech. Need(s)
					Professional	Computer	Product	
A01	Male	50-59	Doctorate Degree	MD	360	240	96	No
A02	Male	30-39	Doctorate Degree	MD	228	180	72	No
A03	Male	40-49	Doctorate Degree	MD	492	120	96	No
A04	Female	70-79	Doctorate Degree	MD	300	120	12	No
A05	Female	60-69	Doctorate Degree	MD	396	120	60	No
A06	Female	40-49	Master's Degree	NP	516	192	48	No
A07	Female	50-59	Doctorate Degree	MD	420	240	96	No
A08	Male	30-39	Doctorate Degree	MD	204	192	24	No
A09	Male	50-59	Doctorate Degree	MD	408	300	84	No
A10	Female	30-39	Master's Degree	PA	84	192	108	No
Total/ Average	F = 5 M = 5	50 yrs. Average Age	Doctorate 8 Master's 2	MD =8 NP+PA =2	341	190	70	None

Appendix D - Informed Consent



WRS Health would like to thank you for participating in this study. The purpose of this study is to evaluate an electronic health records system. If you decide to participate, you will be asked to perform several tasks using the prototype and give your feedback. The study will last about 60 to 90 minutes. At the end of the test, you will be compensated for your time.

Agreement

I understand and agree that as a voluntary participant in the present study conducted by WRS Health. I am free to withdraw consent or discontinue participation at any time. I understand and agree to participate in the study conducted and recorded by the WRS Health.

I understand that the information is for research purposes only and that my name and image will not be used for any purpose. I understand and agree that the purpose of this study is to make software applications more useful and usable in the future.

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

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

Acknowledgement

Please check one of the following:

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

Signature

Name (print): _____

Professional Title: _____

Signature: _____

Date: _____

Appendix E - Moderator's Guide

Note: This document must be completed for each participant and each EHRUT session.

Participant #	
Date:	
Time:	:
Test Administrator:	
Test Proctor:	
Test Recording File Name	
Test Evaluation File Name:	

PART I

During participant selection:

- Send **Usability Invitation** via email
- Schedule test session via email or phone
- Send confirmation and login details to participant

PART II

Prior to test date:

- Confirm receipt of **Informed Content**

- Confirm completion of **Demographic Questionnaire**
- Assign **Participant ID**

PART III

Prior to the start of each test session:

- Confirm connection via GTM software, WRS, Internet
- Test video and audio, recording via GTM
- Login to WRS (live/test) with participant ID
- Begin recording via GTM
- Start recording with participant ID and date of test verbally expressed on the recording

PART IV

Prior to each task:

- Give controls to participant
- Read **welcome, instructions** and **test script**
- Record time of each task, path, observations
- Record scoring on **EHRUT Evaluation** form
- Administer **LIKERT Questionnaire** at end the session

PART V

After each participant

- Review and complete remaining observations
- Save all test documents and recording files

Back up all video and data files

Test Proctor: Part 1

“Thank you for participating in this study. Your input is very important. Our session today will last about 60 minutes. During that time, you will use an instance of WRS Health EMR. I will ask you to complete a few tasks using this system and answer some questions. Please note that we are recording this GoTo Meeting session today as an archive. All information will be kept confidential. Your name will not be associated with this recording or any comments that you offer. We will refer to you only by your assigned participant number only.”

Test Administrator: Part 2

“You should complete the tasks as quickly as possible making as few errors as possible. Please try to complete the tasks on your own following the instructions very closely. Please note that we are not testing you we are testing the system, if you have difficulty this may be something that needs to be improved in the system. I will be here in case you need specific help, but I am not able to instruct you or provide help in how to use the application. Overall, we are interested in how easy (or how difficult) this system is to use, what in it would be useful to you, and how we could improve it.

We will take you through seven brief usability tests for the required MU clinical criteria. You will be asked to complete these tasks as quickly as possible. If you get off track, or have difficulty, we will guide you

back to the correct path, but we will not instruct you in the actual task.

Please do not do anything more than asked.

At the end of tasks, you will be given a chance to add comments and state your feelings about the functionality. Let's begin."

Appendix F – EHURT Scripts (12 Tests)



EHURT – Test Scripts User (MU 2015)

KEY:

W=WRS INSTRUCTOR

T=EXPECTED TESTER WORKFLOW

[[]] OTHER METHODS OF ACCESSING THAT IS ACCEPTABLE

ITALICS=TEST ADMINISTERED

(TIME)=EXPECTED COMPLETION

#1 {§170.315(a)(5)} DEMOGRAPHICS

W: Your first task is to search for patient <> and navigate to patient management module. I'd like for you to review the new, updated "sexual orientation" and "gender identification" options. Many providers may not find this area useful in their everyday patient encounters, but it is required for EHR certification and for some qualifying clinics and facilities. Please review the options available. {§170.315(a)(5)}

- 1) Search patient
- 2) Open patient management module
- 3) Navigate to pertinent demographic fields
- 4) Identify and review demographic options

T: (2-3 minutes) search for patient from “search box”, select patient from list, right click>select patient management, review demographics located under “personal information” tab [[may also search patient using the Patients>Patients Search tab]]

#2 {§170.315(a)(6)} *PROBLEM LIST*

W: Our next task will be to create a note for this patient and review their problem list. Please open a new note and navigate to the Past medical History. You are going to add a new condition of “anemia”, and enable it as INACTIVE. And for the conditions of HYPERTENSION and DIABETES you will add them to the CURRENT NOTE ASSESSMENT. Finally, I want you to RECONCILE all conditions listed {§170.315(a)(6)}

- 1) Create new note for patient
- 2) Click to open “History/Habits” tab
- 3) Select ADD NEW>Anemia>”PRESENT” radio button and SUBMIT
- 4) For ANEMIA uncheck “ACTIVE” radio button
- 5) Individually, for HYPERTENSION and DIABETES, right click and ADD TO ASSESSMENT
- 6) Select RECONCILE for all PMH

T: (2-3 minutes) From “recently viewed” either right click>create new note, or from hover screen>create new note, add new patient history (anemia), make anemia an “inactive” history, add HTN and Diabetes to current note assessment, reconcile all history conditions [[can also create new note by navigating to patient’s EMR and create new note]]

#3 & #4 {§170.315(a)(2)} AND {§170.315(a)(3)} *CPOE LAB & CPOE DIAGNOSTIC IMAGING*

W: Next I would like for you to diagnosis this patient with an “ACOUSTIC NEUROMA” and then create 3 orders for our patient: a CBC, an MRI of the Brain, and a Flu Shot (and adding the diagnoses to each order) {§170.315(a)(2)} AND {§170.315(a)(3)}

- 1) Navigate to Assessment page and add diagnosis

- 2) Please note that this patient also has the diagnoses of HYPERTENSION and DIABETES that you added from the PMH
- 3) Order a CBC and MRI and apply diagnoses
- 4) Order FLU

T: (5-8 minutes) go to Assessment Page and search/add “acoustic neuroma, review all diagnoses, go to Orders page, select Orders tab, scroll down the Superbill and select CBC and MRI, add as Order, select diagnoses from patient active note diagnoses [[may also search for CPT codes via name or code from search module//may also search for ICD codes from search module]]

W: Please update the expected date of completion for the Flu Shot to December and indicate in the COMMENTS “advised to get flu shot by end of year”

- 1) Update “Expected Date of Completion” to December 31
- 2) Add COMMENTS to Flu Shot

T: (5 minutes) will click in “Expected DOC” box and select date from calendar option in “specific date” box, SAVE, add comments directly into COMMENTS box for Flu CPT, MUST SAVE

5 *{§170.315(a)(9)}* CDSR

W: Please review any tests due for this patient, results received on this patient, and outstanding orders for this patient *{§170.315(a)(9)}*

- 1) Review any “Tests Due” for this patient, advise what is Due (wait to complete)
- 2) Review any “results Received” for this patient, advise what results are available (wait to complete)
- 3) Review any “Open Tests” for this patient, advise what is outstanding (wait to complete)

- 4) There will be new functionality associated with this action that will autopopulate appropriate ICD, CPT, RxNORM related educational content from Medline Plus website, and send that data electronically to the patient's portal ((have Medline Plus page open to VIEW))
- 5) <https://connect.medlineplus.gov/application?mainSearchCriteria.v.cs=2.16.840.1.113883.6.90&mainSearchCriteria.v.c=e11.9&mainSearchCriteria.v.dn=&informationRecipient.languageCode.c=en>

I: (5-10 minutes) will select SHOW TESTS DUE for Clinical Support Rule Compliance. Will select VIEW ALL RESULTS [[may elect to view from popup menu but this then takes the tester out of note]] ((you can suggest that viewing from within the note saves time and keeps the note open)). Will select “open test” from dropdown, and all orders created should be in this view.

#6 & #7 & #8 & #9 & #10 . {§170.315(a)(1)} and {§170.315(a)(4)} and {§170.315(a)(7)} and {§170.315(a)(8)} and {§170.315(b)(3)}: CPOE MEDICATIONS, DRUG-DRUG DRUG ALLERGY INTERACTIONS, MEDICATION LIST, MEDICATION ALLERGY LIST, ELECTRONIC PRESCRIBING

W: Our next series of tasks will be done through the medications module. WRS Health has added enhanced functionality that differentiates between “practice entered/created medication and allergy lists” and “patient entered medication/allergy lists”. This allows the patient to identify all their medications and allergies easily and conveniently from the patient portal, and gives the provider the access to all these medications noted and reconcile for best continuity of care. We will be reviewing medication lists, allergy lists, creating provider order entries of both medications and allergies, noting drug related interactions/allergies/contraindications, and eprescribing. We will also engage in the newest functionality in WRS, Erx Cancel a little later. *{§170.315(a)(1)} and {§170.315(a)(4)} and {§170.315(a)(7)} and {§170.315(a)(8)} and {§170.315(b)(3)}*

First, navigate to the medication page and review the current medication data available to you. This will include 1) current medications entered by the practice, 2) medications entered by the patient, 3) allergies entered by the practice, and 4) allergies entered by the patient. You will be addressing all data available and doing a reconciliation process for each.

- 1) Navigate to the Medications Page of the note for this patient

- 2) Review all Current Medications for this Patient and advise when created and by whom (hover over med)
- 3) Review any Patient Entered Medications for this patient
- 4) For the AUGMENTIN, as this was a one time dosing, and the patient is no longer taking, please INDICATE THIS STATUS AND DO NOT ADD TO THE CURRENT MEDICATION LIST
- 5) For the DIABETA, this is a chronic medication and PLEASE ADD TO CURRENT MEDICATIONS AND RECONCILE

- T: (5 minutes) click tab for medication page, will hover over “current medication” medications and respond with dates added, by whom, ((may use the right click>view all actions)), will select Augmentin check box and add comment to indicate status, will select diabetes check box and reconcile to move to current medication list
- W: Now we will move to the allergy section and review current practice entered allergies and patient entered allergies
 - 1) RECONCILE Sulfa allergy
 - 2) RECONCILE Milk allergy
 - 3) Amoxil “allergy” was a red dot rash and probable side effect, indicate as such in COMMENTS
- W: Patient advises that they also have a LATEX ALLERGY
 - 4) Add new allergy to LATEX
 - 5) RECONCILE all allergies

- T: (3-4 minutes) select sulfa and reconcile, select milk and reconcile, select amoxil and comment related non-allergy, search and select latex and add as allergy, reconcile all active allergies

W: Patient also advises that they just started taking Lipitor 10 mg per day, add it as a current medication

- 1) Add Lipitor 10 mg as a current medication ((this may cause an age-related alert, if it does advise the tester to BYPASS THE ALERT)) Tester would need to select a reason for over-ride
- 2) RECONCILE all Current Medications

T: (2 minutes) search Lipitor, exact dose, add as current medication ((may add SIG values or not)), select all meds in list and reconcile

W: Now let's prescribe medications for this patient. The first medication will be creating a new prescription for the patient and the second will be represcribing from the current medications list. You will prescribe BACTRIM and represcribe BENICAR

- 1) Prescribe Bactrim DS 800mg 160 mg tab ((this will produce a drug-to-drug alert drug to disease and age-related allergy/contraindications, provider can decide to continue, indicating an appropriate alert response; or cancel))
- 2) Represcribe Benicar, NOTE if provider accurately updates the missing SIG during this step
- 3) Electronically send the BENICAR (if SIG and pharmacy were not updated in step 2, may need to ALERT based on incompleteness of Rx)

T: (5 minutes) search and select Bactrim, will trigger allergy alert, provider can determine how to address ((best case is to CANCEL)), right click Benicar and select represcribe, from open popup window ((best practice)) is to verify and update SIG and pharmacy as this will allow for adding and esending smoothly ((this can be done from the Current Note Prescriptions queue)) If not done the Rx will not esend successfully, esend Rx

W: Now we are going to work in the newest module on this page, the Erx CANCEL. This allows an electronically sent prescription o be canceled electronically within a reasonable time-frame

and from the open note where the original Rx was created and sent. This can only be done by the prescribing provider, ancillary staff are not eligible for this permission. MAY HAVE TO REFRESH PAGE DUE TO LIVETEST ENVIRONMENT

- 1) CANCEL the Benicar prescription
- 2) Note the popup alerts to cancel action
- 3) Note the ACTION LOG of cancel Rx

T: (1-2 minutes, as this is a new module and the provider may require clinical review of the workflow) select the CANCEL icon and complete the cancel selection

W: More new functionality is the ability to address those “CHANGE” requests you may receive from pharmacies, usually if they are out of stock of a medication, notice an allergy or interaction, etc. These requests will come directly to the providers TASK QUEUE, and similar to electronic refill requests, will be sent electronically to the originating provider. Let’s view the functionality

- 1) Go to “your” task queue
- 2) Open one of the CANCEL REQUEST tasks
- 3) Note that the request has all the pertinent information required to make an informed decision regarding the medication for this patient
- 4) You can elect to ACCEPT the change request, DENY the change request and continue with the current prescription, or DENT AND CANCEL, which also cancels the original prescription. In those cases, the provider would need to prescribe a new medication, if warranted

T: (3-5 minutes) Navigate to task queue, review queue, select task and open, open request within task, review request, select actions (can only select one action)

#11 & #12 {§170.315(b)(2)} and {§170.315(a)(14)}: CLINICAL INFORMATION RECONCILIATION, IMPLANTABLE DEVICE

W: Our next series of workflows will be conducted using a different patient, you will search for <> (make it the “pair” to the test patient used). We will be adding clinical content electronically to a patient, using a CCDa that was electronically created and submitted through the WRS

platform, and we will be adding data related to implantable devices that are discretely applied to the patient's record. This last workflow is a new module in WRS and is pending release, so you will be getting a PREVIEW. {§170.315(b)(2)} and {§170.315(a)(14)}

- 1) Search for patient <>
- 2) Open patient management module
- 3) Navigate to the Directives tab
- 4) using "Implantable Device List", ADD new device
- 5) You will use the Device UDI to enter the data and SUBMIT, where the device will be identified by the database
- 6) Use UDI # (01)00643169007222(17)160128(21)BLC200461H
- 7)

T: (2-3 minutes, this is a new module and may require a workflow review) search for patient from "search box", select patient from list, right click>select patient management, select Directives tab, using Device list module>Add Implantable Device, enter code given, submit, device will match from database and be viewed in entirety [[may also search patient using the Patients>Patients Search tab]]

W: Next, using this patient, we will add clinical data to the "empty note". Let's verify that the patient is devoid of clinical data, other than the device you just submitted. The best way to determine if there is clinical data is to view the note OPEN IN LIVE

- 1) Open a new note for this patient
- 2) View the note to determine if there are any problem Lists, Medication Lists or Allergy Lists
- 3) Review completely, once verified there is no data on the patient, delete that note to avoid any confusion once data has been electronically submitted

T: (2-3 minutes) right click>create new note, review can be done using 2 techniques: (A) select VIEW NOTE from left side bar menu, (B) per page of the note, review content (focus on

History/Habits Page, Medication page, Assessment page), navigate to EMR All Notes to “drop” note created [[can also create new note by navigating to patient’s EMR and create new note]]

W: Our final workflow will be to now add clinical content electronically to this patient, that you just verified as having no medication, allergy or problem list. But first, let’s review new functionality that relates directly to the clinical reconciliation workflow just completed. As many patients may have more than one provider (PCP, cardiologists, pulmonary, etc) WRS will be releasing the ability to view and reconcile more than one CCDA at a time.

- 1) NEW Search for patient <> ((use the twentyone-twentyfive)
- 2) Navigate to EMR ALL NOTES>Documents
- 3) Review that there are 2 Imported CCDA xml files
- 4) Select IMPORT CLINICAL DATA
- 5) Note the ability to review and compare CCDA from different providers, facilities, etc

(T) (3-5 minutes, this is an established module but many providers do not actually work in this module, and may require a review of clinical workflows) search new patient, navigate to EMR all Notes, review dual document xml file, select import clinical data icon, from new opened window and for each list: select list to review and reconcile (A) Problem, (B) Medication, (C) Allergy,

TESTING FUNCTIONALITY:

- 1) From EMR All Notes, note under Documents the IMPORTED CCD XML file ((INFORMAS: this file has been electronically sent to WRS, matched to this patient, and awaits importing to the patient record))
- 2) Select the Import Clinical Data Icon
- 3) Now proceed to import all pertinent data available: medications, Allergies, Problem List
- 4) To verify that data has been imported, open a new note and review as in earlier step to view data

T: (5-8 minutes, this is an established module but many providers do not actually work in this module, and may require a review of clinical workflows) navigate to EMR all Notes (should actually be on this module as last step for prior workflow is on this module), review document xml file, select import clinical data icon, from new opened window and for each list: select list to review and reconcile (A) Problem, (B) Medication, (C) Allergy, open new note, review can be done using 2 techniques: (A) select VIEW NOTE from left side bar menu, (B) per page of the note, review content (focus on History/Habits Page, Medication page, Assessment page

Appendix G - Closing Questions

To be asked Test Administrator to participant end of session:

- 1) What was your overall impression of the functionality presented today?
- 2) What functionality is most valuable to you in your practice?
- 3) What functionality is least valuable, or least likely to be used frequently, in your practice?
- 4) Were there any features that you were surprised to see?
- 5) What features did you expect to encounter, but did not see? That is, is there anything that is missing in this function?
- 6) Compare this function to other EMR you may have used, if applicable.
- 7) Would you recommend this part of the system to your colleagues?

Appendix H - Satisfaction Survey (Likert)

The following survey was created for each of the 12 functional areas tested and it was completed by all 10 participants:

Select one rating for each question as it best describes your impression of the clinical functionality tested today:

Test	Question	Strongly Disagree (1)	Somewhat Disagree (2)	Neutral (3)	Somewhat Agree (4)	Strongly Agree (5)
1	I found this function USEFUL					
2	I found this FUNCTION not overly complex					
3	I thought this FUNCTION easy to use					
4	I would not need assistance to use this FUNCTION					
5	I found steps in this FUNCTION were well integrated					
6	I thought this FUNCTION had Consistent Design					
7	I imagine most people would learn to use this FUNCTION Very quickly					
8	I Found this FUNCTION helpful to use					
9	I felt confident using this FUNCTION					

10	I did need to learn a lot before I get going with this FUNCTION.					
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Appendix I - Acknowledgement of Receipt

I hereby acknowledge receipt of a \$100 (Amazon Gift Card) for my participation in a usability research study run by WRS Health on <<DATE>>.

Participant

Name (print): _____

Title: _____

Signature: _____

Date: _____

Test Moderator

Name (print): _____

Title: _____

Signature: _____

Date: _____

Witness

Name (print): _____

Title: _____

Signature: _____

Date: _____

Bibliography

Schumacher, R. M., & Lowry, S. Z. (2010). *NISTIR 7741 - Guide to the Processes Approach for Improving the Usability of Electronic Health Records*. Gaithersburg, MD: National Institute of Standards and Technology. Retrieved from http://www.nist.gov/manuscript-publication-search.cfm?pub_id=907313

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WRS Health Web EHR and Practice Management System

Summative Usability Test Report

170.315(b)(11) Safety Enhanced Design

Report based on – NIST 7742

Common Industry Format for Usability Test Reports

Usability Test Period:	December 20, 2024 to January 4, 2025
Date of Report:	February 28, 2025
Report Prepared By:	WRS Health Web EHR and Practice Management System 2004 NY-17M Goshen, NY 10924 United States

Executive Summary

A summative usability test was conducted between December 20, 2024 to January 4, 2025 to evaluate the usability of the b11 Decision Support Intervention (DSI) functionality in compliance with ONC certification criterion §170.315(b)(11). The test assessed effectiveness, efficiency, and user satisfaction using System Usability Scale (SUS) metrics and task performance data.

The intended users of the WRS Health Web EHR and Practice Management System functionality are clinical healthcare professionals who are responsible for reviewing and responding to clinical decision support (CDS) alerts during their daily workflows. These users include:

- **Physicians:** Primary decision-makers regarding patient care who frequently interact with CDS alerts during diagnosis and treatment planning.
- **Medical Directors:** Supervisory clinicians overseeing the implementation and effectiveness of CDS systems within the organization.
- **Registered Nurses (RNs):** Clinical support staff who assist with patient care and may also interact with CDS alerts to support clinical decision-making.

The system is designed to support users with varying levels of clinical experience and technical proficiency, ensuring that decision support interventions are accessible, understandable, and actionable at the point of care.

A total of 10 participants representing key user roles, including physicians, medical directors, and registered nurses, took part in the study. These participants used WRS Health Web EHR and Practice Management System to complete tasks related to decision support interventions, providing valuable insights into the system's usability and functionality.

The study evaluated user interaction with the b11 DSI functionality across four key tasks:

- View Decision Support Interventions (DSIs)
- Verify Source Attributes in CDS Alerts
- Provide Electronic Feedback on CDS Alerts
- Download and Export CDS Feedback

Metrics such as task success rate, task completion time, path deviations, and user satisfaction scores were collected.

During the testing session, which lasted approximately 30 minutes per session, each participant was welcomed virtually by the test administrator. Participants were informed of their right to withdraw at any time, and verbal consent was obtained for both participation and session recording.

The administrator began by introducing the test, explaining the safety-enhanced design criteria, and providing instructions for completing a series of tasks sequentially within the EHR. Throughout the

session, metrics such as task completion time and path deviations were captured from session logs for later analysis.

No guidance was provided during the tasks unless a participant was unable to proceed. In such cases, the task was marked as a failure. Participant screens and audio were recorded to facilitate comprehensive post-test analysis.

This study follows the user-centered design (UCD) principles outlined in NISTIR 7741: *NIST Guide to the Processes Approach for Improving the Usability of Electronic Health Records* ([NISTIR 7741 PDF](https://nvlpubs.nist.gov/nistpubs/Legacy/IR/nistir7741.pdf)).

This report is structured using the reporting template defined in NISTIR 7742: *Customized Common Industry Format Template for Electronic Health Record Usability Testing* ([NISTIR 7742 PDF](https://nvlpubs.nist.gov/nistpubs/Legacy/IR/nistir7742.pdf)).

The following types of data were collected for each participant:

- Time to complete the task (in seconds)
- Path deviations (alternates navigation) used, if any
- Participant’s verbalizations during each test, if any
- Participant’s satisfaction ratings for each of the tested functions/criteria

All participant data was de-identified, ensuring no correlation between identity and data. After completing the testing sessions, participants were invited to fill out a post-test questionnaire. The usability of the EHR was evaluated using various recommended metrics aligned with NISTIR 7741 guidelines.

Summary of Summative Usability Test Results

Table 1 provides an overview of the clinical performance metrics and user rating data gathered for the system.

Measure/ Task Description	N (users)	Task Success Mean % (SD)	Task Path Deviation Observed (Optimal)	Task Time Mean seconds (SD)	Task Time Deviations Observed/ Optimal	Task Errors Mean % (SD)	Task Ratings (5=easy) Mean/SD
View Decision Support Interventions (DSIs)	10	100% (0)	3/3	58 (5)	58/58	0% (0)	5/0
Verify Source Attributes in CDS Alerts	10	100% (0)	1/1	45 (4)	45/45	0% (0)	5/0
Provide Electronic Feedback on CDS Alerts	10	100% (0)	1/1	60 (5)	61/60	10% (0.3)	4.8/.4
Download and Export CDS Feedback	10	100% (0)	5/5	40 (3)	40/40	0% (0)	5/0

Table 1. Clinical Test Summary

System Usability Score

The System Usability Scale (SUS) was used to measure users' subjective satisfaction with the system based on their task performance. The system received a score of 93.5% indicating high user satisfaction.

Major Findings:

Participants found WRS Health Web EHR and Practice Management System to be highly effective and user-friendly, enhancing workflow efficiency and providing easy access to key functions. Positive feedback focused on the following aspects:

- High Task Success Rate: All tasks achieved a 100% success rate, confirming that users were able to complete their intended actions with minimal difficulty.
- Efficient Task Completion: Most tasks were completed in under a minute, with minimal path deviations and errors.
- Strong User Satisfaction: The SUS score of 93.5% reflects an excellent user experience, with participants consistently rating tasks as easy to complete.
- Workflow Optimization Opportunities: While overall efficiency was high, some minor inefficiencies were observed in the "Provide electronic feedback" task, which had the highest task time and the only recorded errors.

Areas for Improvement

Participants provided constructive feedback with suggestions into further optimization:

- Participants found the Patient Health Maintenance button to be too far down in the dropdown list and suggested improving its location for easier access.
- Participants proposed that the feedback window should open automatically upon clicking "Thumbs Down" to streamline feedback collection.

Introduction

This study was conducted to ensure the system meets the Safety-Enhanced Design (§170.315(g)(3)) and Decision Support Intervention (§170.315(b)(11)) certification requirements under the ONC Health IT Certification Program. This study was conducted according to the user-centered design (UCD) principles in NISTIR 7741 (NIST, 2010) and follows the reporting structure recommended in NISTIR 7742 (NIST, 2010).

The primary goal of this study was to evaluate and validate the system's usability by measuring task efficiency, accuracy, and user satisfaction. By simulating real-world use cases, the study collected key performance metrics related to task success rates, error frequencies, and user-reported ease of use. The findings from this evaluation provide actionable insights to improve user interaction, enhance clinical workflows, and ensure compliance with safety-enhanced design principles.

Method

Participants

Ten healthcare professionals, including psychiatrists, medical directors, and registered nurses, participated. None of the participants had direct involvement in the development of the EHRUT, ensuring unbiased feedback. They were selected to represent a diverse range of professional backgrounds and technical expertise, allowing for a comprehensive evaluation of the system's usability. These users interact with the system to complete tasks such as patient documentation, decision support review, electronic feedback, and care coordination.

While participants had prior experience with earlier versions of the EHRUT, this was their first interaction with some new feature. This ensured that their feedback reflected an authentic first-time user experience, identifying potential learning curves and workflow efficiency improvements.

The table below summarizes participant demographics, professional experience, computing skills, and any specific assistive technology requirements. To maintain privacy and confidentiality, participant identities were anonymized using unique Participant IDs, ensuring that individual responses could not be linked to specific individuals.

Summative Usability Testing - Participant Demographics

Identifier	Gender	Age	Education	Occupation/Role	Professional Experience	Computer Experience	Product Experience	Assistive Technology Needs
A011	Male	50-59	MD	Psychiatrist	243.00	360.00	36.00	No
A012	Female	50-59	MD	Medical Director	216.00	300.00	36.00	No
A013	Male	30-39	Master's degree	Registered Nurse	60.00	180.00	24.00	No
A014	Female	20-29	Associate degree	Certified Medical Assistant	168.00	300.00	48.00	No
A015	Male	30-39	Master's degree	Operation Director	125.00	216.00	13.00	No
A016	Female	40-49	Master's degree	Licensed Marriage and Family Therapist	120.00	264.00	12.00	No
A017	Male	50-59	MD	MD	300.00	180.00	28.00	No
A018	Female	40-49	Bachelor's degree	Office Manager	228.00	264.00	108.00	No

A019	Female	40-49	Bachelor's degree	Registered Nurse	240.00	252.00	75.00	No
A020	Female	40-49	No degree	Medical Assistant	264.00	264.00	66.00	No

Study Design

The primary objective of this usability test was to evaluate both the strengths and limitations of the EHR system. This included assessing its effectiveness, efficiency, and user satisfaction, while also identifying areas requiring improvement. The findings from this study serve as a benchmark for future usability evaluations, ensuring consistent methodologies and task structures for comparisons with updated versions or alternative EHR systems.

To maintain consistency, all participants interacted with the same EHR version in a controlled environment, following a standardized set of instructions. The system's usability was assessed using key metrics, including:

- Task Success Rate – The percentage of tasks completed successfully within the allotted time.
- Time to Task Completion – The average duration required to complete each task.
- Error Rate – The frequency and type of errors encountered by participants.
- Path Deviations – The number of deviations from the optimal workflow.
- Participant Verbal Feedback – Observations and comments provided by users during testing.
- User Satisfaction Ratings – Post-test ratings evaluating the system's ease of use and overall usability.

Additional details on these metrics and evaluation methods can be found in the Usability Metrics section below.

Tasks

Four tasks were designed to reflect realistic and representative activities a clinical user might perform when using WRS Health Web EHR and Practice Management System. These tasks were specifically constructed to address the functionality gap between the previously tested criterion 170.315(a)(9) Clinical Decision Support and the new criterion 170.315(b)(11) Decision Support Intervention. The tasks included:

- View Decision Support Interventions (DSIs)
- Verify Source Attributes in CDS Alerts
- Provide Electronic Feedback on CDS Alerts
- Download and Export CDS Feedback

Procedures

The remote usability testing was conducted using Google Meet, allowing for screen sharing and audio conferencing. Upon joining the session, each participant's identity was verified against the test schedule and assigned an anonymous Participant ID for data tracking and confidentiality.

The usability test was facilitated by two staff members:

- Usability Test Moderator – Oversaw the session, provided task instructions, and recorded performance data.
- Proctor – Ensured participants adhered to the test protocol and addressed procedural questions.

Verbal consent was obtained from each participant before beginning the test. They were also informed of data protection measures, including de-identification and session recording for analysis.

After providing demographic information, participants received a brief introduction to the functionality being tested.

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

- As quickly as possible, making as few errors and deviations as possible
- Without assistance; the moderator gave only immaterial guidance and clarification, but not instructions on use
- Activities were by the participants and thinking aloud was discouraged

For each task, timing started after the administrator read the question and stopped when the participant indicated task completion. Scoring details are covered in the Data Scoring section.

After the session, participants completed a post-test questionnaire. Demographic information, task success rates, time on task, errors, deviations, verbal responses, and questionnaire results were recorded and archived for review.

Test Location

Testing was conducted remotely using Google Meet. Users were informed of technical requirements beforehand, and assistance with Google Meet was provided as needed.

Test Environment

The usability testing for the EHR system was conducted remotely, as the system is typically used in healthcare office settings. The testing environment was configured by WRS Health Web EHR and Practice Management System to replicate real-world application use under standard conditions.

Each participant received unique login credentials to access the testing environment, which mirrored production-level configurations. Participants used their own computers, keyboards, and mice to interact with the system, ensuring a realistic user experience.

To maintain privacy and confidentiality, no real patient data was used or collected during the sessions. The system recorded only usability interactions and performance metrics, without storing any personal participant data.

Throughout all testing sessions, the administrator ensured that conditions closely resembled actual field use (e.g., a medical office setting). This approach allowed the evaluation of system usability under conditions that closely reflect everyday clinical workflows.

Test Forms and Tools

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

1. Informed Consent
2. Participant Briefing
3. Post-test Questionnaire

Examples of these documents can be found in Appendices in this document, respectively.

Participant Instructions

The moderator conducting the session read a set of standardized instructions to participants to ensure consistency in the testing process. These instructions are detailed in the Participant Briefing, which is included in the Appendix of the report.

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 WRS Health Web EHR and Practice Management System by measuring participant success rates and errors
2. Efficiency of WRS Health Web EHR and Practice Management System by measuring the average task time and path deviations
3. Satisfaction with of WRS Health Web EHR and Practice Management System by measuring ease of use ratings

The following table details how tasks were scored, errors evaluated, and the time data analyzed and is taken directly from NISTIR 7742 Customized Common Industry Format Template for Electronic Health Record Usability Testing.

Measures	Rationale and Scoring
<p>Effectiveness:</p> <p>Task Success</p>	<p>A task was counted as a “Success” if the participant was able to achieve the correct outcome, without assistance, within the allotted time, using only allowable number of path deviations or less.</p> <p>The total number of successes were calculated for each task and each user. These are presented in detail under the Results section of this document.</p> <p>Task Times were benchmarked by users, under realistic conditions, in advance of any test sessions.</p>
<p>Effectiveness:</p> <p>Task Failures</p>	<p>If the participant abandoned the task, or did not perform the test incorrectly, the task was counted as a “Failure.”</p>
<p>Efficiency:</p> <p>Task Deviations</p>	<p>The path that the participant followed in the software was recorded for each test and each participant.</p> <p>If the user was unable to navigate to the functional area to perform a given task, then it was counted as a Path Deviation.</p> <p>All Path Deviations were collected and subsequently compared to the Optimal Paths that were created and benchmarked in advance of any test sessions.</p>
<p>Efficiency</p> <p>Task Time</p>	<p>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.</p> <p>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.</p>
<p>Satisfaction</p> <p>Task Rating</p>	<p>The participant's subjective impression of the ease of use of the application was measured by administering both a simple post-task question as well as a post-session questionnaire.</p> <p>After each task, the participant was asked to rate “Overall, this task was:” on a scale of 1 (Very Difficult) to 5 (Very Easy). These data are averaged across participants.</p> <p>Common convention is that average ratings for systems judged easy to use should be 3.3 or above.</p> <p>To measure participants’ confidence in and likeability of the application overall, the testing team administered the System Usability Scale (SUS) post-test questionnaire.</p> <p>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.”</p>

Results

Data Analysis and Reporting

The usability test results were calculated using the methods outlined in the Usability Metrics section. Data from participants who did not follow session or task instructions were excluded from the analysis. No irregularities or issues arose during testing that could impact data collection or result interpretation.

The detailed results for the EHRUT are presented in the table below. These results should be interpreted in the context of the objectives and goals described in the Study Design section. The findings provide actionable insights that can positively influence user performance.

Measure/ Task Description	N (users)	Task Success Mean % (SD)	Task Path Deviation Observed/Optimal	Task Time Mean (SD)	Task Time Deviations Observed/Optimal	Task Errors Mean % (SD)	Task Ratings (5=easy) Mean/SD
View Decision Support Interventions (DSIs)	10	100% (0)	3/3	58 (5)	58/58	0% (0)	5/0
Verify Source Attributes in CDS Alerts	10	100% (0)	1/1	45 (4)	45/45	0% (0)	5/0
Provide Electronic Feedback on CDS Alerts	10	100% (0)	1/1	60 (5)	61/60	10% (0.3)	4.8/.4
Download and Export CDS Feedback	10	100% (0)	5/5	40 (3)	40/40	0% (0)	5/0

System Usability Test Results

The System Usability Scale (SUS) was used to measure users' subjective satisfaction with the system based on their task performance. The system received a score of 93.5% indicating high user satisfaction.

Discussion of Findings

Effectiveness

The usability test results indicate that the WRS Health Web EHR and Practice Management System is highly effective in supporting clinical workflows related to Decision Support Intervention (DSI) functionality. Task success rates were 100% across all tested functions, demonstrating that participants were able to complete each task successfully within the allotted time. Additionally, error rates were minimal, with only one task ("Provide electronic feedback when presented with CDS intervention") showing a slight error rate of 10%, likely due to minor workflow inefficiencies. These findings suggest that the system is well-optimized for its intended users, enabling them to complete tasks with a high degree of accuracy.

Efficiency

The efficiency of WRS Health Web EHR and Practice Management System was assessed based on task completion times, path deviations, and observed workflow interruptions. The average task completion times were within the expected range, with the longest task taking 60 seconds (providing electronic feedback on CDS alerts). Path deviations were minimal across all tasks, indicating that users generally followed the intended workflow without confusion or unnecessary detours. The only noted inefficiency was a slight deviation in providing electronic feedback. While minor, this suggests that refining this process could improve overall efficiency.

Satisfaction

User satisfaction with the system was overwhelmingly positive, as reflected by the System Usability Scale (SUS) score of 93.5%. This score is significantly above the industry standard threshold of 68, indicating that users found the system highly intuitive and user-friendly. Participants consistently rated tasks as "easy" or "very easy," with most tasks receiving an average rating of 5. The high satisfaction scores confirm that the system's design aligns well with user expectations and workflow requirements.

Major Findings

All tasks achieved a 100% success rate, confirming that users were able to complete their intended actions with minimal difficulty. Most tasks were completed in under a minute, with minimal path deviations and errors. The SUS score of 93.5% reflects an excellent user experience, with participants consistently rating tasks as easy to complete. While overall efficiency was high, some minor inefficiencies were observed in the "Provide electronic feedback" task, which had the highest task time and the only recorded errors.

Areas for improvement

Participants found the Health Maintenance button to be too far down in the dropdown list and suggested improving its location for easier access. Participants proposed that the feedback window should open automatically upon clicking "Thumbs Down" to streamline feedback collection. Overall, WRS Health Web EHR and Practice Management System demonstrated a high level of usability, effectiveness, and user satisfaction. Addressing the identified areas for improvement will help refine the system further and enhance clinical workflows.

APPENDICES

Appendix A – Demographic Questionnaire



Participant Screening Survey

Thank you for your interest in the WRS Clinical Usability Study. Please take a few minutes to complete the information below. This will be used to qualify your participation in the Study. All questionnaire and testing data is anonymous.

Name	
Gender	<i>Female, Male</i>
Age	<i>20-29, 30-39, 40-49, 50-59, 60-69, 70-79, 80-89</i>
Education (highest attained)	<i>LPN, RN, NP, PA, MD, Other</i>
Occupation or Role	
Professional Experience (in months)	
Experience with Computers in Healthcare (in months)	
Experience with EHR (in months)	
Assistive technology needs	<i>e.g., screen reader, etc.</i>

Appendix B - Participant Demographics

Gender	Count
Male	5
Female	5
Age (years)	
20-29	1
30-39	2
40-49	4
50-59	3
Occupational Distribution	Count
RN/LPN/MA	5
Prescribers	4
Staff	1
Professional Experience (years)	Count
1-10	3
11-15	1
15+	6
Computer Experience (years)	Count
1-10	0
11-15	2
15+	8
EHR Experience (years)	Count
1-3	6
4-5	1
5+	2

Appendix C - Informed Consent



WRS Health Web EHR and Practice Management System would like to thank you for participating in this study. The purpose of this study is to evaluate an electronic health records system. If you decide to participate, you will be asked to perform several tasks using the prototype and give your feedback. The study will last about 60 to 90 minutes. At the end of the test, you will be compensated for your time.

Agreement

I understand and agree that as a voluntary participant in the present study conducted by WRS Health Web EHR and Practice Management System. I am free to withdraw consent or discontinue participation at any time. I understand and agree to participate in the study conducted and recorded by the WRS Health Web EHR and Practice Management System.

I understand that the information is for research purposes only and that my name and image will not be used for any purpose. I understand and agree that the purpose of this study is to make software applications more useful and usable in the future.

I understand and agree that the data collected from this study may be shared outside of WRS Health Web EHR and Practice Management System. I understand and agree that data confidentiality is assured, because only de-identified data – i.e., identification numbers not names – will be used in analysis and reporting of the results.

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

Acknowledgement

Please check one of the following:

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

Name (print): _____

Professional Title: _____

Signature: _____

Date: _____

Appendix D - Participant Briefing

Introduction

Hello and thank you for participating in our study today! Our session will take about 30 minutes. During this time, you'll be exploring an electronic health record system.

I'll guide you through a few tasks using the system and ask some questions along the way. The goal is to understand how easy or difficult it is to use, what features you find helpful, and where there's room for improvement.

Here's how it will work:

- You'll complete the tasks on your own, aiming to do them as quickly and accurately as possible.
- Please stick to the tasks as they are presented—there's no need to explore beyond what's asked.
- If you get stuck or encounter issues, I won't be able to assist you with the system itself. However, feel free to note any challenges so we can discuss them after the session.

Your honest feedback is invaluable, so don't hesitate to share your thoughts. We'll save detailed discussions for the end of each task or the session overall to keep things focused.

You'll be working with a demo version of the WRS Health Web EHR and Practice Management System today. It's populated with sample data, so some of it might not seem logical or relevant—that's normal for placeholder content.

Rest assured, all the information you provide will remain confidential. Your name won't be associated with your feedback in any way.

Do you have any questions or concerns before we start?

Before we begin, I'd like to ask a few questions about you and your background. This helps us understand how your experience might influence your interaction with the system. This is for record-keeping purposes only; your responses will remain anonymous.

1. What is your name?
2. What is your gender and age?
3. What is the highest level of education you've completed?
4. What is your current job title?

5. How long have you been working in your current professional role? (Years and months)
6. How many years and months of experience do you have using computers in general?
7. How many years and months of experience do you have with the EHR systems?

Now, I'll ask you to complete a series of tasks using the demo version of the system. Please try to complete them as quickly and accurately as possible. If you encounter difficulties, feel free to let me know, but I won't be able to provide help directly related to the system during the tasks.

Do you have any questions before we proceed?

Appendix E - Tasks

1. View Decision Support Interventions (DSIs)

You would like to know if there are Clinical Decision Support Interventions for the patient you are seeing today, Demo Test.

Optimal Path: Navigate to the patient's Health Maintenance section from Today's Appt List and view the DSI

Rating: Overall, how would you rate this task? ("Very Difficult" (1) to "Very Easy" (5))

2. Verify Source Attributes in CDS Alerts

You would like to verify the source attributes for the DSI. Once you have located the attributes, tell me the name of the primary author for the bibliographic citation.

Optimal Path: View the attributes information within the "Source" section of the DSI

Rating: Overall, how would you rate this task? ("Very Difficult" (1) to "Very Easy" (5))

3. Provide Electronic Feedback on CDS Alerts

You would like to provide feedback on this DSI.

Optimal Path: Select the feedback option within the DSI alert and leave a comment

Rating: Overall, how would you rate this task? ("Very Difficult" (1) to "Very Easy" (5))

4. Download and Export CDS Feedback

You would like to export the feedback report for today.

Optimal Path: Navigate to the Clinical Logs section, Apply filters for today's date and select the Feedback report type. Click on "Export" to download the csv report.

Rating: Overall, how would you rate this task? ("Very Difficult" (1) to "Very Easy" (5))

Appendix F - System Usability Scale

Ratings:

5 - Strongly Agree

4 - Agree

3 - Neutral

2 - Disagree

1 - Strongly Disagree

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

References

- National Institute of Standards and Technology. (2010). *NISTIR 7741: NIST Guide to the Processes Approach for Improving the Usability of Electronic Health Records*. Gaithersburg, MD: U.S. Department of Commerce. <https://nvlpubs.nist.gov/nistpubs/Legacy/IR/nistir7741.pdf>
- National Institute of Standards and Technology. (2010). *NISTIR 7742: Customized Common Industry Format Template for Electronic Health Record Usability Testing*. Gaithersburg, MD: U.S. Department of Commerce. <https://nvlpubs.nist.gov/nistpubs/Legacy/IR/nistir7742.pdf>