Greenway Intergy EHR / Version 11.00

EHR Usability Test Report of Greenway Intergy EHR 11.00

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

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1 | Executive Summary

A usability test of Greenway Intergy 11.00, an ambulatory electronic health record software from Greenway Health, was conducted on August 10-13, 2016 in Atlanta, Georgia and on January 11, 2017 in Wesley Chapel, Florida by Greenway Health User Experience researchers. The purpose of this summative study was to test and validate the usability of the current user interface, and provide evidence of usability in the EHR Under Test (EHRUT).

During the usability test, 32 healthcare providers and/or other intended users matching the target demographic criteria served as participants and used the EHRUT in simulated, but representative tasks.

This study collected performance data on 46 tasks typically conducted on an EHR by physicians/providers and nurses/medical assistants. The tasks are correlated to the twelve certification criteria in *45 CFR Part 170 Subpart C of the Health Information Technology: 2015 Edition Health Information Technology (Health IT) Certification Criteria, 2015 Edition Base Electronic Health Record (EHR) Definition, and ONC Health IT Certification Program Modifications*:

§170.315(a)(1) Computerized Provider Order Entry – Medications

§170.315(a)(2)   Computerized Provider Order Entry – Laboratory

§170.315(a)(3)   Computerized Provider Order Entry – Diagnostic Imaging

§170.315(a)(4)   Drug-Drug, Drug-Allergy Interactions Checks

§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

The test sessions varied in time, as follows:

- 60 minutes for Clinical Users (Atlanta, GA)
- 30 minutes for Clinical Users (Wesley Chapel, FL)
- 15 minutes for Administrative/Clerical Users (Wesley Chapel, FL)

During each one-on-one usability test, each participant was greeted by the administrator and asked to review and sign an informed consent and release form (included in **Appendix C | Recording Consent Form**).

All participants were current users of Intergy EHR, so they had prior experience with some version of the EHR. Training videos and a live demonstration were provided to clinical participants on three new electronic prescribing features. The training videos were online training that is available to end users.

The administrator introduced the test, and instructed participants to complete a series of tasks (given one at a time) using the EHRUT. During the testing, the administrator timed the test and, along with the data logger(s), recorded user performance data on paper and electronically. The administrator did *not* give the participant assistance in how to complete the task.

Participant screens, picture-in-picture participant interaction, and audio were recorded. The recordings were later analyzed to determine task times and evaluate user performance. The following types of data were collected for each participant:

- Number of tasks successfully completed within the allotted time without assistance
- Time to complete the tasks
- Number and types of errors
- Path deviations
- Participant's familiarity, ease-of-use, and satisfaction ratings of the system and its components
- System Usability Scale (SUS)

All participant testing data was de-identified – no correspondence could be made from the identity of the participant to the data collected.

Following the conclusion of the testing, participants were asked to complete a post-test questionnaire. They were later sent a $25 gift card in appreciation for their time.

The UCD process used in the design and development of the above twelve 2015 Edition certification criteria was based on NISTIR 7741[1]. Various recommended metrics were used to evaluate the usability of the EHRUT. Use was in accordance with the examples set forth in the *NIST Guide to the Processes Approach for Improving the Usability of Electronic Health Records*.

In addition, results include the following qualitative observations:

- Major findings
- Areas for improvement
- Participant's verbalizations

The results from the System Usability Scale (SUS)[2] scored the subjective satisfaction with the system based on performance with these tasks to be: 84.63. Results are detailed in the Results section of this report, which includes a subsection for each of the twelve ONC CEHRT 2015 Edition criteria.

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[1] National Institute of Standards and Technology. (November 2010). *NIST Guide to the Processes Approach for Improving the Usability of Electronic Health Records* (NISTIR 7741). Gaithersburg, MD. nist.gov/publications/nistir-7741-nist-guide-processes-approach-improving-usability-electronic-health-records.

[2] See Tullis, T. & Albert, W. (2008). Measuring the User Experience. Burlington, MA: Morgan Kaufman (p. 149). Broadly interpreted, scores under 60 represent systems with poor usability; scores over 80 would be considered above average.

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2 | Introduction

The EHR Under Test (EHRUT) tested for this study was Greenway Intergy EHR 11.00, an ambulatory electronic health record software. Designed to present medical information to healthcare providers in an ambulatory setting for various specialties, Greenway Intergy EHR consists of a comprehensive electronic clinical system used to create, store, and retrieve patient data. Greenway Intergy EHR is fully integrated with the Greenway Intergy Practice Management System. Intended users of Intergy EHR are doctors, nurse practitioners, physician assistants, nurses, medical assistants, and anyone entering or accessing clinical data at an ambulatory medical practice. The usability testing attempted to represent realistic exercises and conditions that occur in a typical medical practice environment.

The purpose of this study was to test and validate the usability of the current user interface and provide evidence of usability in the EHRUT. To this end, measures of effectiveness, efficiency, and user satisfaction were captured during the usability testing, such as task success, time on task, and task group ratings.

3 | Method

Participants

A total of 32 participants were tested on Greenway Intergy EHR. Participants in the test were physicians and allied healthcare providers in ambulatory settings, ranging in years of experience with Greenway Intergy EHR and varied in specialty including Multi-Specialty, Family Practice, Internal Medicine, Pediatrics, OB/GYN, Gastroenterology, Nephrology, ENT, and Infectious Disease.

Greenway Health User Experience researchers coordinated the recruitment of participants. The request for participants described end-user roles required for testing. Participants either responded directly or were identified by administrators of their health care organization. For the test purposes, end-user characteristics were identified and translated into a recruitment screener used to solicit potential participants; an example of a screener is provided in **Appendix A | Sample Recruiting screener**.

Participants had no direct connection to the development organization producing the Greenway Intergy system. Participants were not from the testing or supplier organization. For new features being tested, participants being given the electronic prescribing tasks were given the opportunity to have the same orientation and level of training as the actual end users would have received. Participants were sent a $25 gift card in appreciation for their participation.

Recruited participants had a mix of backgrounds and demographic characteristics conforming to the recruitment screener. **Table 1: Participants** lists participants by characteristics, including occupation/role and product experience. Participant names were replaced with Participant IDs so that an individual's data cannot be tied back to individual identities. Participant demographics are detailed in **Appendix B | Participant demographics**.

Total Number and Description of Participants

Thirty-two (32) participants were recruited and participated in the usability test. Their descriptions are indicated in the table below:

Table 1: Participants

Part ID	Gender	Age	Education	Occupation/ Role	Professional Experience (months)	Computer Experience	Product Experience (months)	Assistive Technology Needs
ID01	Male	30-39	Master's Degree	Family Practice, Physician's Assistant, Co-Director of Business Intelligence Department	144	360	72	No
ID02	Female	40-49	Bachelor's Degree	Nephrology, LPN, Clinical Coordinator	192	240	120	No
ID03	Female	50-59	Doctorate degree (e.g., MD, DNP, DMD, PhD)	Multispecialty: Primary Care, RN	360	300	192	No
ID04	Male	50-59	Doctorate degree (e.g., MD, DNP, DMD, PhD)	Primary Care, Administrative	312	360	108	No
ID05	Male	40-49	Doctorate degree (e.g., MD, DNP, DMD, PhD)	Gastroenterology, Doctor	252	360	30	No
ID06	Female	50-59	Bachelor's Degree	Multispecialty, EHR Trainer	384	240	120	No
ID07	Male	60-69	Doctorate degree (e.g., MD, DNP, DMD, PhD)	Family Practice, Doctor	384	360	72	No
ID08	Female	50-59	Doctorate degree (e.g., MD, DNP, DMD, PhD)	OBGYN, Physician	228	444	192	No
ID09	Female	40-49	Doctorate degree (e.g., MD, DNP, DMD, PhD)	Family Practice, Doctor	216	240	48	No
ID10	Female	50-59	Doctorate degree (e.g., MD, DNP, DMD, PhD)	OBGYN	360	240	84	No
ID11	Female	40-49	Some college credit, no degree	Nephrology, LPN	240	240	60	No
ID12	Male	40-49	Doctorate degree (e.g., MD, DNP, DMD, PhD)	Pediatrics, Pediatrician	144	150	180	No
ID13	Female	40-49	Doctorate degree (e.g., MD, DNP, DMD, PhD)	Pediatrics, Pediatrician	240	300	48	No
ID14	Female	20-29	Bachelor's Degree	Multispecialty	48	180	12	No
ID15	Female	40-49	Master's Degree	Multispecialty	240	324	12	No
ID16	Male	50-59	Doctorate degree (e.g., MD, DNP, DMD, PhD)	Infectious Diseases, Doctor	240	240	120	No
ID17	Female	50-59	Some college credit, no degree	Multispecialty	204	360	144	No

Part ID	Gender	Age	Education	Occupation/ Role	Professional Experience (months)	Computer Experience	Product Experience (months)	Assistive Technology Needs
ID18	Female	50-59	Some college credit, no degree	Neurology receptionist	6	300	6	No
ID19	Male	40-49	Some college credit, no degree	Multispecialty	312	360	120	No
ID20	Female	20-29	Bachelor's Degree	Multispecialty	60	240	60	No
ID21	Female	30-39	Some college credit, no degree	ENT	180	240	96	No
ID22	Male	50-59	Master's Degree	Multispecialty	144	360	144	No
ID23	Female	40-49	Master's Degree	ENT	204	192	30	No
ID24	Female	30-39	Master's Degree	Family Practice	156	240	4	No
ID25	Female	30-39	Master's Degree	Neurology	156	240	12	No
ID26	Female	30-39	Doctorate degree (e.g., MD, DNP, DMD, PhD)	Pediatrics	108	360	7	No
ID27	Female	30-39	Some college credit, no degree	Multispecialty	240	360	120	No
ID28	Female	40-49	Bachelor's Degree	Multispecialty	204	360	120	No
ID29	Female	30-39	Master's Degree	Informatics	204	240	60	No
ID30	Male	30-39	Bachelor's Degree	Clinical Research	204	408	120	No
ID31	Female	40-49	Trade/technical/vocational training	Clinical Research	324	324	120	No
ID32	Male	50-59	Doctorate degree (e.g., MD, DNP, DMD, PhD)	Urgent Care	240	360	48	No

Participants were scheduled for sessions with the following time length and time interval between sessions for debrief by the administrator and data logger, and to reset systems to proper test conditions:

Table 2: Test Location

Location	Session Length	Interval Between Sessions
Atlanta, GA – Clinical Users	60 minutes	15-minutes
Wesley Chapel, FL – Clinical Users	30 minutes	15-minutes
Wesley Chapel, FL – Administrative and Clerical Users	15 minutes	15-minutes

A spreadsheet was used to keep track of the participant schedule and included key identification details for each participant.

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 Greenway Intergy EHR and may also be used for 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 and also to identify areas for improvement.

During the usability test, each participant used Greenway Intergy EHR at the location detailed in **Table 2: Test Location** and was provided with the same instructions. The system was evaluated on the following measures for effectiveness, efficiency, and satisfaction as defined by measures collected and analyzed for each participant:

- Number of tasks successfully completed within the allotted time without assistance
- Time to complete the tasks
- 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 in the **Usability Metrics** section of this report.

Tasks

A number of tasks were constructed that would be realistic and representative of the kinds of activities a user might perform with this EHR. Tasks were selected based on the twelve ONC CEHRT2015 certification criteria, taking into consideration frequency of use, potential for risk to patient safety, and criticality of function. The Safety-Enhanced Design (SED) tasks for the twelve ONC CEHRT2015 certification criteria included:

Scenario 1: Medication Allergy List	
Access Active Medication Allergies (A8.1)	170.315(a)(8) - Medication Allergy List
Change an Existing Medication Allergy (A8.3)	170.315(a)(8) - Medication Allergy List
Record a New Medication Allergy (A8.2)	170.315(a)(8) - Medication Allergy List
Locate Inactive Allergies in Medication Allergy List (A8.4)	170.315(a)(8) - Medication Allergy List
Reactivate an Inactive Medication Allergy (A8.5)	170.315(a)(8) - Medication Allergy List
Scenario 2: Problem List	
Access the Active Problem List (A6.1)	170.315(a)(6) - Problem List
Change an Existing Problem from a Different Encounter (A6.2)	170.315(a)(6) - Problem List
Access the Full Problem List (A6.3)	170.315(a)(6) - Problem List
Reactivate an Inactive Problem (A6.4)	170.315(a)(6) - Problem List

Record a New Problem (A6.5)	170.315(a)(6) - Problem List
Find Problem SNOMED Code (A6.6)	170.315(a)(6) - Problem List
Find Problem Reference Information (A9.8)	170.315(a)(9) – Clinical Decision Support

Scenario 3: Implantable Device List	
Access Implantable Device List (A14.1)	170.315(a)(14) – Implantable Device List
Change an Existing Implantable Device (A14.2)	170.315(a)(14) – Implantable Device List
Record a New Implantable Device (A14.3)	170.315(a)(14) – Implantable Device List
Access Full Implantable Device List (A14.4)	170.315(a)(14) – Implantable Device List

Scenario 4: Clinical Decision Support	
Access CDS Interventions (A9.1)	170.315(a)(9) – Clinical Decision Support
Identify Due / Overdue CDS Interventions (A9.2)	170.315(a)(9) – Clinical Decision Support
Process a CDS Intervention (A9.3)	170.315(a)(9) – Clinical Decision Support
Identify the Guideline for a CDS Intervention (A9.4)	170.315(a)(9) – Clinical Decision Support
Locate Reference Information for a CDS Intervention (A9.5)	170.315(a)(9) – Clinical Decision Support
Configure a CDS Guideline (A9.6)	170.315(a)(9) – Clinical Decision Support

Scenario 5: Medication List	
Access Active Medications List (A7.1)	170.315(a)(7) - Medication List
Review Full Medications List (A7.2)	170.315(a)(7) - Medication List
Change an Existing Medication (A7.3)	170.315(a)(7) - Medication List
Locate Medication Reference Information (A9.7)	170.315(a)(9) – Clinical Decision Support

Scenario 6: Computerized Physician Order Entry (CPOE)	
Access Orders and Record a New Diagnostic Imaging Order (A3.1)	170.315(a)(3) - CPOE Radiology
Record a New Medication Order (A1.1)	170.315(a)(1) - CPOE Medications
Change an Existing Medication Order (A1.2)	170.315(a)(1) - CPOE Medications
Record a Laboratory Order (A2.1)	170.315(a)(2) - CPOE Laboratory

Scenario 7: Drug Utilization Review	
Identify High-Priority Drug Interactions (A4.1)	170.315(a)(4) - Drug-drug, Drug-allergy Interaction Checks
View Full Details of a Drug Interaction (A 4.2)	170.315(a)(4) - Drug-drug, Drug-allergy Interaction Checks
Process a Drug-Drug, Drug-Allergy Interaction Alert (A4.3)	170.315(a)(4) - Drug-drug, Drug-allergy Interaction Checks

Scenario 8: Clinical Information Reconciliation & Incorporation	
Access Retrieved C-CDA Document (B2.1)	170.315(b)(2) - Clinical Information Reconciliation and Incorporation
Reconcile CCD Data into Chart (B2.2)	170.315(b)(2) - Clinical Information Reconciliation and Incorporation
Check for CDS Interventions Generated by Reconciled C-CDA Data (A9.9)	70.315(a)(9) – Clinical Decision Support

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Scenario 9: Demographics (Clerical)	
Access and Record Demographics (A5.1)	170.315(a)(5) - Demographics
Change Demographics (A5.2)	170.315(a)(5) - Demographics
Scenario 10: DUR Settings (Administrative)	
Adjust Severity Level of Interventions - Limited Permissions (A4.4)	170.315(a)(4) - Drug-drug, Drug-allergy Interaction Checks
Scenario 11: Electronic Prescriptions	
Create a New Electronic Prescription (B3.1)	170.315(b)(3) - E-Prescribing
Send an Electronic Prescription Cancellation to the Pharmacy (B3.2)	170.315(b)(3) - E-Prescribing
Check the Fill Status of an Electronic Prescription (B3.3)	170.315(b)(3) - E-Prescribing
Request and Receive Prescription History Information Electronically (B3.4)	170.315(b)(3) - E-Prescribing
Record a New Prescription for a Liquid Medication (A7.4)	170.315(a)(7) - Medication List
Process an Electronic Rx Change Request from the Pharmacy (B3.5)	170.315(b)(3) - E-Prescribing
Process an Electronic Rx Request from the Pharmacy (A3.6)	170.315(b)(3) - E-Prescribing

Procedures

Upon arrival, participants were greeted; their identity was verified and matched with a name on the participant schedule. Participants were then assigned a participant ID. Each participant reviewed and signed an informed consent and release form (see **Appendix C | Recording Consent Form**). A representative from the test team witnessed the participant's signature.

To ensure that the test ran smoothly, two Greenway Health staff members participated in this test, the usability administrator and the data logger. The usability testing staff conducting the test were experienced usability researchers.

The administrator moderated the session, including administering instructions and tasks. The administrator also monitored task times, obtained post-task rating data, and took notes on participant comments. A second person served as the data logger and took notes on task success, path deviations, number and type of errors, and comments. Participants were instructed to perform the tasks:

- As quickly as possible, making as few errors and deviations as possible.
- Without assistance; administrators were allowed to give immaterial guidance and clarification on tasks, but not instructions on use.
- Withholding questions until the end of the test.

See specific instructions in **Appendix D | Sample Orientation**.

For each task, the participants were given oral directions. Task timing began once the administrator finished reading the task and said, "Begin now." The task time was stopped once the participant said, "Done," or otherwise indicated he or she had successfully completed the task.

Following the session, the administrator gave the participant the post-test questionnaire (see **Appendix F | System Usability Scale Questionnaire**). Scoring is discussed below in the Data Scoring section.

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

Test Location

Usability tests were conducted at the following locations:

1. Greenway Health's ENGAGE16 User Conference in Atlanta, Georgia

    The testing at this location was conducted at a Usability Lab set up for the conference. The Usability Lab was situated in a meeting room that was partitioned into usability testing stations. Participants were Intergy EHR users attending the conference from various healthcare organizations.

2. Healthcare Organization in Wesley Chapel, Florida

    The testing at this location was conducted in a training room provided by the healthcare organization. The participants were employees of the healthcare organization.

To ensure that the surroundings were comfortable for participants, noise levels were kept to a minimum and the ambient temperature kept within a normal range.

Test Environment

Greenway Intergy EHR is typically used in an ambulatory healthcare setting. Usability testing was conducted in person at two different locations, and the test environment for each location is detailed below:

1. Greenway Health's ENGAGE16 User Conference in Atlanta, Georgia

    Participants were scheduled for the Usability Lab in advance and instructed to arrive at the appointed time of their session. Each station contained a table, a computer for the participant, and a computer for the data logger. The administrator sat next to the participant to facilitate the test, and the data logger sat across the table from the participant where he could see the participant's face as well as the laptop screen to view the participant's interactions with Greenway Intergy EHR.

2. Healthcare Organization in Wesley Chapel, Florida

    Participants were scheduled for usability test sessions in advance and instructed to arrive at the appointed time of their session. Two stations were set up to conduct the testing. Each station contained a table, a computer for the participant, and a computer for the data logger. The administrator sat next to the participant to facilitate the test, and the data logger sat across the table from the participant where he could see the participant's face as well as the laptop screen to view the participant's interactions with Greenway Intergy EHR.

In both testing environments, Dell Latitude E6410 laptops were used running Windows 7 at 1024x768 resolution. They were configured with a 19-inch monitor attached to each computer. The participants used the 19-inch monitor, a mouse, and a keyboard when interacting with Greenway Intergy EHR. The Greenway Intergy and Intergy EHR software was set up by Greenway Health's Information Technology resources according to the product documentation describing the system setup and preparation.

Each instance of Intergy and Intergy EHR was run on a VMware virtual machine using a demonstration database over a LAN set up with an Ethernet connection. Technically, the system performance (i.e., response time) was similar to what actual users would experience in a field implementation. Participants did not change any of the default system settings.

Test Forms and Tools

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

1. Recording Consent Form

2. Usability Protocol, including the Post-test Questionnaire and SUS

3. TechSmith Morae Recorder software

4. Logitech Orbit AF Webcam and Audio Recorder

5. Lapel Microphones

6. Datalogic QuickScan™ QD2430 General Purpose Corded Handheld Area Imager Bar Code Reader

7. Bar Code Test Sheet

Examples of these documents can be found in Appendices A-F respectively. The Usability Protocol was devised to be able to capture required data.

The participant's interaction with the Greenway Intergy and Intergy EHR software was captured and recorded digitally with screen capture software running on the test machine. A camera recorded each participant's facial expressions synced with the screen capture and verbal comments were recorded with a microphone. Each test session was observed by the data logger.

Participant Instructions

The moderator read instructions to the participant from the Usability Protocol, which is available in **Appendix E | User Protocol Tasks**. Following the procedural instructions, participants being given the electronic prescription tasks were shown instructional videos. The participant was then shown Greenway Intergy EHR. Participants were given a selection of the 46 tasks to complete based on their role(s) in their healthcare organization. Tasks are listed in the moderator's guide in **Appendix E | User Protocol Tasks**.

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 Greenway Intergy EHR by measuring participant success rates and errors.

2. Efficiency of Greenway Intergy EHR by measuring the average task time and path deviations.

3. Satisfaction with Greenway Intergy EHR by measuring ease-of-use ratings.

Data Scoring

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

Table 3: Details of how observed data were scored.

	Rationale and Scoring
Effectiveness: Task Success	Task success was determined by assigning numeric weights for various levels of task success, as follows: • Success (without assistance) = 1.0 • Partial success = 0.5 • Failure = 0.0 A task was counted as a "Success" if the participant was able to achieve the correct outcome within the time allotted on a per-task basis and a "Partial success" if the participant was able to achieve the correct outcome with minimal assistance. A success score for each task was calculated by averaging the scores for each task. The results are provided as a percentage. Task times were recorded for successes. Observed task times divided by the optimal time for each task were calculated as a measure of optimal efficiency. Optimal task performance time, as benchmarked by expert performance under realistic conditions, was recorded when constructing tasks. Target task times were operationally derived by multiplying a benchmarked expert performance by a factor of 2.0, allowing for some time buffer because participants were not trained to expert performance, some features were new, and some tasks had multiple valid paths to a successful outcome. Thus, if expert, optimal performance on a task was 10 seconds then allotted task time performance was [10 * 2.0] seconds. This ratio was aggregated across tasks and reported with mean and variance scores.

Rationale and Scoring	
Effectiveness: Task Failures	If the participant abandoned the task, did not reach the correct answer, performed it incorrectly, or reached the end of the allotted time before successful completion, the task was counted as a "Failure". No task times for failed tasks or tasks that exceeded the target task time were used in calculations.
	The total number of errors was calculated by averaging the number of errors counted for each task. Not all deviations were counted as errors. Task failures were also expressed as the mean number of failed tasks per participant.
	A qualitative account of the observed errors and error types was collected.
Efficiency: Task Deviations	The participant's navigation path (i.e., steps) through the application was recorded.
	Deviations occur if the participant, for example, went to a wrong screen, clicked on an incorrect menu item, followed an incorrect link, or interacted incorrectly with an on-screen control. This path was compared to the optimal path. The number of steps in the observed path is divided by the number of optimal steps to provide a ratio of path deviation.
	Path deviations are reported on a qualitative level for use in recommendations for improvement.
Efficiency: Task Time	Each task was timed from when the administrator said "Begin" until the participant said "Done." If the participant failed to say "Done," the time was stopped when the participant ceased performing the task. Only task times for tasks that were successfully completed and tasks that were completed at or under the target time were included in the average task time analysis. Average time per task and variance measures were calculated for each task for use in the results analysis.
Satisfaction: Task Rating	Participant's subjective impression of the ease of use of the application was measured by administering both a simple question on completion of each scenario and a post-session questionnaire. After each scenario, the participant was asked to rate "Overall, these tasks were:" on a scale of 1 (Very Difficult) to 5 (Very Easy). These data were averaged across participants.
	To measure participants' confidence in and likeability of Greenway Intergy EHR overall, the testing team administered the System Usability Scale (SUS) post-test questionnaire. Questions included, "I think I would like to use this system frequently," "I thought the system was easy to use," and "I would imagine that most people would learn to use this system very quickly." See the full System Usability Score questionnaire in **Appendix F | System Usability Scale Questionnaire**.

4 | 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.

The usability testing results for Greenway Intergy EHR are detailed in the sections below. The results should be seen in light of the objectives and goals outlined in Study Design section. The data yielded actionable results that, when corrected, will yield a material, positive impact on user performance.

Criteria 170.315(a)(1) CPOE – Medications

Data Analysis and Reporting

Table 4: Computerized Physician Order Entry (CPOE) – Medications Task Results

Task Scores	N	Task Success		Task Time (sec)		Path Deviation		Errors	
Task	#	Mean (%)	(SD)	Mean (seconds)	(SD)	Deviations (Observed / Optimal)	(SD)	Mean	(SD)
Record a New Medication Order	15	1.00	0.00	14.47	7.97	0.35	0.19	0.57	0.50
Change an Existing Medication Order	14	0.86	0.36	9.43	9.13	0.67	0.65	0.29	0.73

Table 5: CPOE (Computerized Physician Order Entry) Medications Task Scenario

Task Scenario Ratings	Mean	(SD)
Task Group Familiarity Ratings (5=very familiar)	4.65	0.55
Task Group Satisfaction Ratings (5=very easy)	4.57	0.51

Discussion of Findings

Participants were given two CPOE—Medications tasks:

- Record a New Medication Order (A1.2)
- Change an Existing Medication Order (A1.3)

Effectiveness

RECORD A NEW MEDICATION ORDER

The success score for this task was 100%. Participants were easily able to order a medication.

CHANGE AN EXISTING MEDICATION ORDER

The success score for this task was 86%. All participants completed the task, but two participants did not complete the task within the optimal task time. In both cases, the participant started to complete the task using one path and then switched to doing it in a more familiar way.

Efficiency

RECORD A NEW MEDICATION ORDER

Of the 15 participants who completed this task, 47% completed this task using the same number of steps as the optimal number of steps and 53% exceeded the optimal number of steps for this task, as determined by expert performance. The majority of these participants filled out a new, blank medication order, rather than using any of the available shortcuts. Of the four possible paths to completing this tasks, 53.4% used New Rx, 33.3% used Favorite by Diagnosis, 0% used Favorite Rx, and 13.3% used Order Management. The participants who used the Favorite by Diagnosis path completed the task in the same number of steps as the experts, indicating that the variation in number of steps was largely due to the workflow used. All participants completed the task within the optimal time.

CHANGE AN EXISTING MEDICATION ORDER

Of the 14 participants who completed this task, 57% completed this task using the same number of steps as the optimal number of steps, 14% exceeded the optimal number of steps for this task, and 29% used fewer steps than the optimal number of steps, as determined by expert performance. Two participants were unable to complete the task within the optimal task time.

Satisfaction

The average satisfaction rating for CPOE was high at 4.57 out of 5 points on a Likert scale (91% satisfaction). This satisfaction rating is an increase from the average satisfaction results from the Meaningful Use 2014 Edition safety-enhanced design testing, which was 4.13 on a 5-point Likert scale (83% satisfaction).

Of the task groups, CPOE had the highest familiarity rating at 4.65 on a 5-point Likert scale (93% familiarity) for orders and 4.61 (92% familiarity) for lab orders. When compared to the familiarity ratings from the 2014 Edition safety-enhanced design testing with an average familiarity rating of 3.27 for orders and 3.55 for lab orders, these results may indicate a greater adoption of computerized order entry.

Major Findings

- Medication orders were executed swiftly, particularly when participants used the "Favorites by Diagnosis" option. There are multiple paths for working with medication orders, which is beneficial as healthcare providers are able to adapt their preferred workflows.

Areas for Improvement

- Prior to issuing a new prescription for a patient, check to see if the patient has a matching prescription that is eligible for renewal. Prompt the user to issue a renewal instead of a new prescription if one is found.
- Consider adding a way to direct the provider to the prescription favorites list if a diagnosis for the patient has a matching prescription favorite.
- Provide more intelligence- and analytics-based options for displaying quick selection lists for prescriptions.

Criteria 170.315(a)(2) CPOE – Laboratory

Data Analysis and Reporting

Table 6: Computerized Physician Order Entry (CPOE) – Laboratory Task Results

Task Scores	N	Task Success		Task Time (sec)		Path Deviation		Errors	
Task	#	Mean	(SD)	Mean	(SD)	Deviations (Observed / Optimal)	(SD)	Mean	(SD)
Record a Laboratory Order	14	1.00	0.00	21.79	8.75	0.39	0.16	0.11	0.29

Table 7: CPOE (Computerized Physician Order Entry) Laboratory Task Scenario

Task Scenario Ratings	Mean	(SD)
Task Group Familiarity Ratings (5=very familiar)	4.61	0.62
Task Group Satisfaction Ratings (5=very easy)	4.57	0.51

Discussion of Findings

Participants were given one CPOE—Laboratory task:

- Record a Laboratory Order (a2.1)

Effectiveness

RECORD A LABORATORY ORDER

The success score for this task was 100%. Even participants who were not familiar with the electronic lab order system were able to complete an electronic lab order with little difficulty.

Efficiency

RECORD A LABORATORY ORDER

Of the 14 participants who completed this task, 93% completed this task using the same number of steps as the optimal number of steps and 7% (one participant) exceeded the optimal number of steps for this task by one step. All participants completed the task within the optimal time, as benchmarked by expert performance.

Satisfaction

The average satisfaction rating for CPOE was high at 4.57 out of 5 points on a Likert scale (91% satisfaction). This satisfaction rating is an increase from the average satisfaction results from the Meaningful Use 2014 Edition safety-enhanced design testing, which was 4.13 on a 5-point Likert scale (83% satisfaction).

Of the task groups, CPOE had the highest familiarity rating at 4.65 on a 5-point Likert scale (93% familiarity) for orders and 4.61 (92% familiarity) for lab orders. When compared to the familiarity ratings from the Meaningful Use 2014 Edition safety-enhanced design testing with an average familiarity rating of 3.27 for orders and 3.55 for lab orders, these results may indicate a greater adoption of computerized order entry.

Major Findings

- Several participants expressed a preference for having their Medical Assistants complete the lab orders for them, a workflow that is supported by the system.

Areas for Improvement

- No significant areas of improvement were identified.

Criteria 170.315(a)(3) CPOE – Diagnostic Imaging

Data Analysis and Reporting

Table 8: Computerized Physician Order Entry (CPOE) – Diagnostic Imaging Task Results

Task Scores	N	Task Success		Task Time (sec)		Path Deviation		Errors	
Task	#	Mean	(SD)	Mean	(SD)	Deviations (Observed / Optimal)	(SD)	Mean	(SD)
Access Orders and Record a New Diagnostic Imaging Order	15	0.93	0.26	24.47	13.37	0.54	0.30	0.13	0.35

Table 9: CPOE (Computerized Physician Order Entry) Diagnostic Imaging Task Scenario

Task Scenario Ratings	Mean	(SD)
Task Group Familiarity Ratings (5=very familiar)	4.65	0.55
Task Group Satisfaction Ratings (5=very easy)	4.57	0.51

Discussion of Findings

Participants were given one CPOE—Diagnostic Imaging task:

- Access Orders and Record a New Diagnostic Imaging Order (a3.1)

Effectiveness

ACCESS ORDERS AND RECORD A NEW DIAGNOSTIC IMAGING ORDER

The success score for this task was 93%. Participants had no difficultly accessing orders. One participant was unable to complete the task within the optimal task time. The participant was not a care provider and had difficulty locating the order. Clinical participants typically indicated that ordering functionality is one of the features in the system they use most frequently.

Efficiency

ACCESS ORDERS AND RECORD A NEW DIAGNOSTIC IMAGING ORDER

Of the 15 participants who completed this task, 93% completed this task using a number of steps within the range of the optimal number of steps and 7% exceeded the optimal number of steps for this task. The one participant who exceeded the optimal number of tasks had difficulty finding the order in the test system. All participants completed the task, but one participant was unable to complete the task within the optimal time.

Satisfaction

The average satisfaction rating for CPOE was high at 4.57 out of 5 points on a Likert scale (91% satisfaction). This satisfaction rating is an increase from the average satisfaction results from the Meaningful Use 2014 Edition safety-enhanced design testing, which was 4.13 on a 5-point Likert scale (83% satisfaction).

Of the task groups, CPOE had the highest familiarity rating at 4.65 on a 5-point Likert scale (93% familiarity) for orders and 4.61 (92% familiarity) for diagnostic imaging orders. When compared to the familiarity ratings from the Meaningful Use 2014 Edition safety-enhanced design testing with an average familiarity rating of 3.27 for orders and 3.55 for lab orders, these results may indicate a greater adoption of computerized order entry.

Major Findings

- Participants were easily able to access diagnostic imaging orders and record a new diagnostic imaging order.

- Many providers indicated that their typical workflow was to begin ordering by adding problems addressed during the visit to assessments in the Note. The assessments are then available in the CPOE for adding orders. They then add orders to those assessments. Because the usability study did not incorporate the Note into the test scenarios, many participants were using an atypical workflow to complete the CPOE tasks.

- Adoption of the advanced ordering functionality that allows providers to create orders based on order history seems to have greater adoption since the usability studies conducted for Meaningful Use 2014 Edition safety-enhanced design.

Areas for Improvement

- Search is available for medication and lab orders. However, diagnostic imaging and other orders would greatly benefit by having a search option.

Criteria 170.315(a)(4) Drug-Drug, Drug-Allergy Interactions Checks

Data Analysis and Reporting

Table 10: Drug-Drug, Drug-Allergy Interaction Task Results

Task Scores	N	Task Success		Task Time (sec)		Path Deviation		Errors	
Task	#	Mean	(SD)	Mean	(SD)	Deviations (Observed / Optimal)	(SD)	Mean	(SD)
Identify High-Priority Drug Interactions	14	0.93	0.27	5.14	4.31	0.43	0.36	0.14	0.36
View Full Details of a Drug Interaction	14	1.00	0.00	3.21	2.97	0.32	0.30	0.00	0.00
Process a Drug-Drug, Drug-Allergy Interaction Alert	14	1.00	0.00	11.29	8.40	0.34	0.25	0.07	0.27
Adjust Severity Level of Interventions - Limited Permissions	10	0.45	0.52	87.50	50.37	1.11	0.64	1.36	0.67

Table 11: Drug-Drug, Drug-Allergy Interaction Task Scenario

Task Scenario Ratings	Mean	(SD)
Task Group Familiarity Ratings (5=very familiar)	4.13	1.20
Task Group Satisfaction Ratings (5=very easy)	4.33	1.23

Table 12: Configure DUR Tasks Scenario

Task Scenario Ratings	Mean	(SD)
Task Group Familiarity Ratings (5=very familiar)	2.13	1.72
Task Group Satisfaction Ratings (5=very easy)	3.40	1.51

Discussion of Findings

Participants were given the following drug-drug, drug-allergy interactions checks tasks:

- Identify High-Priority Drug Interactions (a4.1)
- View Full Details of a Drug Interaction (a4.2)
- Process a Drug-Drug, Drug-Allergy Interaction Alert (a4.3)
- Adjust Severity Level of Interventions - Limited Permissions (a4.4)

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Effectiveness

IDENTIFY HIGH-PRIORITY DRUG INTERACTIONS

The success score for this task was 93%. All participants were able to perform a drug utilization review successfully. One participant did not complete the task within the optimal time due to performing a more thorough review of the interactions.

VIEW FULL DETAILS OF A DRUG INTERACTION

The success score for this task was 100%. All participants located the monograph in the full drug details of the Drug Utilization Review Report successfully.

PROCESS A DRUG-DRUG, DRUG-ALLERGY INTERACTION ALERT

The success score for this task was 100%. Participants were able to process the drug interaction alerts.

ADJUST SEVERITY LEVEL OF INTERVENTIONS - LIMITED PERMISSIONS

The success score for this task was 36%, with seven participants being unable to complete the task within the optimal task time. The clinical participants indicated that they do not have access to configure the system in their practices; however, they were all ultimately able to complete the task.

Efficiency

IDENTIFY HIGH-PRIORITY DRUG INTERACTIONS

All participants completed the tasks with the same number of steps as expert users. All participants completed the tasks within the optimal time, except one participant who simply inspected the DUR report more thoroughly.

VIEW FULL DETAILS OF A DRUG INTERACTION

All participants completed the tasks with the same number of steps as expert users. All participants completed the tasks within the optimal time, as benchmarked by expert performance.

PROCESS A DRUG-DRUG, DRUG-ALLERGY INTERACTION ALERT

All participants completed the tasks with the same number of steps as expert users. All participants completed the tasks within the optimal time, as benchmarked by expert performance.

ADJUST SEVERITY LEVEL OF INTERVENTIONS - LIMITED PERMISSIONS

Of the 10 participants who completed this task, 80% completed this task using the same number of steps as the optimal number of steps and 20% exceeded the optimal number of steps for this task due to being unfamiliar with the task. The two users who completed the task using the same number of steps as the experts work in a system administration role. All participants completed the task, but seven participants were unable to complete the task within the optimal task time, as benchmarked by expert performance.

Satisfaction

Drug Utilization Review had an average satisfaction rating of 4.33 out of 5 points on a Likert scale (87% satisfaction). This rating is slightly lower than the satisfaction rating for Meaningful Use 2014 Edition safety-enhanced design testing, which had an average satisfaction rating of 4.67. Many participants indicated that they do not typically look at the DUR. Several participants suggested that the drug interaction priorities be color coded or that the higher-priority interaction warnings be displayed more prominently.

The Adjusting the Severity Level of Interventions task had an average satisfaction rating of 3.40 out of 5 points on a Likert scale (68% satisfaction). It was both the lowest satisfaction rating and the lowest familiarity rating in the study (average familiarity rating = 2.13 or 43% familiarity). Providers were not familiar with the configuration of drug interactions, as that task is typically a function of their system administration.

Major Findings

- Many providers indicated that the DUR contained irrelevant data and that it displays too often. As one participant stated, "You have got to let us filter this stuff out, and the box needs to come up less frequently. It only needs to come up in, say, one in every ten patients–for really meaningful interactions–so we pay attention to it."

- Two participants indicated that the priority of the drug interaction warnings would be more apparent by using color coding or by making higher-priority warnings more prominent.

- Clinical participants do not typically have access to adjust the level of severity of the DUR. One of the clinical participants stated, "This may be the first time I've ever been in System Administration."

- System administrator participants were able to adjust the level of severity of the DUR successfully, with two completing it within half the optimal time.

- Participants complained about the wording of the drug interaction alerts, which come from a third-party integration, indicating that the severity of the alerts is not clear and the alert meaning is indirect. One participant stated, "Most people look at it, but it doesn't say in the message what is the key point. And the key point is that adverse effects and toxicity can occur. I would like to see the main thing show up there."

Areas for Improvement

- Improve the visual display of the Drug Utilization Review Report, making the higher priority drug interaction warnings easier to identify.
- Simplify the options for setting up drug interaction alerts.
- Give providers accessible options to configure the level of warnings that display for the prescriptions they write and to streamline their workflows.

Criteria 170.315(a)(5) Demographics

Data Analysis and Reporting

Table 13: Demographics Task Results

Task Scores	N	Task Success		Task Time (sec)		Path Deviation		Errors	
Task	#	Mean	(SD)	Mean	(SD)	Deviations (Observed / Optimal)	(SD)	Mean	(SD)
Access and Record Demographics	12	0.71	0.40	68.17	23.60	0.77	0.27	0.65	0.72
Change Demographics	12	1.00	0.00	5.08	1.93	0.51	1.93	0.00	0.00

Table 14: Demographics Task Scenario

Task Scenario Ratings	Mean	(SD)
Task Group Satisfaction Ratings (5=very easy)	4.46	0.66

Discussion of Findings

Participants were given two demographics tasks:

- Access and Record Demographics (A5.1)
- Change Demographics (A5.2)

Effectiveness

ACCESS AND RECORD DEMOGRAPHICS

The success score for this task was 71%, with two participants being unable to complete the task within the optimal task time and three participants being given a hint. All of these participants were clinical users. The success score for this task among just the clerical and administrative users was 100%.

CHANGE DEMOGRAPHICS

The success score for this task was 100%. All participants were able to edit a patient's demographic information.

Efficiency

ACCESS AND RECORD DEMOGRAPHICS

Of the eleven participants who completed this task, 55% completed this task using the same number of steps as the optimal number of steps and 45% exceeded the optimal number of steps for this task. The participants who work in a clinical role indicated being unfamiliar with the task. The task required participants to select a new option to get the CDC race codes to display. Some users found this the new option confusing.

CHANGE DEMOGRAPHICS

All participants completed the tasks with the same number of steps as expert users. All participants completed the tasks within the optimal time, as benchmarked by expert performance.

Satisfaction

Participants had an average satisfaction rating of 4.38 out of 5 points on a Likert scale (89% satisfaction) for these tasks. The participant who gave the lowest score cited the new feature for adding the CDC race codes to the Race selection list as confusing.

Major Findings

- Front desk personnel, rather than nursing staff, typically perform demographic data entry tasks. One participant who works in a clinical role stated, "This is not something I do often."

- The task required participants to use a new feature that added the CDC race codes to the race code list, which was confusing for participants. Once they learned how to add the CDC race codes, they had no problem, indicating that training on the new feature was necessary.

- Clinical participants liked that they can enter sexual orientation and gender identity demographics in the EHR, rather than having it entered in the practice management system by front desk personnel.

Areas for Improvement

- It is important that training be provided regarding the addition of CDC race codes and that once the CDC race codes are added to the list, they remain there until filtered.

Criteria 170.315(a)(6) Problem List

Data Analysis and Reporting

Table 15: Problem List Task Results

Task Scores	N	Task Success		Task Time (sec)		Path Deviation		Errors	
Task	#	Mean	(SD)	Mean	(SD)	Deviations (Observed / Optimal)	(SD)	Mean	(SD)
Access the Active Problem List	15	1.00	0.00	1.07	0.62	0.32	0.24	0.13	0.52
Change an Existing Problem from a Different Encounter	15	0.67	0.49	10.90	3.78	1.51	1.58	0.60	0.91
Access the Full Problem List	15	0.93	0.26	1.86	1.03	0.36	0.40	0.13	0.52
Reactivate an Inactive Problem	15	0.93	0.26	7.85	2.91	0.68	0.30	0.13	0.35
Record a New Problem	14	1.00	0.00	18.21	5.91	0.47	0.21	0.14	0.53
Find Problem SNOMED Code	15	0.60	0.51	15.47	16.72	1.03	1.11	0.80	0.94

Table 16: Problem List Task Scenario

Task Scenario Ratings	Mean	(SD)
Task Group Familiarity Ratings (5=very familiar)	4.39	1.02
Task Group Satisfaction Ratings (5=very easy)	4.13	1.06

Discussion of Findings

Participants were given the following problem list tasks:

- Access the Active Problem List (A6.1)
- Change an Existing Problem from a Different Encounter (A6.2)
- Access the Full Problem List (A6.3)
- Reactivate an Inactive Problem (A6.4)
- Record a New Problem (A6.5)
- Find Problem SNOMED Code (A6.6)

Effectiveness

ACCESS THE ACTIVE PROBLEM LIST

The success score for this task was 100%.

CHANGE AN EXISTING PROBLEM FROM A DIFFERENT ENCOUNTER

The success score for this task was 67%. Five participants were unable to complete the task within the optimal time. Four participants looked for the problem's Last Assessment in the Medcin findings and ICD-10. Several participants also looked in the Status field for the last problem assessment.

ACCESS THE FULL PROBLEM LIST

The success score for this task was 93%, with one participant unable to complete the task within the optimal time.

REACTIVATE AN INACTIVE PROBLEM

The success score for this task was 93%. One participant did not complete the task within the optimal time, due to adding more detail.

RECORD A NEW PROBLEM

The success score for this task was 100%. Participants were easily able to record a new problem.

FIND PROBLEM SNOMED CODE

The success score for this task was 60%. All participants completed the task successfully, but six participants failed to complete it within the optimal time due to the SNOMED code being located below the scroll line. Regarding the use of SNOMED codes, one participant stated, "I never do that. I've seen it down there before, but I never look at it."

Efficiency

ACCESS ACTIVE PROBLEMS

Most participants were able to complete this task using the same number of steps as the optimal number of steps. One participant had an additional step due to navigating to a preferred location for viewing problems. Of the two paths for viewing patient problems, 93.3% navigated to the Problem List and 6.7% navigated to the Facesheet. All participants completed this task within the optimal time, as suggested by expert timings.

CHANGE AN EXISTING PROBLEM FROM A DIFFERENT ENCOUNTER

Of the 15 participants who completed this task, 73% completed it using the same number of steps as the experts and 27% exceeded the optimal number of steps for this task, as determined by expert performance. Of all participants, 53% completed the task from the Info List, 33.3% from the Problem List using a button, 6.7% from the Problem List by right clicking, and 0% from the Facesheet. Five participants were unable to complete the task within the optimal time, as suggested by expert timings.

ACCESS THE FULL PROBLEM LIST

Most participants were able to complete this task using the same number of steps as the optimal number of steps. One participant took additional steps and was not able to complete the task within the optimal time. The participant was viewing and modifying the problem list from the Facesheet, which does not provide functionality for viewing inactive problems.

REACTIVATE AN INACTIVE PROBLEM

All participants were able to complete this task using the same number of steps as the optimal number of steps. One participant did not complete the task within the optimal time, due to adding more detail to the problem.

RECORD A NEW PROBLEM

Most participants were able to complete this task using the same number of steps as the optimal number of steps. One participant took an additional step in adding more detail to the problem. All participants completed this task within the optimal time, as suggested by expert timings.

FIND PROBLEM SNOMED CODE

Of the 15 participants who completed this task, 64% completed it using the same number of steps as the optimal number of steps and 43% exceeded the optimal number of steps for this task, as determined by expert performance.

All participants completed the task successfully, but six participants failed to complete it within the optimal time. Participants right clicked the problem and looked in the outline view of the Note. The SNOMED code was in the problem details, but was below the scroll line. Participants had to scroll the problem details to view the SNOMED code.

Satisfaction

Participants gave Problem List tasks an average satisfaction rating of 4.13 out of 5 points on a Likert scale (83% satisfaction). One participant stated, "I like the ability to annotate problems."

Major Findings

- Participants tended to use options other than the Last Assessment field to indicate the problem assessment. Four participants attempted to find the problem's last assessment in Medcin or ICD-10 codes. Four participants expected to find the assessment in the problem details in the Status field or Chronicity options. One participant's comment regarding the last assessment was, "I'm not sure anyone uses that."

- One participant added the last assessment as text into the Comments field so it would show in the Problem List.

- One participant noted that the ICD-10 diagnosis codes took a long time to load.

- Many participants were not familiar with SNOMED codes. One participant stated, "We don't use that. Is it short for something? I've been in practice for 19 years and I've never heard of SNOMED codes."

- Several participants complained about a workflow used to add patient problems that results in problems not being consistently mapped to ICD-10 codes and subsequent issues with reporting.
- Several participants were unaware of available features to assist with entering problems so that they are mapped to ICD-10 codes.

Areas for Improvement

- Add the last assessment and last history record for the problem to the Problem List or problem fly-over, so that users can see it when they are working in other areas of the system, such as the Note or Orders.
- Add functionality to enable users to map patient problems to ICD-10 codes from the Problem List similar to the option that is available in Orders.
- Include an option to note quickly whether a problem is observed or reported, as well as who reported it, such as an external document, patient, or caregiver.
- Add a shortcut to put a date in the comments.
- Ensure that physicians and providers have accessible training on all of their options for entering problems and mapping them to ICD-10 codes.

Criteria 170.315(a)(7) Medication List

Data Analysis and Reporting

Table 17: Medication List Task Results

Task Scores	N	Task Success		Task Time (sec)		Path Deviation		Errors	
Task	#	Mean	(SD)	Mean	(SD)	Deviations (Observed / Optimal)	(SD)	Mean	(SD)
Access Active Medications List	15	1.00	0.00	2.47	1.96	0.41	0.33	0.00	0.00
Access Full Medications List	15	1.00	0.00	5.40	3.54	0.39	0.25	0.00	0.00
Change an Existing Medication	15	0.93	0.26	6.07	3.35	0.55	0.30	0.07	0.26

Table 18: Medication List Task Scenario

Task Scenario Ratings	Mean	(SD)
Task Group Familiarity Ratings (5=very familiar)	4.45	0.96
Task Group Satisfaction Ratings (5=very easy)	4.93	0.26

Discussion of Findings

Physician/provider participants were given three medication list tasks:

- Access Active Medications List (A7.1)
- Access Full Medications List (A7.2)
- Change an Existing Medication (A7.3)

Effectiveness

ACCESS CURRENT MEDICATIONS LIST

The success score for this task was 100%. All participants successfully accessed their patient's current medications.

ACCESS FULL MEDICATIONS LIST

The success score for this task was 100%. All participants successfully reviewed their patient's previous medications.

CHANGE AN EXISTING MEDICATION

The success score for this task was 93%. All participants completed the task, but one participant did not complete the task within the optimal task time, simply due to typing additional information about the discontinued medication.

Efficiency

ACCESS CURRENT MEDICATIONS LIST

All participants were able to complete this task using the same number of steps as the optimal number of steps. Of the three paths for viewing a patient's medications, 100% of participants used the Medications List. All participants completed this task within the optimal time.

ACCESS FULL MEDICATIONS LIST

All participants were able to complete this task using the same number of steps as the optimal number of steps. All participants completed this task within the optimal time.

CHANGE AN EXISTING MEDICATION

All participants were able to complete this task using the same number of steps or fewer steps as the optimal number of steps, as determined by expert performance. All but one of the participants completed this task within the optimal time.

Satisfaction

Ease of use and satisfaction for the medications scenario was the highest score of all the scenarios with an average satisfaction rating of 4.93 on a 5-point Likert scale (99% satisfaction). Participants indicated that it was easy and intuitive. They were familiar with the workflow having given it an average familiarity rating of 4.45 on a 5-point Likert scale (89% familiarity).

Major Findings

- Participants had no difficulty accessing, recording, and changing medications from the Medications List.

- Participants were familiar with the filtering options. It helps that the filter is in a standard location on the interface.

- One participant did not think that the mechanism for sorting the medications list was intuitive and preferred to have the sorting options be more prominent. The participant requested a way to sort a patient's medication list by drug class.

Areas for Improvement

- Add the ability to sort the medications list by drug class.

Criteria 170.315(a)(8) Medication Allergy List

Data Analysis and Reporting

Table 19: Medication Allergy List Task Results

Task Scores	N	Task Success		Task Time (sec)		Path Deviation		Errors	
Task	#	Mean	(SD)	Mean	(SD)	Deviations (Observed / Optimal)	(SD)	Mean	(SD)
Access Active Medication Allergies	15	1.00	0.00	3.13	1.96	0.45	0.28	0.00	0.00
Change an Existing Medication Allergy	15	1.00	0.00	10.33	3.29	0.38	0.12	0.07	0.26
Record a New Medication Allergy	15	1.00	0.00	10.07	3.08	0.59	0.18	0.07	0.26
Access Inactive Allergies in Medication Allergy List	15	1.00	0.00	3.20	1.82	0.46	0.26	0.00	0.00
Reactivate an Inactive Medication Allergy	15	1.00	0.00	8.07	3.51	0.47	0.16	0.07	0.26

Table 20: Medication Allergy List Task Scenario Results

Task Scenario Ratings	Mean	(SD)
Task Group Familiarity Ratings (5=very familiar)	4.48	0.77
Task Group Satisfaction Ratings (5=very easy)	4.67	0.62

Discussion of Findings

Participants were given four medication allergy list tasks:

- Access Active Medication Allergies (A8.1)
- Change an Existing Medication Allergy (A8.2)
- Record a New Medication Allergy (A8.3)
- Access Inactive Allergies in Medication Allergy List (A8.4)
- Reactivate an Inactive Medication Allergy (A8.5)

Effectiveness

ACCESS ACTIVE MEDICATION ALLERGIES

The task success score was 100%. Participants were easily able to access their patient's active medication allergies.

CHANGE AN EXISTING MEDICATION ALLERGY

The task success score was 100%. Participants were easily able to change the information on an existing patient medication allergy.

RECORD A NEW MEDICATION ALLERGY

The success score for this task was 100%. Participants were easily able to record a new medication allergy for their patient.

ACCESS INACTIVE ALLERGIES IN MEDICATION ALLERGY LIST

The success score for this task was 100%. All participants were able to review their patient's inactive medication allergies.

REACTIVATE AN INACTIVE MEDICATION ALLERGY

All of the participants were able to change the status of an inactive allergy to 'Active', yielding a task success score of 100%.

Efficiency

ACCESS ACTIVE MEDICATION ALLERGIES

All participants completed this task with the same number of steps as the optimal number of steps. The task can be completed in four ways: 80% completed it from the Allergies List, 13.3% from the Facesheet, 6.7% from the Info List, and 0% from the Indicators. All participants completed this task within the optimal time, as suggested by expert timings.

CHANGE AN EXISTING MEDICATION ALLERGY

Most participants completed this task with the same number of steps as the optimal number of steps, except one participant who exceeded it. The task can be completed in three ways: 66.7% completed it from the Info List, 33.3% from the Allergies List, and 0% from the Facesheet. All participants completed this task within the optimal time, as suggested by expert timings.

RECORD A NEW MEDICATION ALLERGY

Most participants completed this task with the same number of steps as the optimal number of steps, except one participant who exceeded it. The task can be completed in three ways; however, all participants completed it from the Allergies List. All participants completed this task within the optimal time, as suggested by expert timings.

ACCESS INACTIVE ALLERGIES IN MEDICATION ALLERGY LIST

All participants completed this task with fewer steps than the average optimal number of steps. All participants completed this task within the optimal time, as suggested by expert timings.

REACTIVATE AN INACTIVE MEDICATION ALLERGY

Most participants completed this task with the same number of steps as the average optimal number of steps, except one participant who exceeded it. The task can be completed in three ways: 73.3% completed it from the Allergies List using a right-click option, 6.7% from the Allergies List using a button, and 0% from the Info List. All participants completed this task within the optimal time.

Satisfaction

Participants generally indicated that it was easy to work with patient medication allergies, giving it an average satisfaction rating of 4.67 on a 5-point Likert scale (93% satisfaction). The reason cited for the lowest score was "too many clicks".

Major Findings

- Having to define an encounter before entering clinical data consistently slowed participants down.
- One participant talked about how patients often call to inform the practice of an allergy they have discovered they have. The participant would like a way to add this information quickly to the patient's chart without requiring an encounter because the patient is not in for a visit.
- Many participants used the right-click menu options to perform actions on existing allergies.
- Allergy reactions are grouped for selection. When asked to enter one reaction, some providers did not select the group and typed that single reaction into the Other field.
- One participant put date, assessment, and information source in the comments when adding or modifying a medication allergy. The participant stated, "We like to show a little narrative history if something changes—so when you go back—(you can see) why did that change? If there's some sort of clarifying information, we're more confident in it."

Areas for Improvement

- One participant stated, "Spell check would have made it faster." Add spell check to medication allergy free text entry fields.
- Making reactions individual selections would give providers a one-click option. This recommendation was made in the software.
- Add a simple way for clinicians to add patient-reported data into a chart that does not require an encounter.

- Provide an option to note quickly whether a medication allergy is observed or reported, as well as who reported it, such as an external document, patient, or caregiver.
- Add a shortcut to put a date in the comments.

Criteria 170.315(a)(9) Clinical Decision Support

Data Analysis and Reporting

Table 21: Clinical Decision Support Task Results

Task Scores	N	Task Success		Task Time (sec)		Path Deviation		Errors	
Task	#	Mean	(SD)	Mean	(SD)	Deviations (Observed / Optimal)	(SD)	Mean	(SD)
Access CDS Interventions	15	0.93	0.26	2.33	1.45	0.58	0.36	0.13	0.35
Identify Due / Overdue CDS Interventions	15	1.00	0.00	3.40	1.50	0.57	0.25	0.20	0.41
Identify the Guideline for a CDS Intervention	15	1.00	0.00	2.47	2.23	0.25	0.22	0.27	0.46
Process a CDS Intervention	15	0.87	0.35	13.87	13.27	0.73	0.70	0.20	0.56
Locate Reference Information for a CDS Intervention	15	0.60	0.51	26.47	15.01	1.02	0.58	0.67	0.90
Configure a CDS Guideline	20	0.83	0.34	32.60	17.89	0.55	0.30	0.38	0.60
Locate Medication Reference Information	15	1.00	0.00	4.20	2.37	0.32	0.18	0.00	0.00
Find Problem Reference Information	15	0.93	0.26	11.93	15.16	1.08	1.38	0.33	0.59
Check for CDS Interventions Generated by Reconciled C-CDA Data	13	0.92	0.28	4.08	4.73	0.34	0.39	0.23	0.60

Table 22: Clinical Decision Support Task Scenario

Task Scenario Ratings	Mean	(SD)
Task Group Familiarity Ratings (5=very familiar)	3.68	1.51
Task Group Satisfaction Ratings (5=very easy)	4.00	0.86

Discussion of Findings

Participants were given the following clinical decision support tasks:

- Access CDS Interventions (a9.1)
- Identify Due / Overdue CDS Interventions (a9.2)
- Identify the Guideline for a CDS Intervention (A9.3)
- Process a CDS Intervention (a9.4)
- Locate Reference Information for a CDS Intervention (A9.5)
- Configure a CDS Guideline (a9.6)
- Locate Medication Reference Information (A9.7)
- Find Problem Reference Information (A9.8)
- Check for CDS Interventions Generated by Reconciled C-CDA Data (A9.9)

Effectiveness

ACCESS CDS INTERVENTIONS

The success score for this task was 93%. All participants accessed the CDS interventions easily, but one participant took longer than the optimal task time.

IDENTIFY DUE / OVERDUE CDS INTERVENTIONS

The success score for this task was 100%. All participants were able to complete the task within the optimal task time.

IDENTIFY GUIDELINE FOR CDS REMINDER

The success score for this task was 100%. All participants were easily able to identify the guideline that triggered the CDS reminder.

PROCESS A CDS INTERVENTION

The success score for this task was 87%. Two participants did not complete the task within the optimal task time. One participant spent time adding detail to the intervention, but had no difficulty processing the CDS intervention. The other participant double-clicked and right-clicked the intervention multiple times, expecting to have the options display for processing the intervention, but did not notice that the options were on the bottom half of the screen. The participant stated, "I tried both (left and right clicking). Neither one of them seem to want to open it up."

LOCATE REFERENCE INFORMATION FOR A CDS INTERVENTION

The success score for this task was 60%. Six participants were unable to complete the task within the optimal task time. The task asked participants to locate reference information for an intervention, but on the interface the reference is labelled as 'Knowledge Link'. Also, previous tasks in the study that asked participants to find reference information used an interface standard, which also has a right-click option.

CONFIGURE A CDS GUIDELINE

The success score for this task was 83%. Two participants were unable to complete the task within the optimal task time and three participants were given a hint. Participants struggled with this task because they typically do not use this functionality. One participant stated, "It's easy. I only know because I train this system. My providers don't know how to do this. We would never let them do it."

LOCATE MEDICATION REFERENCE INFORMATION

The success score for this task was 100%. Participants were able to find the reference information for the medication within the optimal time.

FIND PROBLEM REFERENCE INFORMATION

The success score for this task was 93%. One participant was unable to find the reference information for the problem within the optimal time.

CHECK FOR CDS INTERVENTIONS GENERATED BY RECONCILED C-CDA DATA

The success score for this task was 92%. One participant did not complete the task within the optimal task time due to not realizing that a refresh was required.

Efficiency

ACCESS CDS INTERVENTIONS

All participants completed this task with the same number of steps as the optimal number of steps. The task can be completed in four ways: 73.4% completed it from the Reminders List, 20% from the Facesheet, and 6.6% from the Reminders Alert. All participants except one completed this task within the optimal time, as suggested by expert timings.

IDENTIFY DUE / OVERDUE CDS INTERVENTIONS

All participants completed this task with the same number of steps as the optimal number of steps. All participants completed this task within the optimal time, as suggested by expert timings.

IDENTIFY GUIDELINE FOR CDS REMINDER

Of the 15 participants who completed this task, 73% completed this task using the same number of steps as the optimal number of steps and 27% exceeded the optimal number of steps for this task. The participants exceeding the optimal steps simply required an extra step due to the path they took. Of the 4 paths for completing this task: 66.7% completed it from the Reminders List by viewing a flyover, 20% from the Facesheet, and 13.3% from the Reminders Browser. All participants completed this task within the optimal time, as suggested by expert timings.

PROCESS A CDS INTERVENTION

Of the 15 participants who completed this task, 93% completed this task using the same number of steps as the optimal number of steps and 7% exceeded the optimal number of steps for this task. All participants completed the task, but two participants were unable to complete the task within the optimal task time, one due to adding detail and the other due to difficulty locating the data entry screen.

LOCATE REFERENCE INFORMATION FOR A CDS INTERVENTION

Of the 15 participants who completed this task, 73% completed this task using the same number of steps as the optimal number of steps and 27% exceeded the optimal number of steps for this task. All participants completed the task, but four participants were unable to complete the task within the optimal task time due to terminology inconsistency and a workflow that deviated from the standard for reference information.

CONFIGURE A CDS GUIDELINE

Of the 20 participants who completed this task, 80% completed this task using the same number of steps as the optimal number of steps and 20% exceeded the optimal number of steps for this task. Two participants were unable to complete the task within the optimal task time, as benchmarked by expert timings.

LOCATE MEDICATION REFERENCE INFORMATION

Of the 15 participants who completed this task, 93% completed this task using the same number of steps as the optimal number of steps and 7% used fewer steps than optimal number of steps. Of the six possible paths for completing this task, 53.4% completed it from the Info List using the right-click option, 40% from the Info List using the button, and 6.6% from the Medications List using the right-click option. All participants successfully located reference information for the medication within the optimal time, as suggested by expert timings.

FIND PROBLEM REFERENCE INFORMATION

Of the 15 participants who completed this task, 87% completed this task using the same number of steps as the optimal number of steps and 13% exceeded the optimal number of steps for this task, as determined by expert performance. One participant mistakenly selected patient vitals and the other mistakenly selected patient education. All participants completed the task successfully, but one participant failed to complete it within the optimal time.

CHECK FOR CDS INTERVENTIONS GENERATED BY RECONCILED C-CDA DATA

Of the 13 participants who completed this task, 85% completed this task using the same number of steps as the optimal number of steps and 15% exceeded the optimal number of steps, as determined by expert performance. All participants completed the task successfully, but one participant failed to complete it within the optimal time due to not realizing that the list required a refresh.

Satisfaction

For the Health Reminders task group, participants gave an average satisfaction rating of 4.00 out of 5 points on a Likert scale (80% satisfaction). This ease-of-use and satisfaction rating was good, considering the participants' self-reported lack of familiarity with the Health Reminders system at 3.68 on a 5-point Likert scale (74% familiarity). Participants' familiarity with setting up CDS interventions was low at 2.90 on a 5-point Likert scale (58% familiarity), the lowest of all the task groups. Participants cited the biggest barrier to the use of CDS interventions as the work required to maintain them. Industry standards for CDS guidelines would ease the burden of this setup.

Major Findings

- Participants expected that the Reminders List and the list of reminders in the Reminders browser would be synchronized.

- One participant commented about wanting more automation in the system, so that patient health reminders would be automatically marked as satisfied in response to certain data being entered or received. The participant was unaware of the available automation features for satisfying reminders and how to set them up.

- When the Previously Satisfied option is selected for an intervention, the default date is today's date rather than a previous date.

- Some participants thought that the CDS system should be simplified. One participant stated, "No one really uses it and there is no real push to use it. Maybe it needs to be simplified." However, other participants thought the CDS system needs the complexity to handle more conditional logic.

- Some participants configure only the guidelines needed for health program reporting. One participant stated, "We have limited our health reminders only to required data points like UDS, Meaningful Use, things like that. Because nobody looks at them anyway."

- Providers would like to be able to view the history of each CDS intervention for the patient, such as what occurred to satisfy the intervention in past visits.

- Some participants did not like that the CDS interventions had to be refreshed to check for additional interventions after data was imported from an external source via C-CDA. One participant stated, "As soon as I open it, it should have automatically refreshed itself, and I don't think most providers know that necessarily."

Areas for Improvement

- Synchronize the Reminders List and the Reminders browser.

- Consider changing the default date for the Previously Satisfied option to something else, such as the date of the patient's last visit.

- Add more functionality for automatically satisfying a reminder. For instance, one provider suggested the ability to scan a document in fulfillment of an intervention. Other suggestions include creation of orders, entry of data, or return of results or upon scanning an image that contains specific text in the title or attributes.

- Change the knowledge link to match the standard reference functionality, which is used in medication allergies, problems, and medications.

- Allow users to satisfy multiple reminders at once.

- Refresh the clinical interventions automatically any time external data is imported into the patient's chart.

Criteria 170.315(a)(14) Implantable Device List

Data Analysis and Reporting

Table 23: Implantable Device List Task Results

Task Scores	N	Task Success		Task Time (sec)		Path Deviation		Errors	
Task	#	Mean	(SD)	Mean	(SD)	Deviations (Observed / Optimal)	(SD)	Mean	(SD)
Access Implantable Device List	15	0.67	0.49	3.60	14.53	1.47	2.08	0.67	0.90
Change an Existing Implantable Device	15	1.00	0.00	4.13	2.00	0.38	0.18	0.00	0.00
Record a New Implantable Device	15	0.47	0.52	18.80	11.19	1.25	0.75	0.60	0.63
Access Full Implantable Device List	15	0.87	0.35	7.47	8.90	7.47	0.64	0.33	0.72

Table 24: Implantable Device List Task Scenario

Task Scenario Ratings	Mean	(SD)
Task Group Familiarity Ratings (5=very familiar)	NA	NA
Task Group Satisfaction Ratings (5=very easy)	4.87	0.35

Discussion of Findings

Participants were given the following implantable device list tasks:

- Access Implantable Device List (a14.1)
- Change an Existing Implantable Device (a14.2)
- Record a New Implantable Device (a14.3)
- Access Full Implantable Device List (a14.4)

Effectiveness

ACCESS IMPLANTABLE DEVICE LIST

The success score for this task was 67%. The feature is new, and participants were not trained on it.

CHANGE AN EXISTING IMPLANTABLE DEVICE

The success score for this task was 100%. All participants were easily able to change the status of an existing implantable device for their patient.

RECORD A NEW IMPLANTABLE DEVICE

The success score for this task was 47%, due to eight of the fifteen participants failing to complete the task within the optimal time. The task was completed using a bar code scanner. The eight participants completed the workflow with no path deviations. The contributing factors that resulted in participants exceeding the optimal time for this task included:

- Having difficulty with calibrating and using the scanner to capture the bar code.
- Having to scroll or move the data entry dialog box because its location onscreen upon opening has the date entry fields and action buttons below the scroll line.

One participant entered a device description into the text box designated for the GTIN. The error message that displayed was confusing. The participant also indicated that the text box label was confusing. One participant returned to the facesheet to record the new device because that was the participant's preferred location for entering patient data.

ACCESS FULL IMPLANTABLE DEVICE LIST

The success score for this task was 87%. Two participants were unable to complete the task within the optimal task time due to being unfamiliar with the new workflow. Both participants attempted to view the full implantable device list from the facesheet. Once they realized the task could not be completed from the facesheet, they navigated to the chart and quickly completed the task.

Efficiency

ACCESS IMPLANTABLE DEVICE LIST

One third of the participants exceeded the optimal number of steps for this task, as determined by expert performance. Five participants were unable to complete the task within the optimal time, primarily due to being unfamiliar with this new feature.

CHANGE AN EXISTING IMPLANTABLE DEVICE

All of the participants were able to complete this task with a number of steps that was within the range of optimal steps determined by expert performance. All participants were able to complete the task within the optimal time.

RECORD A NEW IMPLANTABLE DEVICE

All except one participant was able to complete the task with the same number of steps as the optimal number of steps, as determined by expert performance. Eight participants were not able to complete the task within the optimal time.

ACCESS FULL IMPLANTABLE DEVICE LIST

Of the fifteen participants given this task, 80% were able to complete the task with the same number of steps as the optimal number of steps and 20% exceeded the optimal number of steps for this task. Two participants were unable to complete the task within the optimal task time.

Satisfaction

Ease of use and satisfaction for the implantable device task group was good with an average satisfaction rating of 4.87 on a 5-point Likert scale (97% satisfaction). Participants were not asked to rate their familiarity with the implantable devices feature, as it was a new feature that had not been released.

Major Findings

- Many participants had trouble finding the feature because it is new, so they were not familiar with the location of the implantable device list. Participants also indicated that they are used to the way their Intergy EHR system is set up because they are able to customize their patient chart display.
- Once participants located the implantable device list feature, they were easily able to complete the tasks, although not always within the optimal times. The implantable device workflows are consistent with other patient data entry workflows.
- Many providers had difficulty getting the bar code to scan.
- Participants clicked the Implanted Devices heading in the facesheet, expecting that action to navigate them to the section of the chart.

Areas for Improvement

- Participants indicated that they would like the ability to note implanted devices reported by the patient or referring provider, even when the unique device identifier (UDI) is not available. One participant stated, "We need to know that people have these things. Most of the time, we would try to find something here (in the Note) under Therapy and add it. I would rather do it in a more standard way. It makes sense to go here (Device section in Chart). But you have to be able to add it without knowing all the numbers – just by name."
- Research the onscreen opening location of the Add Implantable Device dialog box and consider moving it higher.
- Improve the error message that displays when a user enters invalid data into the Unique Device Identifier text box to be more descriptive of the issue encountered and its resolution.
- Enable users to access chart sections by clicking the related header on the facesheet.
- Provide a quick way to enter dates into date fields. As one participant stated, "I would love to be able to do T, T-1, T-7. Keyboard shortcuts anywhere you can!"
- Adding the ability to view historical and voided implanted devices from the facesheet would assist users who like to view and enter patient data on the facesheet.
- Participants indicated that the workflow of the device tasks was easy and would have no trouble using it going forward. Accessible training is needed to familiarize users with the new implantable device features.

Criteria 170.315(b)(2) Clinical Information Reconciliation and Incorporation

Data Analysis and Reporting

Table 25: Clinical Information Reconciliation and Incorporation Task Results

Task Scores	N	Task Success		Task Time (sec)		Path Deviation		Errors	
Task	#	Mean	(SD)	Mean	(SD)	Deviations (Observed / Optimal)	(SD)	Mean	(SD)
Access Retrieved C-CDA Document	13	0.92	0.28	4.46	2.30	0.56	0.29	0.23	0.44
Import C-CDA Data into Chart	13	0.92	0.19	25.77	10.75	0.39	0.16	0.08	0.19

Table 26: Clinical Information Reconciliation and Incorporation Task Scenario

Task Scenario Ratings	Mean	(SD)
Task Group Familiarity Ratings (5=very familiar)	2.90	1.81
Task Group Satisfaction Ratings (5=very easy)	4.46	0.97

Discussion of Findings

Participants were given the following clinical information reconciliation and incorporation tasks:

- Access Retrieved C-CDA Document (B2.1)
- Import C-CDA Data into Chart (B2.2)

Effectiveness

ACCESS RETRIEVED C-CDA DOCUMENT

The success score for this task was 92%. One participant was unable to complete the task within the optimal task time. The participant initially navigated to the screen for generating a C-CDA document rather than the screen for viewing C-CDA documents.

IMPORT C-CDA DATA INTO CHART

The success score for this task was 92%. Two participants were given a hint about how to import clinical data from the CCD into the Chart.

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Efficiency

ACCESS RETRIEVED C-CDA DOCUMENT

Of the 13 participants who completed this task, 92% completed this task using the same number of steps as the optimal number of steps and 8% exceeded the optimal number of steps for this task. One participant was unable to complete the task within the optimal time, as suggested by expert timings.

IMPORT C-CDA DATA INTO CHART

Of the 13 participants who completed this task, all completed this task using the same number of steps as the optimal number of steps. All participants completed this task within the optimal time, as suggested by expert timings.

Satisfaction

Despite having the second lowest familiarity rating of the tasks tested—2.90 out of 5 points on a Likert scale (58% familiarity rating)—participants gave the CCD scenario a favorable average satisfaction rating of 4.46 on a 5-point Likert scale (89% satisfaction rating). A number of participants indicated that they rarely use the exchange document functionality in the system because they are rarely provided with CCDs by other doctors or healthcare providers.

Major Findings

- Participants commented that the interface was intuitive and stressed a lack a familiarity with the system as the reason for errors in completing tasks.
- Most participants seem more familiar with generating C-CDAs than with reviewing them. Some participants were not aware that data from a C-CDA could be imported into the patient's chart. One participant stated, "I didn't know you could do all this stuff. I knew you could get the CCD document, but I didn't know you could import it."
- One participant suggested adding an indicator when a newly retrieved C-CDA was available in the patient's chart and an indicator when the C-CDA has unimported clinical data on it.
- One participant complained that getting the CCD to the Chart when sent from a specific patient portal as a secure message was difficult and required too many steps.
- Many participants looked for an "Import All" button when importing data from the C-CDA into the patient's chart. One participant stated: "I'm looking for a Select All. Without the Select All button it's pretty low (ease of use). With the Select All button, it's pretty easy."
- Participants liked that the data imported from the C-CDA was annotated automatically with the source.

Areas for Improvement

- Add an indicator when a newly retrieved CCD is available for the patient.
- Add an indicator on the document record when a CCD has unimported data.
- Add a Select All button to the Import CCD options.
- Ensure that accessible training is available to familiarize users with the C-CDA features.

Criteria 170.315(b)(3) Electronic Prescribing

Data Analysis and Reporting

Table 27: Electronic Prescribing Task Results

Task Scores	N	Task Success		Task Time (sec)		Path Deviation		Errors	
Task	#	Mean	(SD)	Mean	(SD)	Deviations (Observed / Optimal)	(SD)	Mean	(SD)
Create New Electronic Prescription	10	1.00	0.00	53.61	13.52	0.56	0.14	0.10	0.32
Send Electronic Rx Cancellation to the Pharmacy	10	1.00	0.00	11.01	2.44	0.65	0.14	0.40	0.52
Check the Fill Status of an Electronic Prescription	10	1.00	0.00	9.72	5.41	0.57	0.32	0.20	0.42
Request and Receive Medication History Information Electronically	10	0.90	0.32	12.07	6.85	0.46	0.26	0.50	0.71
Process Electronic Rx Change Request from Pharmacy	10	1.00	0.00	33.83	9.62	0.58	0.17	0.00	0.00
Process an Electronic Rx Request from the Pharmacy	10	1.00	0.00	40.93	7.60	0.58	0.11	0.50	0.53

Table 28: Electronic Prescribing Task Scenario

Task Scenario Ratings	Mean	(SD)
Task Group Familiarity Ratings (5=very familiar)	NA	NA
Task Group Satisfaction Ratings (5=very easy)	4.10	0.57

Discussion of Findings

Participants were given the following electronic prescribing tasks:

- Create a New Electronic Prescription (B3.1)
- Send an Electronic Prescription Cancellation to the Pharmacy (B3.2)
- Check the Fill Status of an Electronic Prescription (B3.3)
- Request and Receive Prescription History Information Electronically (B3.4)
- Process Electronic Rx Change Request from the Pharmacy (B3.5)
- Process an Electronic Rx Request from the Pharmacy (B3.6)

Effectiveness

CREATE A NEW ELECTRONIC PRESCRIPTION

The success score for this task was 100%. All participants were able to create a new electronic prescription successfully and many indicated that it was a workflow they used frequently in practice.

SEND ELECTRONIC PRESCRIPTION CANCELLATION TO THE PHARMACY

The success score for this task was 100%. All participants were able to send an electronic prescription cancellation to the pharmacy successfully. These results were encouraging because the feature is new and participants had never used it.

CHECK THE FILL STATUS OF AN ELECTRONIC PRESCRIPTION

The success score for this task was 100%. All participants were able to check the fill status of an electronic prescription successfully. These results were encouraging because the feature is new and participants had never used it.

REQUEST AND RECEIVE PHARMACY BENEFIT MANAGER PRESCRIPTION HISTORY INFORMATION ELECTRONICALLY

The success score for this task was 90%. One participant was unable to complete the task within the optimal time due to being unfamiliar with the task. The participant looked on the Medications List, in the Medications List filter, and on the Info List.

PROCESS ELECTRONIC PRESCRIPTION CHANGE REQUEST FROM THE PHARMACY

The success score for this task was 100%. All participants were able to process an electronic prescription change request from the pharmacy successfully. These results were encouraging because the feature is new and participants had never used it. Participants liked that the workflow was familiar, as it uses a workflow that is based on the existing Rx Requests workflow.

PROCESS AN ELECTRONIC RX REQUEST FROM THE PHARMACY

The success score for this task was 100%. Many participants indicated that they used this workflow in their work daily. All participants were able to process an electronic prescription request from the pharmacy successfully.

Efficiency

CREATE A NEW ELECTRONIC PRESCRIPTION

Of the ten participants who completed this task, 90% completed this task using the same number of steps as the optimal number of steps and 10% exceeded the optimal number of steps for this task. All participants completed this task within the optimal time, as suggested by expert timings.

SEND ELECTRONIC PRESCRIPTION CANCELLATION TO THE PHARMACY

Of the 10 participants who completed this task, 60% completed this task using the same number of steps as the optimal number of steps and 40% exceeded the optimal number of steps for this task. All participants completed this task within the optimal time, as suggested by expert timings.

CHECK THE FILL STATUS OF AN ELECTRONIC PRESCRIPTION

Of the 10 participants who completed this task, 80% completed this task using the same number of steps as the optimal number of steps and 20% exceeded the optimal number of steps for this task. All participants completed this task within the optimal time, as suggested by expert timings.

REQUEST AND RECEIVE PHARMACY BENEFIT MANAGER PRESCRIPTION HISTORY INFORMATION ELECTRONICALLY

Of the 10 participants who completed this task, 60% completed this task using the same number of steps as the optimal number of steps and 40% exceeded the optimal number of steps for this task. One participant was not able to complete this task within the optimal time, as suggested by expert timings. The participant stated, "I will use this. I did not know this existed."

PROCESS ELECTRONIC PRESCRIPTION CHANGE REQUEST FROM THE PHARMACY

Of the ten participants who completed this task, 50% completed this task using the same number of steps as the optimal number of steps and 50% exceeded the optimal number of steps for this task. All participants completed this task within the optimal time, as suggested by expert timings.

PROCESS AN ELECTRONIC RX REQUEST FROM THE PHARMACY

All 10 of the participants were able to complete this task with a number of steps that was within the range of optimal steps determined by expert performance. All participants were able to complete the task within the optimal time.

Satisfaction

Participants had an average satisfaction rating of 4.10 out of 5 points on a Likert scale (82% satisfaction rating) of the task scenarios tested. Although many of these tasks were new, most participants were able to complete them successfully. Participants were not asked to rate their familiarity with e-Prescribing because many of the features being tested were new.

Major Findings

- Most participants indicated daily use of electronic prescribing functionality.

- Many participants were unaware of the availability of the patient's prescription history from their pharmacy benefit manager (PBM). One participant stated, "I've never even looked at that. I didn't know what that was. I've never seen this before."

- Regarding the PMB history, one participant indicated that the medical assistants are responsible for reconciling patients' medications, so the PBM history is used only for resolving discrepancies when taking patient history. The participant stated, "I use it on occasion. I don't use it probably as often as I should. We really rely on our staff to update the medications. It's when I'm talking to a patient and I get a feeling they're on something we're not documenting that I try to go to their PBM history to see, because they'll tell me, 'Dr. So-and-so down the street prescribed me X.' I don't see it on the list, it's not reminiscent, and I go check the PBM history."

- One participant noted a preference for issuing prescriptions from the Orders screens, and noted that the PBM history is not accessible from there.

- One participant noted that it is difficult to find specific information in the prescription details from the patient's PBM history.

- The diagnosis list was slow in loading for one participant. The participant indicated a preference for selecting diagnoses from patient problems and was frustrated that problems that do not have ICD-10 codes are not listed in certain workflows.

- Several participants liked that sending a cancellation to the pharmacy was made easy because the option is selected by default whenever a prescription is discontinued or voided.

- Several participants liked the ability to send a prior authorization number to the pharmacy in response to a request.

Areas for Improvement

- Provide an option in Orders for clinicians to view the prescription history from a patient's pharmacy benefit manager (PBM).

- Improve the details view of the prescriptions in the PBM history by providing a search, making it easier to locate the details for a specific prescription, or some other workflow. As stated by a participant, "A search would be very helpful. What would be even more helpful is to select it here, hit 'View Details', and just get the medication you selected. My first inclination was to see if I could right click and get more details about the med. If there was a menu that would pop up saying 'Details' or 'Prescribing Details', I think that would be helpful. That was my initial inclination."

- Research the load times for diagnoses and provide an improved workflow or recommendations for linking problems to ICD-10 codes.

- Ensure that clinicians and their assistants have accessible training for new e-prescribing features in the software.

Overall Results

In addition to the specific findings and areas for improvement in specific features, several overall areas for improvement recurred throughout this usability study.

Low familiarity ratings with certain functionality, along with participants' lack of awareness of the existence of some functionality, may indicate a need for training and documentation that is accessible within common workflows and provided in formats that are easily consumable by busy clinical professionals.

Participants identified opportunities for improving several common workflows. This feedback was directed mostly at streamlining and optimizing problem list and clinical intervention alert workflows. Additional feedback identifies opportunities to make refinements to the user interface, reduce click-counts, and enhance efficiency for clinicians.

Participants were excited about the new electronic prescription features that improve their communication with pharmacies, medical assistants, and patients. The results from the SUS (System Usability Scale) scored the subjective satisfaction with the system based on performance with these

tasks to be 84.63. Broadly interpreted, scores under 60 represent systems with poor usability; scores over 80 would be considered above average.

Through the user-centered design and usability testing processes, opportunities to refine and enhance the user experience were identified. Some of these enhancements have been prioritized for release in upcoming release cycles. Still others will be revisited in more depth in future studies.

Appendices

The following appendices include supplemental data for this usability test report. Following is a list of the appendices provided:

Appendix A | Sample Recruiting screener

Appendix B | Participant demographics

Appendix C | Recording Consent Form

Appendix D | Sample Orientation

Appendix E | User Protocol Tasks

Appendix F | System Usability Scale Questionnaire

Appendix A | Sample Recruiting Screener

At the beginning of each usability test session, the test administrator asked participants the questions on the recruiting screener. The data logger recorded the responses.

User Profile and System Questions [5-10 minutes]

1. Please tell me a little bit about yourself – your job title and role description/responsibilities, and how long you've been using Intergy EHR.

Professional Experience: (Practice Specialty, # yrs. practicing):

2. Gender: ☐ Male ☐ Female ☐ Other

3. Age: ☐ 0-9 ☐ 10-19 ☐ 20-29 ☐ 30-39 ☐ 40-49 ☐ 50-59
   ☐ 60-69 ☐ 70-79 ☐ 80-89 ☐ 90-99 ☐ 100+"

4. What is your Level of Education?

   ☐ No high school degree ☐ Associate degree
   ☐ High school graduate, diploma or equivalent (ex: GED) ☐ Bachelor's degree
   ☐ Trade/technical/vocational training ☐ Master's degree
   ☐ Some college credit, no degree ☐ Doctorate degree (e.g., MD, DNP, DMD, PhD)

5. How long have you been working in healthcare?

6. What is your practice specialty?

7. How long have you been using computers?

Product Experience (# years using Intergy EHR):

8. How long have you been using Intergy EHR?

9. Which features do you use most frequently? Please list your top 2 or 3. (e.g. orders, prescriptions, labs, notes, flowsheets, tasks, etc.

10. On a scale of 1 to 5 with 5 being 'most familiar', how would you rate your level of familiarity with these workflows in Intergy EHR:

Maintaining Allergies	1	2	3	4	5
Maintaining Problems	1	2	3	4	5
Reviewing and Satisfying Health Reminders	1	2	3	4	5
Setting Up Health Reminders	1	2	3	4	5
Maintaining Medications	1	2	3	4	5
Creating Orders (using the Orders System)	1	2	3	4	5
Ordering Lab Tests	1	2	3	4	5
Reviewing the DUR	1	2	3	4	5
Configuring the DUR	1	2	3	4	5
Reviewing and Retrieving CCDs	1	2	3	4	5

11. Do you require any assistive technology to participate in this usability test? No Yes

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Appendix B | Participant Demographics

Below is a summary of participant demographics for this study.

PARTICIPANT GENDER

	n (N=32)	%
Male	10	31.3
Female	22	68.8
Other	0	0

PARTICIPANT AGE

	n (N=32)	%
20-29	2	6.3%
30-39	8	25.0%
40-49	11	34.4%
50-59	10	31.3%
60-69	1	3.1%

PARTICIPANT EDUCATION

	n (N=32)	%
No high school degree	0	0.0%
High school graduate, diploma or equivalent	0	0.0%
Trade/technical/vocational training	1	3.1%
Some college credit, no degree	6	18.8%
Associate degree	0	0.0%
Bachelor's degree	6	18.8%
Master's degree	7	21.9%
Doctorate degree (e.g., MD, DNP, DMD, PhD)	12	37.5%

PARTICIPANT ROLES

	n (N=32)	%
Physician	11	34.4%
Nurse Practitioner	2	6.3%
Physician Assistant	1	3.1%
RN	3	9.4%
LPN	3	9.4%
Medical Assistant	1	3.1%
Trainer	4	12.5%
Administrative	4	12.5%
IT internal	2	6.3%
Clerical	1	3.1%

PARTICIPANT SPECIALTIES

	n (N=32)	%
Multispecialty	10	31.3%
Primary Care	1	3.1%
Gastroenterology	1	3.1%
Family Practice	3	9.4%
OB/GYN	3	9.4%
Nephrology	2	6.3%
Pediatrics	3	9.4%
Infectious Disease	1	3.1%
Neurology	2	6.3%
ENT	2	6.3%
Informatics	1	3.1%
Clinical Research	2	6.3%
Urgent Care	1	3.1%

PARTICIPANT PROFESSIONAL EXPERIENCE

	Months		Years	
Mean	216.6		18.0	
	Min	**Max**	**Min**	**Max**
Range	6.0	384.0	0.5	32.0

PARTICIPANT COMPUTER EXPERIENCE

	Months		Years	
Mean	297.6		24.8	
	Min	**Max**	**Min**	**Max**
Range	150.0	444.0	12.5	37.0

PARTICIPANT EXPERIENCE WITH INTERGY EHR

	Months		Years	
Mean	83.8		7.0	
	Min	**Max**	**Min**	**Max**
Range	4.0	192.0	0.3	16.0

Recording Consent Form

Thank you for participating in our usability research.

We will be recording your session to allow Greenway Health, LLC staff members who are unable to be here today to observe your session and benefit from your comments.

Please read the statement below and sign where indicated.

- -

I understand that my usability test session will be recorded.

I grant Greenway Health, LLC permission to use this recording for internal use only, for the purpose of improving the products being tested.

Signature: _____

Print your name: _____

Date: _____

Appendix D | Sample Orientation

Introduction

Thank you for agreeing to participate in this usability study. Today you will be helping us evaluate workflows pertaining to the ONC's EHR vendor certification requirements.

In a moment, I'll be asking you to complete these workflows using Intergy EHR. I'll be taking notes and so will <note taker>.

As you go through the workflows, please keep in mind that it is Intergy EHR under review here, not you. You may arrive at a point where you're not sure what you are supposed to do. Just take your best guess, and if you get really stuck, let me know. We want to observe how you would expect to use the system if we weren't here.

Also, I want to ask you to hold your questions until the end since the workflows are being timed.

I would like to video record this session to help me later with my report. Therefore, to help with this data collection, we are seeking your consent to video record this session.

<Ask them to sign the consent form.>

Do you have any questions before we get started?

<BEGIN NOW recording the session.>

<Ask User Profile and System Questions.> (see **Appendix A |** Sample Recruiting screener)

Instructions

What you will be looking at today is Intergy EHR populated with a mock patient's information. I will be asking you to perform some workflows that a <role> might perform with Intergy EHR. Please keep in mind that the data may not be clinically accurate, and we understand that it may not be applicable to your specialty.

I will ask you to start when I say "BEGIN NOW", and please tell me when you think you've completed the workflow by saying "DONE".

<Begin test.> (see **Appendix E |** User Protocol Tasks)

Appendix E | User Protocol Tasks

Scenario 1: Medication Allergy List

Jeff Adams has come in today for a follow-up visit for his Diabetes, but he also complains of a recurrence of sinusitis.

1. Open Jeff Adams' chart so you can review his allergies with him.

2. Locate Jeff's active allergies. **BEGIN NOW** (A8.1)

3. Jeff says that his reactions to penicillin are not correct. He gets a rash when he takes penicillin, not shortness of breath.

   Update the Penicillin allergy to change the adverse reaction to Rash. **BEGIN NOW** (A8.2)

4. Jeff states that he also had an allergic reaction to Sulfa Drugs in the past, which was also a rash.

   Add Sulfa Drugs as a new allergy for Jeff, and note "Rash" as the adverse reaction. **BEGIN NOW** (A8.3)

5. In a past visit, Jeff indicated that the Iodine allergy reported in his chart was incorrect. However, today Jeff tells you he had a reaction to Iodine when he had a CT scan recently. It turns out he is allergic to Iodine. Shortness of breath was the symptom.

   Locate Jeff's **Inactive** allergies. **BEGIN NOW** (A8.4)

6. Re-activate Jeff's **Iodine** allergy. **BEGIN NOW** (A8.5)

Scenario 2: Problem List

Having updated Jeff's allergies over time, you are ready to proceed with reviewing Jeff's problem list.

1. Go to Jeff's Problem List. **BEGIN NOW** (A6.1)

2. Jeff is doing much better in controlling his diabetes.

   Change the Assessment for the Diabetes problem to **'Well-Controlled'**. **BEGIN NOW** (A6.3)

3. Jeff is having a recurrence of Sinusitis.

   Locate Jeff's Inactive problems. **BEGIN NOW** (A6.3)

4. Re-activate Jeff's **Acute Recurrent Maxillary Sinusitis** problem. **BEGIN NOW** (A6.4)

5. Jeff's cholesterol is high. Add a problem for **Hyperlipidemia** with an onset date of today. **BEGIN NOW** (A6.5)

6. For the **Essential Hypertension** problem, show me how you would find the SNOMED code. **BEGIN NOW** (A6.6)

7. For the **Obesity** problem, show me how you would get reference information on "Body Mass Index". **BEGIN NOW** (A9.8)

Scenario 3: Implantable Device List

Jeff previously had a coronary angioplasty during which a balloon catheter was used. During his current exam, Jeff indicates he has cut his arm gardening. You decide that it requires a suture and implant a non-bioabsorbable suture.

1. Locate the Device List in Jeff's chart. **BEGIN NOW** (A14.1)

2. During Jeff's angioplasty, a balloon catheter was used but is no longer implanted.

     Mark Jeff's balloon catheter as historical. **BEGIN NOW** (A14.2)

3. Add Jeff's suture to the device list. **BEGIN NOW** (A14.3)

4. Change the Device List settings to show historical and voided devices, in addition to current. **BEGIN NOW** (A14.4)

Scenario 4: Clinical Decision Support

Next, you will review Jeff's Health reminders.

1. Locate Jeff's Health Reminders. **BEGIN NOW** (A9.1)

2. Tell me which reminders are due. **BEGIN NOW** (A9.2)

3. Tell me which guideline is triggering the Foot Exam reminder. **BEGIN NOW** (A9.4)

4. You have asked Jeff about some of these reminders, and he says that he already had an Eye Exam done last week.

     Mark the Eye Exam reminder as satisfied. **BEGIN NOW** (A9.3)

5. You are not sure that a PSA needs to be done so frequently. Look for reference information for the PSA reminder**. BEGIN NOW** (A9.5)

     Please close the Internet browser window.

Clinical Decision Support Setup (Administrative)

6. The U.S. Preventive Services Task Force (USPSTF) recommends against prostate-specific antigen (PSA)-based screening for prostate cancer.

     In Health Management Setup, edit the **50 to 60 years Male** guideline and remove the **'PSA Testing'** reminder from it. **BEGIN NOW** (A9.6)

Scenario 5: Medication List

After reviewing the reminders, you are now ready to review Jeff's meds with him.

1. Locate Jeff's current meds. **BEGIN NOW** (A7.1)

2. You notice Jeff is taking Lipitor®, you want to see if he has ever been on any other medications for hyperlipidemia. Review his past meds to see what other medications have been given to Jeff **BEGIN NOW** (A7.2)

3. Jeff states that he is no longer taking Clarinex®. Discontinue Clarinex. **BEGIN NOW** (A7.3)

4. You don't remember what the generic name for Procardia XL is. How would you find reference information on Procardia XL? **BEGIN NOW** (A9.7)

Scenario 6: Computerized Physician Order Entry (CPOE)

You have finished examining Jeff, and you are now ready to create Orders. Jeff complains of a recurrence of sinusitis, and you are continuing treatment of his hyperlipidemia. You'll be creating 4 orders, but please stop before you save the orders.

For Jeff's sinusitis:

1. Order a **Nasal Endoscopy**. **BEGIN NOW** (A3.1)

2. Electronically prescribe the drug **Biaxin® 500 mg oral** for his Sinusitis to be taken every 12 hours for 14 days. **BEGIN NOW** (A1.1)

For Jeff's hyperlipidemia:

3. Renew the existing prescription for **Lipitor. BEGIN NOW** (A1.2)

4. Order a **Lipid Panel**. Please use the Lab Order button in the Labs tab so we can test the real-time lab ordering workflow. **BEGIN NOW** (A2.1)

   We're not connected to a printer, so just close the window and answer "Yes" to the message.

Scenario 7: Drug Utilization Review

Now we will perform the DUR test scenario.

1. Select the Save option and the system will display a DUR report. **BEGIN NOW**

2. Locate the highest priority warnings and describe them to me. **BEGIN NOW** (A4.1)

3. Navigate to the full monograph of the first Drug Interaction warning. **BEGIN NOW** (A4.2)

4. Review all other warnings and describe how you would respond to the higher priority warnings. **BEGIN NOW** (A4.3)

Scenario 8: Clinical Information Reconciliation & Incorporation

Now we are going to talk about Interoperability. Part of the Meaningful Use measures is about interoperability and exchanging clinical data.

> Do you know what a CCD document is? *If not, then explain. A CCD is a Continuity of Care document used in the Interoperability initiative where doctors can exchange clinical information with each other. A document would be generated by one doctor from clinical information in his system and then shared with another doctor, either sent directly to the doctor, or given to the patient to share with the doctor. The document is not just text but discrete data that can be imported into the chart.*

> Your next patient, Steven Carlson, has arrived for his annual exam, and he brought a CCD from another provider. Your medical assistant has already retrieved the CCD document from the patient's flash drive and put it into Steven's chart as an Exchange document.

> 1. Open Steven Carlson's chart. **BEGIN NOW**

> 2. Go to Steven's Exchange Documents and locate the newly retrieved Full Chart exchange document from Alachua Community Health Center. **BEGIN NOW** (B2.1)

> 3. Now import the information from the CCD into Steven's Chart that is not already in his chart. **BEGIN NOW** (B2.2)

> 4. One of the meaningful use measures is that the reminders would update once the CCD has been imported.

>   So, show me where you would go to review the Health Reminders to see if anything new was triggered for the patient. **BEGIN NOW** (A9.9)

Scenario 9 (Clerical): Demographics

Now we are going to talk about demographics, which is also part of the Meaningful Use measures. John Smith is a walk-in patient who was quick-registered in Intergy by the staff.

> 1. Please add the following demographic information for this patient. **BEGIN NOW** (A5.1)

>   - Sex   Male
>   - Gender Identity   Male
>   - Sexual Orientation   Declined
>   - Date of Birth   05/05/1995
>   - Race   Filipino
>   - Ethnicity   Not Hispanic or Latino
>   - Preferred Language   English

> 2. While taking the patient history, John indicates he doesn't want his gender identity recorded.

>   Change this patient's Gender Identity in demographics from 'Male' to Declined'. **BEGIN NOW** (A5.2)

Scenario 10 (Administrative): DUR Settings

Your practice providers complain that the Drug Utilization Review (DUR) is reporting insignificant drug interactions.

1. How would you configure the practice settings for DUR so that the minimum severity of interactions reported includes only major drug interactions? You are also a system administrator with the following login: *provide system administrator username and password*

   BEGIN NOW (A4.4)

Scenario 11: Electronic Prescriptions

Hope Dockendorf has come in today for a follow up for Diabetes. You will start the visit by reviewing Hope's meds with her.

1. Locate Hope's current meds. **BEGIN NOW** (A7.1)

2. Write an electronic prescription for Glucophage XR 750mg Tablets to be taken once a day for 30 days. The prescription should be sent to the Madison West pharmacy. **BEGIN NOW**. (B3.1)

3. Hope states that she never picked up her Abilify® prescription from the last visit because it was sent to the wrong pharmacy.

   Void the Abilify prescription and send a cancellation to the pharmacy. **BEGIN NOW** (B3.2)

4. Check whether Hope filled the Nexium® prescription you issued at the last visit. **BEGIN NOW** (B3.3)

Your next patient, Kara Whiteside, is a new patient who is in for a preventive care visit.

5. Open Kara Whiteside's chart so you can review her Meds with her.

6. You want to see if Kara has ever been on any medications for Hyperlipidemia.

   Check to see if any medication history is available from Kara's Pharmacy Benefit Manager. **BEGIN NOW** (B3.4)

After this last visit, you have some time before your next appointment. You decide to work some of your Rx tasks.

7. You decide to look at the Rx Change Request tasks sent by the pharmacy.

   Review the most recent change request and authorize the change that the pharmacy has requested. **BEGIN NOW** (B3.5)

8. You remember that there was an Rx Request for Mary Paltrow that you were supposed to review.

   Authorize the Synthroid® prescription for Mary Paltrow that the pharmacy requested. The diagnosis is Thyroiditis. **BEGIN NOW** (B3.6)

Appendix F | System Usability Scale Questionnaire

SUS

Based on your overall experience with all the tasks, please answer the following questions.

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

    Strongly Disagree   1   2   3   4   5   Strongly Agree

2. I found the system unnecessarily complex

    Strongly Disagree   1   2   3   4   5   Strongly Agree

3. I thought that the system was easy to use

    Strongly Disagree   1   2   3   4   5   Strongly Agree

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

    Strongly Disagree   1   2   3   4   5   Strongly Agree

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

    Strongly Disagree   1   2   3   4   5   Strongly Agree

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

    Strongly Disagree   1   2   3   4   5   Strongly Agree

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

    Strongly Disagree   1   2   3   4   5   Strongly Agree

8. I found the system very cumbersome to use

    Strongly Disagree   1   2   3   4   5   Strongly Agree

9. I felt very confident using the system

    Strongly Disagree   1   2   3   4   5   Strongly Agree

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

    Strongly Disagree   1   2   3   4   5   Strongly Agree