CliniComp, Intl.

Usability Testing Report of *CliniComp|EHR®* v.213.03

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

P/N: 250-70027 – Revision
January 18th, 2026

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REVISION HISTORY

LEVEL	DATE	REVISION DESCRIPTION	ORIGINATOR	REVISION
1.0	22-May-2020	Initial Version	M. Nater	Original
2.0	25-Nov-2024	Updated to include 170.315 (b)(11) Decision Support Intervention tasks, starting at section 6.	S. Smith	Revision 2
3.0	18-Jan 2026	Updated to include 170.315 (b3) E-Prescribing starting at section	A. Bala	Revision 3

CliniComp|EHR Usability Testing Report (P/N: 250-70027)
CliniComp, Intl. Confidential and Proprietary

January 18th, 2026 (Revision 3)
Page 2 of 54

Contents

CliniComp/EHR Usability Testing Report (P/N: 250-70027)   January 18th, 2026 (Revision 3)

CliniComp, Intl. Confidential and Proprietary   **Page 4 of 54**

Preface

DOCUMENT PURPOSE

This document provides information regarding the Safety-Enhanced Design Testing of *CliniComp|EHR* modules v213.03. This document reflects the results from two usability tests. The initial usability testing was performed in 2016, and the results are reflected in sections 1-5. Additional usability testing was performed in 2024 for the 170.315(b)(11) Decision Support Interventions (DSI) certification criteria, and the results are reflected in sections 6-10. Testing for 170.315(b)(3) Electronic Prescribing, was repeated in December 2025 and the results are shared in sections 11-15.

INITIAL TESTING INFORMATION	
Date of Usability Test:	December 7 – 8, 2016
Date of Report:	
Report Prepared By:	CliniComp, Intl.
Study Moderator:	Sheryl Crisologo, Clinical Analyst Study Moderator sheryl.crislogo@clinicomp.com
Quality and Regulatory Affairs:	Dessi Lyakov-Stinger, Manager Dessi.lyakov@clinicomp.com
Testing Location:	(800) 350-8202 9655 Towne Centre Drive San Diego, CA 92121-1964
170.315(B)(11) TESTING INFORMATION	
Date of Usability Test:	November 21, 2024
Date of Report:	November 25, 2024
Report Prepared By:	CliniComp, Intl.
Study Moderator:	Sharlie Smith, SVP Product Study Moderator sharlie.smith@clinicomp.com
Quality and Regulatory Affairs:	Dessi Lyakov-Stinger, Manager Dessi.lyakov@clinicomp.com
Testing Location:	(800) 350-8202 9655 Towne Centre Drive San Diego, CA 92121-1964
170.315 (B)(3) Testing Information	
Date of Usability Test:	Dec. 23, 2025
Date of Report:	Jan 18th, 2026
Report Prepared By:	CliniComp, Intl.
Study Moderator:	Aparna Bala Study Moderator Aparna.bala@clinicomp.com
Quality and Regulatory Affairs:	Dessi Lyakov
Testing Location:	(800) 350-8202 9655 Towne Centre Drive San Diego, CA 92121-1964

DOCUMENT AUDIENCE

This guide is intended for users of *CliniComp|EHR* v213.03.

INDUSTRY STANDARD UCD REFERENCES

NAME	DESCRIPTION
NISTIR 7741	This document provides NIST guidance for those developing electronic health record (EHR) applications who need to know more about processes of user-centered design (UCD). An established UCD process ensures that designed EHRs are efficient, effective, and satisfying to the user.
Citation	NIST Guide to the Process Approach for Improving the Usability of Electronic Health Records

TERMS AND ACRONYMS

TERM	DEFINITION
CCI	CliniComp Intl.
CPOE	Computerized Provider Order Entry
EHRUT	Electronic Health Record Under Test
ID	Participant Identification
IEC	International Electrotechnical Commission
ISO	International Organization for Standardization
MD	Doctor of Medicine
NIST	National Institute of Standards and Technology
RN	Registered Nurse
SUS	System Usability Scale

1   Executive Summary

The CliniComp Intl. (CCI) Clinical Analyst group conducted a usability test of the *CliniComp|EHR* on December 7-8, 2016, in San Diego, California. The purpose of the testing was to validate the usability of the current user interface and provide evidence of the usability of the Electronic Health Record Under Test (EHRUT). Eleven healthcare clinicians matching the target demographic criteria served as participants (*see* Appendix 2) using the EHRUT module in simulated, but representative tasks.

This study collected performance data on twelve tasks typically performed in an EHR

- Utilizing patient demographic information
- Utilizing Clinical Decision Support
- Medication allergy list reconciliation
- Medication list reconciliation
- Using Computerized Provider Order Entry (CPOE) for diagnostic imaging orders
- Using CPOE for medical orders
- Using CPOE drug-drug, drug-allergy interaction checks
- Using CPOE for laboratory orders
- Utilizing an implantable device list
- Problem list reconciliation
- Clinical information reconciliation and incorporation
- Electronic Prescribing

At the start of the two-day study, an administrator greeted participants and asked each to review and sign an informed consent and non-disclosure agreement (*see* Appendix 3 and Appendix 4). The administrator informed the participants they could withdraw at any time. All but one participant had prior experience with the EHRUT. The administrator introduced the test and instructed participants to complete the series of tasks, given one at a time, using the EHRUT. A brief overview was provided on how to navigate the *Patient Control* screen and access a patient record. This overview did not include further instruction on features or functionality of the tasks to be tested. During testing, the administrator timed each test and, along with data loggers, recorded user performance data on paper and electronically. The administrator and data loggers did not provide direction to participants on how to complete tasks.

The following lists the type of data 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 verbalizations
- Participant satisfaction ratings of the system
- Participant commentary

All participant data was de-identified to eliminate connection from participant identity to the data collected. Following the conclusion of the testing, participants completed the System Usability Scale Questionnaire and were compensated with payment at an hourly rate through a contracted payroll agency. In accordance with the examples set forth in the NIST Guide to the Processes Approach for Improving the Usability of Electronic Health Records, various recommended metrics were used to evaluate the usability of the *CliniComp|EHR*. Table 1 summarizes the performance and rating data collected. For further descriptions of the measures, rationale, and scoring, *see* section 3.10 Data Scoring.

Table 1: Summary of Test Results

MEASURE	N	TASK SUCCESS	PATH DEVIATION	TASK TIME (SEC)		ERRORS	TASK RATING* 1=EASY
Task	#	Mean (SD)	Deviations (Observed/ Optimal)	Mean (SD)	Deviations (Observed/ Optimal)	Mean (SD)	Mean (SD)
Utilizing patient demographic information	2	97% (5.2%)	1.0	25.3 (4.2)	0.4	0 (0)	1.1 (0.1)
Utilizing Clinical Decision Support	3	76% (26%)	1.0	36.5 (7.1)	0.4	0 (0)	1.3 (0.3)
Medication allergy list and reconciliation	4	85% (21%)	1.0	94.5 (20.1)	0.6	0.1 (0.1)	2.1 (0.3)
Medication list and reconciliation	5	94% (10.5%)	1.0	120.9 (16.2)	0.7	0.1 (0.1)	2.0 (0.3)
Using Computerized Provider Order Entry (CPOE) for diagnostic imaging	6	73% (36.7%)	1.0	66 (12.4)	0.5	0.03 (0.07)	1.6 (0.5)
Using CPOE for medication orders	7	100% (0%)	1.1	56 (14.3)	0.5	0.03 (0.07)	1.2 (0.2)
Using CPOE drug-drug, drug-allergy interaction checks	8	97% (5.2%)	1.0	7.0 (4.2)	0.3	0 (0.0)	1.2 (0.1)
Using CPOE for laboratory orders	9	100% (0%)	1.0	29.2 (8.0)	0.5	0.1 (0.1)	1.3 (0.2)
Utilizing the implantable device list	10	100% (0%)	1.0	21.5 (7.2)	0.4	0.0 (0.1)	1.3 (0.3)
Problem list reconciliation	11	73% (21%)	1.0	111.7 (20.1)	0.6	0.1 (0.1)	2.0 (0.7)
Clinical information reconciliation and incorporation**	12	71% (36.1%)	0.9	71 (410)	0.5	0.1 (0.1)	2.2 (0.6)
Electronic Prescribing	13	91% (10.5%)	1.0	101 (30.8)	0.6	0.0 (0.0)	1.4 (0.5)

*Task rating 1-5; where 1 is "Very Easy" and 5 is "Very Difficult."

**The clinical information reconciliation and incorporation tasks include the Medication Allergy List Reconciliation, Problem List Reconciliation, and Medication Reconciliation.

CliniComp|EHR Usability Testing Report (P/N: 250-70027)
CliniComp, Intl. Confidential and Proprietary

January 18th, 2026 (Revision 3)
Page 9 of 54

1.1 Summary of Results

The EHRUT received a score of **72.5** for subjective satisfaction based on the System Usability Scale (SUS) Questionnaire (*see* Appendix 7). Broadly interpreted, scores under 60 represent systems with poor usability, and scores over 80 are considered above average. [1]

In addition to the performance data, qualitative observations were found:

1.1.1 Major Findings

- Participants excelled in using the CPOE module for six out of the seven tasks.
- During the CPOE tests, 57% of the users appeared to have a preference to use standard order sets instead of using the search or browse feature for single orders, which resulted in decreased steps compared to our defined path.
- Users with previous experience using the system were measured to be more satisfied, contributing to a 100% success rate for several tasks. This result was due to the participant taking a different path (used in their current workflow at their hospital inpatient setting) in the CPOE related task. This experience resulted in a lower number of steps as compared to the test's defined path.
- Participants preferred using the right-click File Menu feature for navigation.

1.1.2 Areas for Improvement

- Participants suggested that CCI provide functionality for a user to redisplay the *Clinical Decision Support* screen once the registered nurse (RN) or the doctor of medicine (MD) has acknowledged the warning. Currently, there is no way to revisit the *Clinical Decision Support Warning* screen.
- In the Clinical Information Reconciliation module, participants requested an enhancement to allow display of two notes side-by-side for review during use of the *Order Entry* screen. Also, they requested notes include the "date of last dose taken."
- The clinical information reconciliation feature for problem lists produced the lowest success rate. Feedback indicated that over 60% of our participants found the feature difficult to use.

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1 See Tullis, T. & Albert, W. (2008). Measuring the User Experience. Burlington, MA: Morgan Kaufman (p. 149).

2   Introduction

Designed to facilitate clinician duties in both the outpatient and inpatient healthcare settings, the EHRUT consisted of the following applications within *CliniComp|EHR* v.213.03: CPOE, Implantable Devices, Clinical Decision Support, Clinical Information Reconciliation, and Electronic Prescribing. Each application included a user interface for the charting, viewing, modifying, and secure transmission of health information. The testing attempted to represent realistic exercises and conditions to validate the usability of the user interfaces and provide evidence of usability of the *CliniComp|EHR*. Measures of effectiveness, efficiency, and user satisfaction, such as task time and task success, were captured during the usability test.

3   Method

3.1 Participants

A total of eleven participated in usability testing. Participants included nine registered nurses and two nurse practitioners. Participant clinical expertise encompassed a variety of healthcare settings, including cardiothoracic surgery, emergency medicine, neonatal intensive care, and obstetrics. The participants were recruited by CCI's Clinical Analyst group and compensated for their time at an hourly rate established by a contracted payroll agency (*see* Appendix 9). Additionally, participants had no direct connection to the development or the organization producing the EHRUT, and participants were not from the vendor/testing organization. After the completion of all tasks, participants were given a demonstration of the system, similar to what end-users would receive from CCI during commercial implementation.

For test purposes, end-user characteristics were identified and translated into a participant questionnaire used to ensure that prospective participants met the criteria for the usability test (*see* Appendix 1). Recruited participants had a mix of backgrounds and demographic characteristics conforming to the recruitment screening criteria. Table 2 displays participant characteristics, including demographics, professional experience and specialty, computing experience, and user needs for assistive technology. Participant names were replaced with Participant Identification (ID) codes, so identifying data could not be correlated to individual participants.

Table 2: Participant Demographics and Characteristics

N	PART ID	GENDER	AGE	EDUCATION	OCCUPATION / ROLE	PROFESSIONAL EXPERIENCE (MONTHS)	COMPUTER EXPERIENCE (MONTHS)	PRODUCT EXPERIENCE (MONTHS)	ASSISTIVE TECHNOLOGY NEEDS
1	UT01	Male	30-39	Master's degree	RN	36	180	36	No
2	02	Male	30-39	Bachelor's degree	RN	120	240	120	No
3	03	Male	50-59	Bachelor's degree	RN	120	240	120	No
4	04	Female	60-69	Master's degree	RN	120	180	120	No
5	05	Female	60-69	Master's degree	NP	120	180	120	No
6	06	Male	50-59	Master's degree	RN	120	240	120	No
7	07	Female	30-39	Bachelor's degree	RN	36	180	96	No
8	08	Female	30-39	Bachelor's degree	RN	96	180	96	No
9	09	Female	30-39	Bachelor's degree	RN	96	240	96	No
10	10	Female	50-59	Master's degree	NP	120	240	120	No
11	11	Female	50-59	Bachelor's degree	RN	120	240	120	No

Eleven participants, matching the demographics in Table 2, were recruited, and all eleven participated in the usability test. No participants failed to report for the study. Participants were scheduled for two 8-hour sessions during standard working hours (8:30 am to 4:30 pm) in which they were allowed three cycles to perform the tasks. A spreadsheet was used to track the participant schedule and included each participant's demographic characteristics (*see* Appendix 2).

3.2 Study Design

The objectives of this test were to determine areas where the application performed well (effectively, efficiently, and with satisfaction) and where the application failed to meet participant needs. For specific objectives, see the Moderator's Guide (Appendix 5). The data from this usability test may serve as a baseline for future testing with an updated version of the *CliniComp|EHR* and/or comparison with other EHRs.

During the usability test, participants interacted with the *CliniComp|EHR*. Each participant used the EHRUT in the same location and was provided with the same instruction. The system was evaluated for effectiveness, efficiency, and satisfaction as defined by measures collected and analyzed for each participant:

- Number of tasks successfully completed within the allotted time without assistance

- Time to complete the tasks

- Number and types of errors

- Path deviations

- Participant's verbalizations (comments)

- Participant's satisfaction ratings of the system

For additional information about the various measures, *see* 3.9 Usability Metrics.

3.3 Tasks

Tasks were constructed to be realistic and representative of activities a user might perform with each *CliniComp|EHR* module, based on study objectives. Tasks were selected based on the frequency of use within the application, the criticality of the function, and the most troublesome for users.

TASK	TASK DETAIL	2015 ONC CRITERION TESTED
2	Utilizing patient demographic information	170.315 (a)(5) Demographics
3	Utilizing Clinical Decision Support	170.315 (a)(9) Clinical Decision Support
4	Medication allergy list and reconciliation	170.315 (a)(7) Medication Allergy List 170.315 (b)(2) Clinical Information Reconciliation and Incorporation
5	Medication list and reconciliation	170.315 (a)(8) Medication List 170.315 (b)(2) Clinical Information Reconciliation and Incorporation
6	Using Computerized Provider Order Entry (CPOE) for diagnostic imaging orders	170.315 (a)(3) CPOE- diagnostic imaging
7	Using CPOE for medical orders and drug-drug, drug-allergy interaction checks	170.315 (a)(3) CPOE- medications 170.315 (a)(4) CPOE- Drug-drug, Drug-allergy Interaction Checks for CPOE
8	Using CPOE for laboratory orders	170.315 (a)(2) CPOE- laboratory
9	Utilizing the implantable device list	170.315 (a)(14) Implantable Device List
10	Problem list and reconciliation	170.315 (a)(6) Problem List 170.315 (b)(2) Clinical Information Reconciliation and Incorporation
11	Medication Reconciliation	170.315 (b)(2) Clinical Information Reconciliation and Incorporation
12	Electronic Prescribing	170.315 (b)(3) Electronic Prescribing

3.4 Procedures

Upon arrival, participants were greeted, and their identity was verified and matched with a name on the participant schedule. Participants were then assigned a participant ID and introduced to their assigned data logger. Each participant reviewed and signed informed consent and release forms (*see* Appendix 3 and 4). The moderator witnessed the participant's signature and date.

To ensure that the test ran smoothly, 13 staff members participated in this test, including the usability moderator and 11 data loggers. The usability testing staff were experienced healthcare informaticists with a cumulative health information technology experience extending over 20 years in clinical, administrative, executive, and vendor settings.

The moderator administered the session, including instructions and task descriptions, monitored task times, and took notes on participant comments. One data logger was assigned to each participant to record task success, path deviations, number and type of errors, task times, obtain post-task rating data, and participant comments.

The moderator instructed the participants to perform the test tasks in the following ways:

- As quickly as possible
- Without assistance (administrators could give immaterial guidance and clarification on tasks, but no instructions on use)
- Without using a think-aloud technique

Participants were given a written copy of the tasks for each test. After the moderator described the scenario, task objective, and instruction to begin, the task timer started. The data logger stopped the task time once the participant indicated he or she completed the task. The moderator monitored the maximum allotted time per task, and data loggers captured all study data during the task process and after completion (*see 3.10* Data Scoring).

After all tests concluded, the following occurred:

- The moderator gave participants System Usability Scale Questionnaire (*see* Appendix 7), confirmed enrollment with the contracted payroll agency to ensure compensation, and thanked everyone for their participation.

- Participant demographics, testing success rates, time spent on each test, errors, deviations, verbal responses, and post-test questionnaires were recorded by the data logger in a spreadsheet for each test and participant.

- Participant time was captured on the payroll agency's timesheet by the data logger. All participants signed a receipt with the agency, indicating that they had received accurate compensation.

3.5 Test Location

The testing took place at CCI headquarters in San Diego, California. The testing facility included a waiting area and a quiet testing room with a table and a computer for each participant. Only participants, data loggers, and the moderator were present in the test room. To ensure that the environment was comfortable for users, noise levels were kept to a minimum and the ambient temperature within a normal office range. All safety instruction and evacuation procedures were valid, in place, and visible to participants.

3.6 Test Environment

The EHRUT would typically be used in a healthcare office or facility. For usability testing, the effort was conducted in a testing and training computer lab at CCI. The participants used Hewlett Packard® computers running Windows 8.1, which were connected to CCI's local network. The computers were equipped with 15-inch - 1280x1024 pixel resolution displays.

The application was set up on a test server by the CCI Service Support group according to EHRUT documentation describing the system set-up and preparation. Technically, the system performance (i.e., response time) was representative of what actual users would experience in field implementation. Additionally, participants were instructed not to change any of the default system settings (such as control of font size).

3.7 Test Forms and Tools

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

- Informed Consent
- Non-Disclosure Agreement
- Participant Questionnaire
- Moderator's Guide
- System Usability Scale Questionnaire

Examples of these documents are found in the Appendices. The Moderator's Guide (*see* Appendix 5) was devised to capture the required data. The data loggers captured participants' input and responses using digital timers and hand-written documentation.

3.8 Participant Instructions

The moderator read the following instructions aloud to all participants prior to the start of the usability testing (see Appendix 5):

Thank you for participating in this test. Your input is very important to us. Our session today will last approximately two working days. During that time, you will use an instance of an electronic health record.

There will be a number of tasks that will need to be completed as well as a few questions that will need to be answered. Each task will need to be completed on your own, at your own pace with minimal possible errors or deviations. We ask that you do them as quickly and efficiently as possible with the instructions that we have provided. Please complete the task and do not attempt to do more than what is instructed.

We must emphasize that we are not testing you or your ability to use the system- we are evaluating the usability of the system. We are not able to instruct or provide you with help on how to use the application beyond the provided instructions, but we may be able to provide help on other related issues. Please save your detailed comments until the end of the task or at the end of the session when we can discuss freely as a group.

Overall, we are interested in how easy (or how difficult) this system is to use, what features, or functionality are useful to you, and how we could improve it. Please be honest with your opinions.

The information you provide us will be kept confidential. Your name and any other identifying information will be omitted and not be associated with your comments. Should you feel it necessary, you are able to withdraw your participation at any time during the testing.

The product you will be testing today includes the following applications within the CliniComp EHR: CPOE, Implantable Devices, Clinical Decision Support, Clinical Information Reconciliation, and Electronic Prescribing. Since we are testing specific functionality, the workflow many not seem complete, or the data may not make sense compared to your normal work processes.

To access the system, you will be using a demo user and test patient record that correlate with your assigned participant number.

Following the procedural instructions, participants were shown the *CliniComp|EHR*, and the first task given was to explore the system and make comments (10 minutes). Once this task was complete, the moderator gave the following instructions:

For each task, I will read the description to you and say, "Begin." At that point, please perform the task and say "Done" once you believe you have successfully completed the task. I would like to request that you not talk aloud or verbalize while you are doing the tasks. I will ask you your impressions about the task once you are done.

Do you have any questions or concerns?

Participants were then given 11 tasks to complete in three cycles over the course of two testing days. To view the list of tasks, see the Moderator's Guide (Appendix 5).

3.9 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 tests were to assess:

1. Effectiveness of *CliniComp|EHR* by measuring participant success rates and errors

2. Efficiency of *CliniComp|EHR* by measuring the average task time and path deviations

3. Satisfaction with *CliniComp|EHR* module by measuring ease of use ratings

3.10 Data Scoring

Table 3 details how tests were scored and the time data analyzed.

Table 3: Data Scoring

MEASURES	RATIONALE AND SCORING
Effectiveness: Test Success	▪ A task was counted as a "Success" if the participant was able to achieve the correct outcome, without assistance, and within the time allotted on a per-task basis. ▪ The total number of successes was calculated for each task and then divided by the total number of times that task was attempted. The results are provided as a percentage. ▪ Task times were recorded for successes. Observed task times were divided by the optimal time for each task as a measure of optimal efficiency. ▪ Optimal task performance time, as benchmarked by expert performance under realistic conditions, were recorded when constructing tasks. For target task time information, see the Moderator's Guide (Appendix 5).
Effectiveness: Test Failures	▪ If the participant abandoned the test or task, did not reach the correct answer or performed it incorrectly, or reached the end of the allotted time before successful completion, the task was counted as "Failures." No task times were taken for errors. ▪ The total number of errors was calculated for each task and then divided by the total number of times that task was attempted. Not all deviations were counted as errors. This was expressed as the mean number of failed tasks per participant. ▪ On a qualitative level, an enumeration of errors and error types were collected.
Efficiency: Test Deviations	▪ The participant's path (i.e., steps) through the application was recorded. Deviations occurred 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 was divided by the number of optimal steps to provide a ratio of path deviation.
Efficiency: Test Time	▪ Each test was timed from when the administrator said "Begin" until the participant said, "Done." If he or she failed to say "Done," the time was stopped when the participant stopped performing the task. ▪ Only task times for tasks that were successfully completed were included in the average task time analysis. ▪ The average time per task was calculated for each task. Variance measures (standard deviation and standard error) were also calculated.
Satisfaction: Test Rating	▪ Participant's subjective impression of the ease of use of the application was measured by administering both a simple post-task question as well as a post-session questionnaire. After each task, the participant was asked "overall, on a scale of 1 to 5, where 1 is "Very Easy" and 5 is "Very Difficult," this task was ___." This data was averaged across participants. ▪ Common convention dictates that average ratings for systems judged easy to use are 3.7 or lower. ▪ To measure participants' confidence in and likeability of the *CliniComp|EHR* overall, the testing team administered the post-test SUS 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* Appendix 7).

CliniComp|EHR Usability Testing Report (P/N: 250-70027)
CliniComp, Intl. Confidential and Proprietary

January 18th, 2026 (Revision 3)
Page 17 of 54

4   Results

4.1 Data analysis and reporting

The results of the usability tests were calculated according to the methods specified in the Usability Metrics section above. All participants of this study followed the instructions, and no data were excluded.

The usability testing results for the EHRUT are detailed in Table 4 in accordance with the objectives and goals outlined in Section 3.2: Study Design.

Table 4: Test Results

MEASURE	N	TASK SUCCESS	PATH DEVIATION	TASK TIME (SEC)		ERRORS	TASK RATING * 1=EASY
Task	#	Mean (SD)	Deviations (Observed/ Optimal)	Mean (SD)	Deviations (Observed/ Optimal)	Mean (SD)	Mean (SD)
Utilizing patient demographic information	2	97% (5.2%)	1.0	25.3 (4.2)	0.4	0 (0)	1.1 (0.1)
Utilizing Clinical Decision Support	3	76% (26%)	1.0	36.5 (7.1)	0.4	0 (0)	1.3 (0.3)
Medication allergy list and reconciliation	4	85% (21%)	1.0	94.5 (20.1)	0.6	0.1 (0.1)	2.1 (0.3)
Medication list and reconciliation	5	94% (10.5%)	1.0	120.9 (16.2)	0.7	0.1 (0.1)	2.0 (0.3)
Using Computerized Provider Order Entry (CPOE) for diagnostic imaging	6	73% (36.7%)	1.0	66 (12.4)	0.5	0.03 (0.07)	1.6 (0.5)
Using CPOE for medication orders	7	100% (0%)	1.1	56 (14.3)	0.5	0.03 (0.07)	1.2 (0.2)
Using CPOE drug-drug, drug-allergy interaction checks	8	97% (5.2%)	1.0	7.0 (4.2)	0.3	0 (0.0)	1.2 (0.1)
Using CPOE for laboratory orders	9	100% (0%)	1.0	29.2 (8.0)	0.5	0.1 (0.1)	1.3 (0.2)
Utilizing the implantable device list	10	100% (0%)	1.0	21.5 (7.2)	0.4	0.0 (0.1)	1.3 (0.3)
Problem list reconciliation	11	73% (21%)	1.0	111.7 (20.1)	0.6	0.1 (0.1)	2.0 (0.7)
Clinical information reconciliation and incorporation**	12	71% (36.1%)	0.9	71 (410)	0.5	0.1 (0.1)	2.2 (0.6)
Electronic Prescribing	13	91% (10.5%)	1.0	101 (30.8)	0.6	0.0 (0.0)	1.4 (0.5)

*Task rating 1-5; where 1 is "Very Easy" and 5 is "Very Difficult."

**The clinical information reconciliation and incorporation tasks include the Medication Allergy List and Reconciliation, Problem List Reconciliation, and Medication Reconciliation.

4.2 System Usability Scale

The EHRUT received a score of **72.5** for subjective satisfaction based on the SUS Questionnaire. Broadly interpreted, scores under 60 represent systems with poor usability; scores over 80 would be considered

above average.[2] A summary of the SUS Questionnaire results per task or application tested within the EHRUT are included below:

DEMOGRAPHICS
1.   91% of the participants thought they would like to use this system frequently.
2.   91% of the participants found this system was NOT unnecessarily complex.
3.   82% of the participants found the system easy to use.
4.   91% of the participants thought a technical support person would NOT be needed to use this system.
5.   82% of the participants found the system to be well integrated.
6.   91% of the participants did NOT think there was too much inconsistency with the system.
7.   82% of the participants felt most people would learn to use the system very quickly.
8.   91% of the participants did NOT find the system to be cumbersome.
9.   82% of the participants felt very confident using the system.
10.   91% of the participants felt they did NOT need to learn a lot before they could get going with the system.

CLINICAL DECISION SUPPORT
1.   82% of the participants thought they would like to use this system frequently.
2.   82% of the participants found this system was NOT unnecessarily complex.
3.   82% of the participants found the system easy to use.
4.   100% of the participants thought a technical support person would NOT be needed to use this system.
5.   64% of the participants found the system to be well integrated.
6.   91% of the participants did NOT think there was too much inconsistency with the system.
7.   91% of the participants felt most people would learn to use the system very quickly.
8.   100% of the participants did NOT find the system to be cumbersome.
9.   91% of the participants felt very confident using the system.
10.   100% of the participants felt they did NOT need to learn a lot before they could get going with the system.

MEDICATION ALLERGY LIST AND RECONCILIATION
1.   100% of the participants thought they would like to use this system frequently.
2.   55% of the participants found this system was NOT unnecessarily complex.
3.   55% of the participants found the system easy to use.
4.   91% of the participants thought a technical support person would NOT be needed to use this system.
5.   73% of the participants found the system to be well integrated.
6.   82% of the participants did NOT think there was too much inconsistency with the system.
7.   73% of the participants felt most people would learn to use the system very quickly.
8.   73% of the participants did NOT find the system to be cumbersome.
9.   73% of the participants felt very confident using the system.
10.   91% of the participants felt they did NOT need to learn a lot before they could get going with the system.

MEDICATION RECONCILIATION
1.   82% of the participants thought they would like to use this system frequently.
2.   45% of the participants found this system was NOT unnecessarily complex.
3.   36% of the participants found the system easy to use.
4.   100% of the participants thought a technical support person would NOT be needed to use this system.
5.   55% of the participants found the system to be well integrated.
6.   82% of the participants did NOT think there was too much inconsistency with the system.
7.   73% of the participants felt most people would learn to use the system very quickly.
8.   55% of the participants did NOT find the system to be cumbersome.

2 See Tullis, T. & Albert, W. (2008). Measuring the User Experience. Burlington, MA: Morgan Kaufman (p. 149).

CliniComp/EHR Usability Testing Report (P/N: 250-70027)
CliniComp, Intl. Confidential and Proprietary

January 18th, 2026 (Revision 3)
Page 19 of 54

9. 45% of the participants felt very confident using the system.
10. 82% of the participants felt they did NOT need to learn a lot before they could get going with the system.

CPOE
1. 91% of the participants thought they would like to use this system frequently.
2. 91% of the participants found this system was NOT unnecessarily complex.
3. 82% of the participants found the system easy to use.
4. 100% of the participants thought a technical support person would NOT be needed to use this system.
5. 64% of the participants found the system to be well integrated.
6. 91% of the participants did NOT think there was too much inconsistency with the system.
7. 100% of the participants felt most people would learn to use the system very quickly.
8. 100% of the participants did NOT find the system to be cumbersome.
9. 91% of the participants felt very confident using the system.
10. 100% of the participants felt they did NOT need to learn a lot before they could get going with the system.

IMPLANTABLE DEVICES
1. 45% of the participants thought they would like to use this system frequently.
2. 82% of the participants found this system was NOT unnecessarily complex.
3. 82% of the participants found the system easy to use.
4. 100% of the participants thought a technical support person would NOT be needed to use this system.
5. 55% of the participants found the system to be well integrated.
6. 91% of the participants did NOT think there was too much inconsistency with the system.
7. 82% of the participants felt most people would learn to use the system very quickly.
8. 73% of the participants did NOT find the system to be cumbersome.
9. 82% of the participants felt very confident using the system.
10. 100% of the participants felt they did NOT need to learn a lot before they could get going with the system.

PROBLEM LIST
1. **64% of the participants thought they would like to use this system frequently.**
2. **64% of the participants found this system was NOT unnecessarily complex.**
3. **36% of the participants found the system easy to use.**
4. **82% of the participants thought a technical support person would NOT be needed to use this system.**
5. **36% of the participants found the system to be well integrated.**
6. **82% of the participants did NOT think there was too much inconsistency with the system.**
7. **64% of the participants felt most people would learn to use the system very quickly.**
8. **55% of the participants did NOT find the system to be cumbersome.**
9. **73% of the participants felt very confident using the system.**
10. **82% of the participants felt they did NOT need to learn a lot before they could get going with the system.**

CLINICAL INFORMATION RECONCILIATION
1. **82% of the participants thought they would like to use this system frequently.**
2. **55% of the participants found this system was NOT unnecessarily complex.**
3. **42% of the participants found the system easy to use.**
4. **91% of the participants thought a technical support person would NOT be needed to use this system.**
5. **55% of the participants found the system to be well integrated.**
6. **82% of the participants did NOT think there was too much inconsistency with the system.**
7. **70% of the participants felt most people would learn to use the system very quickly.**
8. **61% of the participants did NOT find the system to be cumbersome.**
9. **64% of the participants felt very confident using the system.**
10. **85% of the participants felt they did NOT need to learn a lot before they could get going with the system.**

ELECTRONIC PRESCRIBING
1. **73% of the participants thought they would like to use this system frequently.**
2. **82% of the participants found this system was NOT unnecessarily complex.**
3. **91% of the participants found the system easy to use.**
4. **100% of the participants thought a technical support person would NOT be needed to use this system.**
5. **73% of the participants found the system to be well integrated.**
6. **91% of the participants did NOT think there was too much inconsistency with the system.**
7. **82% of the participants felt most people would learn to use the system very quickly.**
8. **100% of the participants did NOT find the system to be cumbersome.**
9. **100% of the participants felt very confident using the system.**
10. **100% of the participants felt they did NOT need to learn a lot before they could get going with the system.**

4.3 Effectiveness

The effectiveness of the *CliniComp|EHR* was defined by the measurement of participant success rates. Most tasks were successfully completed at rates greater than 80% with seven tasks completed with rates greater than 90%. Problem list generated the lowest rate of completion at 73%. Only 36% of the users found this task easy to use, with participants indicating that it could be improved. To improve effective use in the future, the problem list display will be enhanced, and users will be provided improved training on the feature.

4.4 Efficiency

The efficiency of the *CliniComp|EHR* was defined by comparing the participant task performance times to a predefined optimal time. Optimal times ranged from 60-180 seconds, and the calculated grand mean for each task indicated that most tasks were completed efficiently. For the most part, participants followed the

optimal path to complete each assigned task, but there were minor path deviations for some tasks. Overall, path deviations were minimal as illustrated by deviation ratios between 0.9-1.1 for all tasks. The one task that was determined to be least effective was the problem list and reconciliation of clinical information.

4.5 Satisfaction

Satisfaction with the *CliniComp|EHR* was measured as a subjective impression of the ease of use of the application. This was acquired by soliciting as an ease-of-use score for each task. The participants were asked to fill in the blank in the following statement: "On a scale from 1-5, where 1 is "very easy' and 5 is "very difficult, this task was____." The ease of use ratings for all tasks were between 1.1-2.0. Common convention dictates average ratings for systems judged "easy to use" as 3.7 or lower. EHRUT data revealed that the *CliniComp|EHR* was relatively easy to use.

To measure participants' confidence in and likeability of the *CliniComp|EHR*, the testing team administered the post-test SUS Questionnaire. The scores captured by this questionnaire resulted in a mean score of 72.5, which is interpreted as average usability for the *CliniComp|EHR*. Broadly interpreted, scores under 60 represent systems with poor usability, and systems with scores over 80 would be considered above average.

Participant commentary further clarified the SUS scoring and identified the areas for improvement.

4.6 Major Findings

The usability study indicated that our intended audience found most of the *CliniComp|EHR* easy to use. User satisfaction ratings were high, and task times fell into acceptable ranges for most of the task features. Participants expressed their satisfaction with the *CliniComp|EHR*, stating the system's ease of navigation and the likelihood of using it frequently.

The problem list and clinical information reconciliation task had the lowest completion rate. Only 36% of the participants found the problem list feature well-integrated with the *CliniComp|EHR*. Participants who completed these tasks did so in less time or steps than the optimal path, which contributed to a lower path deviation result. Participants who did not complete the tasks, expressed their frustration with this specific feature, as it was less intuitive compared to other parts of the *CliniComp|EHR*. This study confirmed that additional training or education is needed with the clinical information reconciliation feature in order to reduce frustration, improve performance times, and achieve task results within the optimal path.

Those who used the system frequently or had more experience with the system were more satisfied users. Several participants had over three years of experience using *Essentris* prior to this usability testing. This strong previous experience resulted in a 100% success rate for three tasks and shorter pathways, which were based on participant clinical workflows. With a few tasks, there were a couple of participants with little or no prior experience who achieved the specific task but not by the optimal method for completing the task.

Participant feedback indicated that user training and education has the potential for minimizing these concerns and can be addressed by a client training team.

5 Conclusion

5.1 Areas for Improvement

Participants made the following recommendations:

- Participants suggested that CCI provide functionality for a user to redisplay the *Clinical Decision Support* screen once the RN or the MD has acknowledged the warning. Currently, there is no way to revisit the *Clinical Decision Support Warning* screen.

- In the Clinical Information Reconciliation module, participants requested an enhancement to allow display of two notes side-by-side for review during use of the *Order Entry* screen. Also, they requested the notes should include the "date of last dose taken."

- Although some of the clinical information reconciliation tasks were within or below optimal times, the study confirmed the need for user training in clinical information reconciliation and the incorporation of features to make optimal tasks paths more obvious and to minimize frustration.

6 Executive Summary - Decision Support Interventions: 170.315 (b)(11)

The CliniComp Intl. (CCI) Clinical Analyst group conducted a usability test of the *CliniComp|EHR* on November 21, 2024, in San Diego, California. The purpose of the testing was to validate the usability of the current user interface and provide evidence of the usability of the Electronic Health Record Under Test (EHRUT). Ten healthcare clinicians matching the target demographic criteria served as participants (*see* Appendix 2) using the EHRUT module in simulated, but representative tasks.

This study collected performance data on the decision support intervention tasks typically performed in an EHR:

- Activate evidence based DSI when reviewing ordering a procedure
- Activate user-supplied predictive DSI when ordering a procedure
- Access plain language description for evidence based DSI
- Access plain language description for user-supplied predictive DSI
- Access, record and change source attributes for evidence based DSI
- Access, record and change source attributes for user-supplied predictive DSI
- Provide feedback/intervention response for evidence based DSI - Implantable Device Interaction

At the start of the one-day study, an administrator greeted participants and asked each to review and sign an informed consent and non-disclosure agreement (*see* Appendix 3 and Appendix 4). The administrator informed the participants they could withdraw at any time. All participants had prior experience with the EHRUT. The administrator introduced the test and instructed participants to complete the series of tasks, given one at a time, using the EHRUT. A brief overview was provided on how to navigate and access a patient record. This overview did not include further instruction on features or functionality of the tasks to be tested. During testing, the administrator timed each test and, along with data loggers, recorded user performance data on paper and electronically. The administrator and data loggers did not provide direction to participants on how to complete tasks.

The following lists the type of data 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 verbalizations

Participant satisfaction ratings of the system

Participant commentary

All participant data was de-identified to eliminate connection from participant identity to the data collected. Following the conclusion of the testing, participants completed the System Usability Scale Questionnaire. The participants volunteered their time and were not compensated. In accordance with the examples set forth in the NIST Guide to the Processes Approach for Improving the Usability of Electronic Health Records, various recommended metrics were used to evaluate the usability of the *CliniComp|EHR*. Table 5 summarizes the performance and rating data collected. For further descriptions of the measures, rationale, and scoring, *see* section 8.10 Data Scoring.

Table 5: Summary of Test Results

MEASURE	N	TASK SUCCESS	PATH DEVIATION	TASK TIME (SEC)		ERRORS	TASK RATING* 1=EASY
Task	#	Mean (SD)	Deviations (Observed/ Optimal)	Mean (SD)	Deviations (Observed/ Optimal)	Mean (SD)	Mean (SD)
Activate evidence based DSI when reviewing ordering a procedure	15	100% (0.00)	1.2	67.5 (3.34)	1.03	0.1 (0.23)	1.4 (0.4)
Activate user-supplied predictive DSI when ordering a procedure	16	90% (0.17)	1.4	68.1 (2.81)	1.04	0.2 (0.25)	1.6 (0.7)
Access plain language description for evidence based DSI	17	100% (0.00)	1.0	15.7 (1.10)	1.04	0 (0)	1.0 (0)
Access plain language description for user-supplied predictive DSI	18	100% (0.00)	1.1	15.2 (1.04)	1.01	0 (0)	1.1 (0.1)
Access, record and change source attributes for evidence based DSI	19	80% (0.34)	1.1	78.1 (2.78)	1.04	0.3 (0.46)	1.5 (0.6)
Access, record and change source attributes for user-supplied predictive DSI	20	97% (0.05)	1.1	75.7 (1.00)	1.02	0 (0.05)	1 (0.1)
Provide feedback/intervention response for evidence based DSI - Implantable Device Interaction	21	100% (0.00)	1.1	62.3 (1.67)	1.03	0 (0)	1 (0)

*Task rating 1-5; where 1 is "Very Easy" and 5 is "Very Difficult."

6.1 Summary of Results

The EHRUT received a score of 77.0 for subjective satisfaction based on the System Usability Scale (SUS) Questionnaire (*see* Appendix 7). Broadly interpreted, scores under 60 represent systems with poor usability, and scores over 80 are considered above average. [3]

In addition to the performance data, qualitative observations were found:

6.1.1 Major Findings

The usability study indicated that our intended audience found most of the CliniComp|EHR Decision Support Intervention application easy to use. User satisfaction ratings were high, and task times fell into

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3 See Tullis, T. & Albert, W. (2008). Measuring the User Experience. Burlington, MA: Morgan Kaufman (p. 149).

acceptable ranges for most of the task features. Participants expressed their satisfaction with the CliniComp|EHR, stating the system's ease of navigation and the likelihood of using it frequently.

The ability to activate user-supplied predictive DSI and the ability to access, record and change source attributes tasks had the lowest completion rates. Participants who did not complete the tasks, expressed their frustration with this specific feature, as it was less intuitive compared to other parts of the CliniComp|EHR. This study confirmed that additional training or education is needed with the ability to activate user-supplied predictive DSI and the ability to access, record and change source attributes features in order to reduce frustration, improve performance times, and achieve task results within the optimal path.

6.1.2 Areas for Improvement

Participants made the following recommendations:

Participants suggested that CCI improve the ability to access, record and change source attributes for both evidence based and predictive DSI. The participants felt that the user interface could be more intuitive with clear guidance and less clicks.

7   Introduction

Designed to facilitate clinician duties in both the outpatient and inpatient healthcare settings, the EHRUT consisted of the Decision Support Intervention application within *CliniComp|EHR* v.213.03. The application included a user interface for the activation, access, ability to record/modify and provide feedback for decision support interventions. The testing attempted to represent realistic exercises and conditions to validate the usability of the user interfaces and provide evidence of usability of the *CliniComp|EHR*. Measures of effectiveness, efficiency, and user satisfaction, such as task time and task success, were captured during the usability test.

8   Method

8.1 Participants

A total of ten participants participated in usability testing. Participants included eight registered nurses and two nurse practitioners. Participant clinical expertise encompassed a variety of healthcare settings, including cardiothoracic surgery, emergency medicine, neonatal intensive care, general medicine and PACU. The participants were recruited by CCI's Clinical Analyst group. The participants volunteered their time and were not compensated.

For test purposes, end-user characteristics were identified and translated into a participant questionnaire used to ensure that prospective participants met the criteria for the usability test (*see* Appendix 1). Recruited participants had a mix of backgrounds and demographic characteristics conforming to the recruitment screening criteria. Table 6 displays participant characteristics, including demographics, professional experience and specialty, computing experience, and user needs for assistive technology. Participant names were replaced with Participant Identification (ID) codes, so identifying data could not be correlated to individual participants.

Table 6: Participant Demographics and Characteristics

P ID	GENDER	AGE	EDUCATION	OCCUPATION / ROLE	PROFESSIONAL EXPERIENCE (MONTHS)	COMPUTER EXPERIENCE (MONTHS)	PRODUCT EXPERIENCE (MONTHS)	ASSISTIVE TECHNOLOGY NEEDS
12	Female	30-39	Master's degree	RN	108	300	60	No
13	Female	40-49	Master's degree	RN	144	360	108	No
14	Female	40-49	Bachelor's degree	RN	144	360	96	No
15	Male	20-29	Bachelor's degree	RN	48	180	24	No
16	Female	30-39	Bachelor's degree	RN	66	300	36	No
17	Female	40-49	Master's degree	RN	252	360	60	No
18	Male	40-49	Bachelor's degree	RN	276	360	36	No
19	Female	50-59	Master's degree	NP	300	384	144	No
20	Female	30-39	Master's degree	NP	120	360	60	No
21	Female	30-39	Master's degree	RN	132	360	60	No

Ten participants, matching the demographics in Table 6, were recruited, and all ten participated in the usability test. No participants failed to report for the study. Participants were scheduled for one 4-hour session during standard working hours (8:30 am to 4:30 pm) in which they were allowed three cycles to perform the tasks. A spreadsheet was used to track the participant schedule and included each participant's demographic characteristics (*see* Appendix 2).

8.2 Study Design

The objectives of this test were to determine areas where the application performed well (effectively, efficiently, and with satisfaction) and where the application failed to meet participant needs. For specific objectives, see the Moderator's Guide b(11) (Appendix 5). The data from this usability test may serve as a baseline for future testing with an updated version of the *CliniComp|EHR* and/or comparison with other EHRs.

During the usability test, participants interacted with the *CliniComp|EHR*. Each participant used the EHRUT in the same location and was provided with the same instruction. The system was evaluated for effectiveness, efficiency, and satisfaction as defined by measures collected and analyzed for each participant:

- Number of tasks successfully completed within the allotted time without assistance

- Time to complete the tasks

- Number and types of errors

- Path deviations

- Participant's verbalizations (comments)

- Participant's satisfaction ratings of the system

For additional information about the various measures, *see* 8.9 Usability Metrics.

8.3 Tasks

Tasks were constructed to be realistic and representative of activities a user might perform with the *CliniComp|EHR* Decision Support Intervention module, based on study objectives. Tasks were selected based on the frequency of use within the application, the criticality of the function, and the most troublesome for users.

TASK	TASK DETAIL	ONC CRITERION TESTED
15	Activate evidence based DSI when reviewing ordering a procedure	170.315 (b)(11) Decision Support Interventions
16	Activate user-supplied predictive DSI when ordering a procedure	170.315 (b)(11) Decision Support Interventions
17	Access plain language description for evidence based DSI	170.315 (b)(11) Decision Support Interventions
18	Access plain language description for user-supplied predictive DSI	170.315 (b)(11) Decision Support Interventions
19	Access, record and change source attributes for evidence based DSI	170.315 (b)(11) Decision Support Interventions
20	Access, record and change source attributes for user-supplied predictive DSI	170.315 (b)(11) Decision Support Interventions
21	Provide feedback/intervention response for evidence based DSI - Implantable Device Interaction	170.315 (b)(11) Decision Support Interventions

8.4 Procedures

Upon arrival, participants were greeted, and their identity was verified and matched with a name on the participant schedule. Participants were then assigned a participant ID and introduced to their assigned data logger. Each participant reviewed and signed informed consent and release forms (*see* Appendix 3 and 4). The moderator witnessed the participant's signature and date.

The moderator administered the session, including instructions and task descriptions, monitored task times, and took notes on participant comments. One data logger was assigned to each participant to record task success, path deviations, number and type of errors, task times, obtain post-task rating data, and participant comments.

The moderator instructed the participants to perform the test tasks in the following ways:

　　As quickly as possible

　　Without assistance (administrators could give immaterial guidance and clarification on tasks, but no instructions on use)

　　Without using a think-aloud technique

Participants were given a written copy of the tasks for each test. After the moderator described the scenario, task objective, and instruction to begin, the task timer started. The data logger stopped the task time once the participant indicated he or she completed the task. The moderator monitored the maximum allotted time per task, and data loggers captured all study data during the task process and after completion (*see 8.10* Data Scoring).

After all tests concluded, the following occurred:

The moderator gave participants System Usability Scale Questionnaire (*see* Appendix 7) and thanked everyone for their participation.

Participant demographics, testing success rates, time spent on each test, errors, deviations, verbal responses, and post-test questionnaires were recorded by the data logger in a spreadsheet for each test and participant.

8.5 Test Location

The testing took place at CCI headquarters in San Diego, California. The testing facility included a waiting area and a quiet testing room with a table and a computer for each participant. Only participants, data loggers, and the moderator were present in the test room. To ensure that the environment was comfortable for users, noise levels were kept to a minimum and the ambient temperature within a normal office range. All safety instruction and evacuation procedures were valid, in place, and visible to participants.

8.6 Test Environment

The EHRUT would typically be used in a healthcare office or facility. For usability testing, the effort was conducted in a testing and training computer lab at CCI. The participants used Lenovo® computers running Windows 10 Pro, which were connected to CCI's local network. The computers were equipped with 32-inch - 1280x1024 pixel resolution monitors.

The application was set up on a test server by the CCI Service Support group according to EHRUT documentation describing the system set-up and preparation. Technically, the system performance (i.e., response time) was representative of what actual users would experience in field implementation. Additionally, participants were instructed not to change any of the default system settings (such as control of font size).

8.7 Test Forms and Tools

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

Informed Consent

Non-Disclosure Agreement

Participant Questionnaire

Moderator's Guide

System Usability Scale Questionnaire

Examples of these documents are found in the Appendices. The Moderator's Guide b(11) (*see* Appendix 5) was devised to capture the required data. The data loggers captured participants' input and responses using digital timers and hand-written documentation.

8.8 Participant Instructions

The moderator read the following instructions aloud to all participants prior to the start of the usability testing (see Appendix 5):

Thank you for participating in this test. Your input is very important to us. Our session today will last approximately four hours. During that time, you will use an instance of an electronic health record.

There will be a number of tasks that will need to be completed as well as a few questions that will need to be answered. Each task will need to be completed on your own, at your own pace with minimal possible errors or deviations. We ask that you do them as quickly and efficiently as possible with the instructions that we have provided. Please complete the task and do not attempt to do more than what is instructed.

We must emphasize that we are not testing you or your ability to use the system- we are evaluating the usability of the system. We are not able to instruct or provide you with help on how to use the application beyond the provided instructions, but we may be able to provide help on other related issues. Please save your detailed comments until the end of the task or at the end of the session when we can discuss freely as a group.

Overall, we are interested in how easy (or how difficult) this system is to use, what features, or functionality are useful to you, and how we could improve it. Please be honest with your opinions.

The information you provide us will be kept confidential. Your name and any other identifying information will be omitted and not be associated with your comments. Should you feel it necessary, you are able to withdraw your participation at any time during the testing.

The product you will be testing today includes the Decision Support Intervention application within the CliniComp EHR.. Since we are testing specific functionality, the workflow many not seem complete, or the data may not make sense compared to your normal work processes.

To access the system, you will be using a demo user and test patient record that correlate with your assigned participant number.

Following the procedural instructions, participants were shown the *CliniComp|EHR*, and the first task given was to explore the system and make comments (10 minutes). Once this task was complete, the moderator gave the following instructions:

For each task, I will read the description to you and say, "Begin." At that point, please perform the task and say "Done" once you believe you have successfully completed the task. I would like to request that you not talk aloud or verbalize while you are doing the tasks. I will ask you your impressions about the task once you are done.

Do you have any questions or concerns?

Participants were then given 7 tasks to complete in three cycles over the course of four hours. To view the list of tasks, see the Moderator's Guide b(11) (Appendix 5).

8.9 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 tests were to assess:

Effectiveness of *CliniComp|EHR* by measuring participant success rates and errors

Efficiency of *CliniComp|EHR* by measuring the average task time and path deviations

Satisfaction with *CliniComp|EHR* module by measuring ease of use ratings

8.10 Data Scoring

Table 7 details how tests were scored and the time data analyzed.

Table 7: Data Scoring

MEASURES	RATIONALE AND SCORING
Effectiveness: Test Success	A task was counted as a "Success" if the participant was able to achieve the correct outcome, without assistance, and within the time allotted on a per-task basis. The total number of successes was calculated for each task and then divided by the total number of times that task was attempted. The results are provided as a percentage. Task times were recorded for successes. Observed task times were divided by the optimal time for each task as a measure of optimal efficiency.

	Optimal task performance time, as benchmarked by expert performance under realistic conditions, were recorded when constructing tasks. For target task time information, see the Moderator's Guide (Appendix 5).
Effectiveness: Test Failures	If the participant abandoned the test or task, did not reach the correct answer or performed it incorrectly, or reached the end of the allotted time before successful completion, the task was counted as "Failures." No task times were taken for errors.
	The total number of errors was calculated for each task and then divided by the total number of times that task was attempted. Not all deviations were counted as errors. This was expressed as the mean number of failed tasks per participant.
	On a qualitative level, an enumeration of errors and error types were collected.
Efficiency: Test Deviations	The participant's path (i.e., steps) through the application was recorded. Deviations occurred 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 was divided by the number of optimal steps to provide a ratio of path deviation.
Efficiency: Test Time	Each test was timed from when the administrator said "Begin" until the participant said, "Done." If he or she failed to say "Done," the time was stopped when the participant stopped performing the task.
	Only task times for tasks that were successfully completed were included in the average task time analysis.
	The average time per task was calculated for each task. Variance measures (standard deviation and standard error) were also calculated.
Satisfaction: Test Rating	Participant's subjective impression of the ease of use of the application was measured by administering both a simple post-task question as well as a post-session questionnaire. After each task, the participant was asked "overall, on a scale of 1 to 5, where 1 is "Very Easy" and 5 is "Very Difficult," this task was ___." This data was averaged across participants.
	Common convention dictates that average ratings for systems judged easy to use are 3.7 or lower.
	To measure participants' confidence in and likeability of the *CliniComp|EHR* overall, the testing team administered the post-test SUS 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* Appendix 7).

CliniComp|EHR Usability Testing Report (P/N: 250-70027)
CliniComp, Intl. Confidential and Proprietary

January 18th, 2026 (Revision 3)
Page 33 of 54

9 Results

9.1 Data analysis and reporting

The results of the usability tests were calculated according to the methods specified in the Usability Metrics section above. All participants of this study followed the instructions, and no data were excluded.

The usability testing results for the EHRUT are detailed in Table 8 in accordance with the objectives and goals outlined in Section 8.2: Study Design.

Table 8: Test Results

TASK	TASK #	TASK SUCCESS	PATH DEVIATION	TASK TIME (SEC)		ERRORS	TASK RATING * 1=EASY
Activate evidence based DSI when reviewing ordering a procedure	15	100% (0.00)	1.2	67.5 (3.34)	1.03	0.1 (0.23)	1.4 (0.4)
Activate user-supplied predictive DSI when ordering a procedure	16	90% (0.17)	1.4	68.1 (2.81)	1.04	0.2 (0.25)	1.6 (0.7)
Access plain language description for evidence based DSI	17	100% (0.00)	1.0	15.7 (1.10)	1.04	0 (0)	1.0 (0)
Access plain language description for user-supplied predictive DSI	18	100% (0.00)	1.1	15.2 (1.04)	1.01	0 (0)	1.1 (0.1)
Access, record and change source attributes for evidence based DSI	19	80% (0.34)	1.1	78.1 (2.78)	1.04	0.3 (0.46)	1.5 (0.6)
Access, record and change source attributes for user-supplied predictive DSI	20	97% (0.05)	1.1	75.7 (1.00)	1.02	0 (0.05)	1 (0.1)
Provide feedback/intervention response for evidence based DSI - Implantable Device Interaction	21	100% (0.00)	1.1	62.3 (1.67)	1.03	0 (0)	1 (0)

*Task rating 1-5; where 1 is "Very Easy" and 5 is "Very Difficult."

9.2 System Usability Scale

The EHRUT received a score of 77.0 for subjective satisfaction based on the SUS Questionnaire. Broadly interpreted, scores under 60 represent systems with poor usability; scores over 80 would be considered

above average.[4] A summary of the SUS Questionnaire results per task or application tested within the EHRUT are included below:

DECISION SUPPORT INTERVENTIONS
1. 70% of the participants thought they would like to use this system frequently.
2. 70% of the participants found this system was NOT unnecessarily complex.
3. 80% of the participants found the system easy to use.
4. 90% of the participants thought a technical support person would NOT be needed to use this system.
5. 80% of the participants found the system to be well integrated.
6. 90% of the participants did NOT think there was too much inconsistency with the system.
7. 70% of the participants felt most people would learn to use the system very quickly.
8. 70% of the participants did NOT find the system to be cumbersome.
9. 70% of the participants felt very confident using the system.
10. 80% of the participants felt they did NOT need to learn a lot before they could get going with the system.

9.3 Effectiveness

The effectiveness of the *CliniComp|EHR* was defined by the measurement of participant success rates. Most tasks were successfully completed at rates greater than 80% with six tasks completed with rates greater than 90%. Access, record and change source attributes for evidence based DSI generated the lowest rate of completion at 80%. To improve effective use in the future, the display for modifying source attributes will be enhanced, and users will be provided improved training on the feature.

9.4 Efficiency

The efficiency of the *CliniComp|EHR* was defined by comparing the participant task performance times to a predefined optimal time. Optimal times ranged from 15-75 seconds, and the calculated grand mean for each task indicated that most tasks were completed efficiently. For the most part, participants followed the optimal path to complete each assigned task, but there were path deviations for some tasks. Overall, path deviations were minimal as illustrated by deviation ratios between 1.0-1.4 for all tasks. The one task that was determined to be least effective was the ability to activate a user-supplied predictive DSI when reviewing the problem list.

9.5 Satisfaction

Satisfaction with the *CliniComp|EHR* was measured as a subjective impression of the ease of use of the application. This was acquired by soliciting as an ease-of-use score for each task. The participants were asked to fill in the blank in the following statement: "On a scale from 1-5, where 1 is "very easy' and 5 is "very difficult, this task was____." The ease of use ratings for all tasks were between 1.0-1.6. Common convention dictates average ratings for systems judged "easy to use" as 3.7 or lower. EHRUT data revealed that the *CliniComp|EHR* was relatively easy to use.

To measure participants' confidence in and likeability of the *CliniComp|EHR*, the testing team administered the post-test SUS Questionnaire. The scores captured by this questionnaire resulted in a mean score of 77.0, which is interpreted as average usability for the *CliniComp|EHR*. Broadly interpreted, scores under

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4 See Tullis, T. & Albert, W. (2008). Measuring the User Experience. Burlington, MA: Morgan Kaufman (p. 149).

60 represent systems with poor usability, and systems with scores over 80 would be considered above average.

Participant commentary further clarified the SUS scoring and identified the areas for improvement.

9.6 Major Findings

The usability study indicated that our intended audience found most of the *CliniComp|EHR* Decision Support Intervention application easy to use. User satisfaction ratings were high, and task times fell into acceptable ranges for most of the task features. Participants expressed their satisfaction with the *CliniComp|EHR*, stating the system's ease of navigation and the likelihood of using it frequently.

The ability to activate user-supplied predictive DSI and the ability to access, record and change source attributes tasks had the lowest completion rates. Participants who did not complete the tasks, expressed their frustration with this specific feature, as it was less intuitive compared to other parts of the *CliniComp|EHR*. This study confirmed that additional training or education is needed with the ability to activate user-supplied predictive DSI and the ability to access, record and change source attributes features in order to reduce frustration, improve performance times, and achieve task results within the optimal path.

Those who used the system frequently or had more experience with the system were more satisfied users. Several participants had over three years of experience using the *CliniComp|EHR* prior to this usability testing. This strong previous experience resulted in a 100% success rate for three tasks and shorter pathways, which were based on participant clinical workflows. With a few tasks, there were a couple of participants with little or no prior experience who achieved the specific task but not by the optimal method for completing the task.

Participant feedback indicated that user training and education has the potential for minimizing these concerns and can be addressed by a client training team.

CliniComp|EHR Usability Testing Report (P/N: 250-70027)
CliniComp, Intl. Confidential and Proprietary

January 18th, 2026 (Revision 3)
Page 36 of 54

10 Conclusion

10.1 Areas for Improvement

Participants made the following recommendations:

Participants suggested that CCI improve the ability to access, record and change source attributes for both evidence based and predictive DSI. The participants felt that the user interface could be more intuitive with clear guidance and less clicks.

11 Executive Summary – Electronic Prescribing: 170.315 (b)(3)

The CliniComp Intl. (CCI) Clinical Product Team conducted an ePrescribing usability evaluation of the *CliniComp|EHR* on December 23, 2025, in San Diego, California. The purpose of this evaluation was to assess and validate the usability of the current ePrescribing user interface and to provide objective evidence supporting the usability of the Electronic Health Record Under Test (EHRUT). Ten (10) healthcare clinicians who met the target user demographic criteria participated in the study (see Appendix 2). Participants completed simulated but representative ePrescribing and medication reconciliation tasks using the EHRUT.

This study collected performance data for core ePrescribing workflows typically performed within an EHR, including accessing the patient record, navigating to the medication reconciliation and ePrescribing workspace, reviewing and reconciling existing prescriptions, entering and updating medication orders, associating diagnoses when required, selecting prescription fulfillment options, completing medication reconciliation, and reopening a completed medication reconciliation to update prescription details.

At the start of the one-day study, an administrator greeted participants and requested that each review and sign an informed consent form and non-disclosure agreement (see Appendix 3 and Appendix 4). Participants were informed that they could withdraw from the study at any time. All participants had prior experience using the EHRUT. The administrator introduced the test session and instructed participants to complete a series of tasks presented one at a time using the EHRUT. A brief overview of how to access and navigate a patient record was provided; however, no additional instruction on task-specific functionality was given.

During the testing sessions, the administrator timed each task and, along with designated data loggers, recorded user performance data both electronically and on paper. The administrator and data loggers did not provide guidance or assistance on task completion.

The following data were collected for each participant:

- Number of tasks successfully completed within the allotted time without assistance
- Time required to complete each task
- Number and types of errors
- Task path deviations
- Participant verbalizations during task performance
- Participant satisfaction ratings
- Participant commentary

All participant data were de-identified to ensure anonymity and prevent association between individual participants and the collected data. Upon completion of the usability testing session, participants completed the System Usability Scale (SUS) questionnaire to assess overall user satisfaction. Participants volunteered their time and were not compensated for participation.

Consistent with the guidance provided in the *NIST Guide to the Processes Approach for Improving the Usability of Electronic Health Records*, multiple recommended usability metrics were used to evaluate the usability of the EHRUT ePrescribing functionality. Table 9 summarizes the performance and satisfaction data collected during the study. Additional details regarding the measures, scoring methodology, and analysis are provided in Section 13.10, Data Scoring, Table 12.

Table 9: Summary of Test Results

TASK	TASK NUMBER	TASK SUCCESS	PATH DEVIATION	TASK TIME (SEC)		ERRORS	TASK RATING* 1=EASY
		Mean (SD)	(Observed / Optimal)	Mean (SD)	(Observed / Optimal)	Mean (SD)	Mean (SD)
Access patient record & Navigate to Med rec/eRx	10	98% (2.1)	7/6	58(14)	65 (55)	1.2 (0.9)	1.1 (0.3)
Review & reconcile existing prescriptions	10	94.3% (4.8)	12/10	145 (32)	160/135	4.6 (2.7)	1.4 (0.6)
Enter new medication order and complete prescription details	10	92.1% (6.4)	18/15	210 (48)	235/195	6.8(3.9)	1.6(0.7)
Associate diagnosis with medication (if required)	10	95.6% (3.7)	9/8	78(19)	88/70	3.1(1.9)	1.3(0.4)
Select prescription fulfillment mode (eRx/Print/Patient Obtained)	10	97.8% (2.4)	5/4	36(9)	41/32	1.4(1.0)	1.0(0.0)
Complete medication reconciliation process	10	93.7% (5.2)	10/9	95(22)	108/85	5.2(2.6)	1.4(0.5)
Reopen completed medication reconciliation and update prescription details as needed	10	90.3% (7.1)	14/12	165(40)	185/150	8.1(4.3)	1.6(0.8)

11.1 Summary of Results

The usability evaluation demonstrated strong overall performance across measured dimensions:

Effectiveness:

Participants successfully completed all evaluated tasks, with task success rates consistently above 90 percent. Errors were infrequent and generally associated with higher-complexity workflows.

Efficiency:

Task completion times and path deviations were consistent with expected clinical workflows. Simple navigation and selection tasks were completed quickly with minimal deviation, while more complex tasks showed increased time and variability without preventing task completion.

Satisfaction:

Ease-of-use ratings across all tasks ranged from 1.0 to 1.6 on a five-point scale, indicating that participants perceived the system as easy to use. Post-test SUS results produced a mean score of 75% reflecting average to above-average usability based on standard interpretation.

11.1.1   Major Findings

The following key findings were identified through analysis of the usability data:

- Participants were able to complete all ePrescribing and medication reconciliation tasks successfully with minimal errors.
- Core navigation and prescription fulfillment workflows were consistently rated as easy to use.
- Task complexity correlated with increased completion time and variability but did not introduce usability barriers.
- Overall user satisfaction results indicate that the system supports clinical workflows effectively and meets usability expectations for routine ePrescribing use.
- SUS scores and ease-of-use ratings were consistent with qualitative participant feedback, reinforcing the validity of the findings.

11.1.2   Areas for Improvement

While overall usability results were positive, the evaluation identified opportunities for refinement:

- Tasks involving advanced or less frequently used workflows, such as reopening and updating a completed medication reconciliation, showed greater variability in task time and satisfaction ratings.
- Additional workflow cues or contextual guidance may further reduce cognitive load for complex medication entry scenarios.
- Continued usability optimization for advanced workflows may improve consistency across users with varying levels of product experience.

12 Introduction

Designed to support clinician electronic prescribing workflows in both outpatient and inpatient care settings, the Electronic Health Record Under Test (EHRUT) consisted of the ePrescribing functionality within CliniComp|EHR v.213.03. The evaluated functionality included user interfaces that support medication selection and entry, review and modification of prescription details.

The usability testing was designed to simulate realistic clinical prescribing scenarios and conditions in order to validate the usability of the ePrescribing user interface and to provide evidence of usability for the CliniComp|EHR. Measures of effectiveness, efficiency, and user satisfaction—including task success, task completion time, and user feedback—were collected and analyzed during the study.

CliniComp|EHR Usability Testing Report (P/N: 250-70027)
CliniComp, Intl. Confidential and Proprietary

January 18th, 2026 (Revision 3)
Page 41 of 54

13 Method

13.1 Participants

A total of ten participants participated in usability testing. Participants included eight registered nurses and two nurse practitioners. Participant clinical expertise encompassed a variety of healthcare settings, including cardiothoracic surgery, emergency medicine, neonatal intensive care, general medicine and PACU. The participants were recruited by CCI's Clinical Analyst group. The participants volunteered their time and were not compensated.

For test purposes, end-user characteristics were identified and translated into a participant questionnaire used to ensure that prospective participants met the criteria for the usability test (see Appendix 1). Recruited participants had a mix of backgrounds and demographic characteristics conforming to the recruitment screening criteria. Table 6 displays participant characteristics, including demographics, professional experience and specialty, computing experience, and user needs for assistive technology. Participant names were replaced with Participant Identification (ID) codes, so identifying data could not be correlated to individual participants.

Table 10: Participant Demographics and Characteristics

Participant Identifier	Gender	Age	Education	Occupation	Professional Experience	Computer Experience	Product Experience	Assistive Technology Needs
P1	Female	40-49	Master's degree	RN	240.00	300.00	60.00	No
P2	Female	30-39	Master's degree	RN	144.00	180.00	36.00	No
P3	Male	50-59	Doctorate degree	Pharmacist	300.00	360.00	72.00	No
P4	Female	40-49	Bachelor's degree	RN	216.00	264.00	48.00	No
P5	Female	50-59	Bachelor's degree	RN	288.00	336.00	60.00	No
P6	Male	60-69	Bachelor's degree	RN	360.00	420.00	84.00	No
P7	Female	40-49	Doctorate degree	Pharmacist	264.00	312.00	54.00	No
P8	Female	40-49	Master's degree	Nurse Practitioner	228.00	276.00	48	No
P9	Female	50-59	Master's degree	RN	324.00	372.00	36.00	No
P10	Female	60-69	Master's degree	RN	384.00	432.00	96.00	No

13.2 Study Design

The objectives of this test were to determine areas where the application performed well (effectively, efficiently, and with satisfaction) and where the application failed to meet participant needs. For specific objectives, see the Moderator's Guide b(3) (Appendix 5). The data from this usability test may serve as a baseline for future testing with an updated version of the *CliniComp|EHR* and/or comparison with other EHRs.

During the usability test, participants interacted with the *CliniComp|EHR*. Each participant used the EHRUT in the same location and was provided with the same instruction. The system was evaluated for effectiveness, efficiency, and satisfaction as defined by measures collected and analyzed for each participant:

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

For additional information about the various measures, *see* 13.9 Usability Metrics.

13.3 Tasks

Tasks were constructed to be realistic and representative of activities a user might perform with the CliniComp|EHR Electronic Prescribing module, based on study objectives. These tasks were designed to reflect routine electronic prescribing and medication reconciliation activities performed by clinicians in real-world care settings.

Table 11: Electronic Prescribing Tasks

TASK	TASK DETAIL	ONC CRITERION TESTED
22	Access the patient record and navigate to the Medication Reconciliation/ eRx workspace	170.315 (b)(3) Electronic Prescribing
23	Review and reconcile existing prescriptions	170.315 (b)(3) Electronic Prescribing
24	Enter a new medication order & Complete required prescription details (dose, route, frequency, duration)	170.315 (b)(3) Electronic Prescribing
25	Associate an appropriate diagnosis with the medication, if required.	170.315 (b)(3) Electronic Prescribing
26	Select the prescription fulfillment mode (e.g., ePrescribe, Print, or Patient Obtained).	170.315 (b)(3) Electronic Prescribing
27	Complete the medication reconciliation process	170.315 (b)(3) Electronic Prescribing
28	Reopen a completed medication reconciliation & update prescription details as needed	170.315 (b)(3) Electronic Prescribing

13.4 Procedures

Upon arrival, participants were greeted and their identities were verified against the participant schedule. Each participant was assigned a unique participant identifier and introduced to their designated data logger. Participants reviewed and signed the informed consent and release forms (see Appendices 3 and 4), with the moderator witnessing and documenting the signature and date.

The moderator facilitated each testing session by providing standardized instructions and task descriptions, monitoring task completion times, and documenting participant comments. Each participant was assigned a dedicated data logger responsible for recording task success, path deviations, number and types of errors, task completion times, post-task ratings, and participant commentary.

Participants were instructed to complete the test tasks under the following conditions:

- As quickly as possible
- Without assistance (administrators could provide clarification on task objectives but did not provide instructions on system use)
- Without using a think-aloud technique

Participants were provided with a written copy of each task. After the moderator described the test scenario and task objective and instructed the participant to begin, the task timer was started. The data logger stopped the timer when the participant indicated task completion. The moderator monitored adherence to the maximum allotted time per task, while data loggers captured all study data during task execution and after completion (see Section 8.10, Data Scoring).

Following completion of all test tasks, participants were administered the System Usability Scale (SUS) questionnaire (see Appendix 7) and thanked for their participation. Participant demographics, task success rates, task completion times, errors, path deviations, participant verbalizations, and post-test questionnaire responses were recorded by the data logger in a structured spreadsheet for each participant and task.

13.5 Test Location

The testing took place at CCI headquarters in San Diego, California. The testing facility included a waiting area and a quiet testing room with a table and a computer for each participant. Only participants, data loggers, and the moderator were present in the test room. To ensure that the environment was comfortable for users, noise levels were kept to a minimum and the ambient temperature within a normal office range. All safety instruction and evacuation procedures were valid, in place, and visible to participants.

13.6 Test Environment

The EHRUT would typically be used in a hospital and/or ambulatory clinic. This usability testing, was conducted in a testing and training computer lab at CCI. The participants used Lenovo® laptop computers running current Windows platform..

The application was set up on a test server by the CCI Service Support group according to EHRUT documentation describing the system set-up and preparation. Technically, the system performance (i.e., response time) was representative of what actual users would experience in field implementation. Additionally, participants were instructed not to change any of the default system settings (such as control of font size).

13.7 Test Forms and Tools

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

> Informed Consent
>
> Non-Disclosure Agreement
>
> Participant Questionnaire
>
> Moderator's Guide
>
> System Usability Scale Questionnaire

Examples of these documents are found in the Appendices. The Moderator's Guide b(3) (*see* Appendix 5) was devised to capture the required data. The data loggers captured participants' input and responses using digital timers and hand-written documentation.

13.8 Participant Instructions

The moderator read the following instructions aloud to all participants prior to the start of the usability testing (see Appendix 5):

> *Thank you for participating in this test. Your input is very important to us. Our session today will last approximately four hours. During that time, you will use an instance of an electronic health record.*
>
> *There will be a number of tasks that will need to be completed as well as a few questions that will need to be answered. Each task will need to be completed on your own, at your own pace with minimal possible errors or deviations. We ask that you do them as quickly and efficiently as possible with the instructions that we have provided. Please complete the task and do not attempt to do more than what is instructed.*
>
> *We must emphasize that we are not testing you or your ability to use the system- we are evaluating the usability of the system. We are not able to instruct or provide you with help on how to use the application beyond the provided instructions, but we may be able to provide help on other related issues. Please save your detailed comments until the end of the task or at the end of the session when we can discuss freely as a group.*
>
> *Overall, we are interested in how easy (or how difficult) this system is to use, what features, or functionality are useful to you, and how we could improve it. Please be honest with your opinions.*
>
> *The information you provide us will be kept confidential. Your name and any other identifying information will be omitted and not be associated with your comments. Should you feel it necessary, you are able to withdraw your participation at any time during the testing.*
>
> *The product you will be testing today includes the Decision Support Intervention application within the CliniComp EHR.. Since we are testing specific functionality, the workflow many not seem complete, or the data may not make sense compared to your normal work processes.*
>
> *To access the system, you will be using a demo user and test patient record that correlate with your assigned participant number.*

Following the procedural instructions, participants were shown the *CliniComp|EHR*, and the first task given was to explore the system and make comments (10 minutes). Once this task was complete, the moderator gave the following instructions:

> *For each task, I will read the description to you and say, "Begin." At that point, please perform the task and say "Done" once you believe you have successfully completed the task. I would like to request that you not talk aloud or verbalize while you are doing the tasks. I will ask you your impressions about the task once you are done.*
>
> *Do you have any questions or concerns?*

Participants were then given 7 tasks to complete in two cycles over the course of four hours. To view the list of tasks, see the Moderator's Guide b(3) (Appendix 5).

13.9 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 tests were to assess:

1. Effectiveness of *CliniComp|EHR* by measuring participant success rates and errors
2. Efficiency of *CliniComp|EHR* by measuring the average task time and path deviations
3. Satisfaction with *CliniComp|EHR* module by measuring ease of use ratings

13.10   Data Scoring

Table 12: Data Scoring Methodology

MEASURES	RATIONALE AND SCORING
Effectiveness: Test Success	A task was counted as a "Success" if the participant was able to achieve the correct outcome, without assistance, and within the time allotted on a per-task basis. The total number of successes was calculated for each task and then divided by the total number of times that task was attempted. The results are provided as a percentage. Task times were recorded for successes. Observed task times were divided by the optimal time for each task as a measure of optimal efficiency. Optimal task performance time, as benchmarked by expert performance under realistic conditions, were recorded when constructing tasks. For target task time information, see the Moderator's Guide (Appendix 5).
Effectiveness: Test Failures	If the participant abandoned the test or task, did not reach the correct answer or performed it incorrectly, or reached the end of the allotted time before successful completion, the task was counted as "Failures." No task times were taken for errors. The total number of errors was calculated for each task and then divided by the total number of times that task was attempted. Not all deviations were counted as errors. This was expressed as the mean number of failed tasks per participant. On a qualitative level, an enumeration of errors and error types were collected.
Efficiency: Test Deviations	The participant's path (i.e., steps) through the application was recorded. Deviations occurred 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 was divided by the number of optimal steps to provide a ratio of path deviation.
Efficiency: Test Time	Each test was timed from when the administrator said "Begin" until the participant said, "Done." If he or she failed to say "Done," the time was stopped when the participant stopped performing the task. Only task times for tasks that were successfully completed were included in the average task time analysis. The average time per task was calculated for each task. Variance measures (standard deviation and standard error) were also calculated.
Satisfaction: Test Rating	Participant's subjective impression of the ease of use of the application was measured by administering both a simple post-task question as well as a post-session questionnaire. After each task, the participant was asked "overall, on a scale of 1 to 5, where 1 is "Very

	Easy" and 5 is "Very Difficult," this task was ___." This data was averaged across participants.
	Common convention dictates that average ratings for systems judged easy to use are 3.7 or lower.
	To measure participants' confidence in and likeability of the *CliniComp|EHR* overall, the testing team administered the post-test SUS 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* Appendix 7).

CliniComp|EHR Usability Testing Report (P/N: 250-70027)
CliniComp, Intl. Confidential and Proprietary

January 18th, 2026 (Revision 3)
Page 47 of 54

14 Results

14.1 Data Analysis & Reporting

Usability data were collected from ten (10) clinical participants who completed representative ePrescribing and medication reconciliation tasks. Data were analyzed using quantitative usability measures consistent with NISTIR 7741, including effectiveness, efficiency, and satisfaction. Descriptive statistics (mean and standard deviation) were calculated for all task-level measures.

14.2 System Usability Scale

The EHRUT ePrescribing functionality received a mean System Usability Scale (SUS) score of 75.0, indicating average subjective usability. Broadly interpreted, SUS scores below 60 represent systems with poor usability, while scores above 80 are considered above average. Broadly interpreted, scores under 60 represent systems with poor usability; scores over 80 would be considered above average.[5] The observed score suggests that participants found the ePrescribing workflows usable and acceptable for routine clinical use, with some opportunities for refinement.

A summary of the SUS questionnaire results for the ePrescribing and medication reconciliation functionality evaluated within the EHRUT is provided below:

Table 10: Participant Demographics and Characteristics

E-PRESCRIBING FUNCTIONALITY
1. 65% of participants indicated they would like to use the ePrescribing functionality frequently.
2. 70% of participants reported that the ePrescribing workflows were not unnecessarily complex.
3. 75% of participants found the ePrescribing functionality easy to use.
4. 85% of participants indicated that they would not need technical support to use the ePrescribing functionality.
5. 75% of participants felt that the ePrescribing workflows were well integrated within the EHR.
6. 85% of participants did not perceive significant inconsistency within the ePrescribing workflows.
7. 65% of participants felt that most users would learn to use the ePrescribing functionality quickly.
8. 70% of participants did not find the ePrescribing functionality cumbersome to use.
9. 65% of participants reported feeling confident using the ePrescribing functionality.
10. 75% of participants indicated that they did not need to learn a lot before getting started with the ePrescribing functionality.

14.3 Effectiveness

Effectiveness was evaluated using task success rate, task error rate, and task path deviation. Task success was defined as completion of the task without critical failure. Errors included incorrect actions, omissions, or actions requiring correction to complete the task.

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5 See Tullis, T. & Albert, W. (2008). Measuring the User Experience. Burlington, MA: Morgan Kaufman (p. 149).

CliniComp|EHR Usability Testing Report (P/N: 250-70027)
CliniComp, Intl. Confidential and Proprietary

January 18th, 2026 (Revision 3)
Page 48 of 54

14.4 Efficiency

Efficiency was assessed using task completion time, task time deviation, and task path deviation. Task time deviation represents the difference between observed task time and optimal task time.

14.5 Satisfaction (Ease of Use & User Perception)

User satisfaction with the EHR was evaluated as a subjective assessment of perceived ease of use for each task. Following completion of each task, participants were asked to rate ease of use by responding to the following prompt:

"On a scale from 1 to 5, where 1 is 'very easy' and 5 is 'very difficult,' this task was ____."

Ease-of-use ratings across all evaluated tasks ranged from 1.0 to 1.6, indicating that participants consistently perceived the tasks as easy to complete. Based on commonly accepted usability conventions, systems with average ease-of-use ratings of 3.7 or lower are considered easy to use. The observed ratings fall well below this threshold, demonstrating that participants experienced minimal difficulty when performing ePrescribing and medication reconciliation tasks within the EHR.

Qualitative participant comments provided additional context for the satisfaction ratings and SUS scores. Feedback generally reinforced the quantitative findings and helped identify specific areas for potential refinement, particularly within more complex or less frequently used workflows.

14.6 Major Findings

The following major findings were identified from the usability analysis:

- All evaluated ePrescribing tasks were completed successfully with high effectiveness.
- Increased task complexity correlated with higher task times and variability but did not prevent task completion.
- Navigation and prescription fulfillment workflows were consistently rated as highly usable.
- Advanced medication management tasks demonstrated acceptable usability with expected variability.
- Overall SUS results indicate average user satisfaction and workflow integration.

15 Conclusion

The usability evaluation indicates that the EHR's ePrescribing functionality supports effective, efficient, and satisfactory task performance for clinical users. The results align with NISTIR 7741 usability principles and provide evidence that the system meets usability expectations for certification purposes.

15.1 Areas for Improvement

While overall usability results were positive, the evaluation identified opportunities for refinement. Tasks associated with advanced or less frequently used workflows, such as reopening and updating a completed medication reconciliation, demonstrated greater variability in task completion time and user satisfaction. Participants noted that the user interface could be more intuitive, with clearer guidance and fewer required clicks.

16 Appendix

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

1. Participant Questionnaire
2. Participant Demographics
3. Informed Consent Form
4. Non-Disclosure Agreement
5. Moderator's Guide
6. System Usability Scale Questionnaire
7. Participant Instruction
8. Exit Questionnaire
9. Incentive Receipt and Acknowledgment *(*Not applicable for participants in the b(3) SED testing as time was volunteered.)*

16.1 Appendix 1: Participant Questionnaire

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Test_Participant Ques

16.2 Appendix 2a: Participant Demographics b(11)

GENDER	#
Men	4
Women	7
Total (participants)	11

EDUCATION	#
High school graduate/ General Educational Development	0
College Graduate	6
Postgraduate	5
Total (participants)	11

AGE RANGES	#
20 to 29	0
30 to 39	5
50 to 59	4
60 to 69	2
70 and older	0
Total (participants)	11

YEARS OF EXPERIENCE	#
Less than a year	0
1-5	2
5-10	2
More than 10	7
Total (participants)	11

OCCUPATION/ROLE	#
RN/BSN	9
Physician	0
Nurse Practitioner	2
Total (participants)	11

FACILITY USE OF CURRENT EHR	#
All paper	0
Some paper, some electronic	8
All electronic	3
Total (participants)	11

CliniComp/EHR Usability Testing Report (P/N: 250-70027)
CliniComp, Intl. Confidential and Proprietary

January 18th, 2026 (Revision 3)
Page 52 of 54

16.1 Appendix 2b: Participant Demographics b(3)

Gender	
Male	2
Female	8
Total Participants	10
Occupation/Role	
RN/BSN	3
RN/MSN	5
Doctorate	2
Total	10
Years of Professional Experience	
10-15	1
15-20	3
20-25	3
25-30	2
30+	1
Total	10

16.2 Appendix 3: Informed Consent

MU EHR Usability
Test_Informed Conse

16.3 Appendix 4: Non-Disclosure Agreement

MU Usability NDA
Form

16.4 Appendix 5: Moderator's Guide

MU EHR Usability
Test_Moderator's Gui

MU EHR Usabiliy Test
b(11) Moderators Gui

EHR Usability Test
b(3)_Moderator's Gui

16.5 Appendix 6: Participant Instructions

MU EHR Usability
Test_Participant Instru

MU EHR Participant
Instructions b11.pdf

EHR Usability Test
b(3) Participant Instru

16.6 Appendix 7: System Usability Scale Questionnaire

MU EHR SUS
Questionnaire.pdf

16.7 Appendix 8: Exit Questionnaire

MU EHR Usability Tes
Exit Questionnaire.pdf

16.8 Appendix 9: Incentive Receipt and Acknowledgment

CliniComp, Intl. has an agreement with the following agency who manages payroll processing for contractors:

VACO
Attn: Mariah Taramasco, Office Manager
4250 Executive Square
La Jolla, CA 92037
Phone (858) 642-0000
Fax: (858) 642-0006
mariah@vaco.com

Not applicable for participants in the b(11) SED testing as their time was volunteered.

Usability Test

Participant Questionnaire

Test Name: _____   **Test Date:** _____   **Participant #:** _____

Participant Demographics

1. Gender

   ☐ Male   ☐Female

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

   ☐ No   ☐ Yes

3. Do you, or does anyone in your household work in marketing research, usability research, web design, software development, or similar industry?

   ☐ No   ☐ Yes

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

   ☐ No   ☐ Yes

5. Which of the following best describes your age?

   ☐ 18 to 24   ☐ 25 to 39   ☐ 40 to 59   ☐ 60 - to 74   ☐ 75 and older

6. Which of the following best describes your race or ethnic group?

   ☐ Caucasian   ☐Asian or Pacific Islander ☐Black/African-American

   ☐ Latino/a or Hispanic   ☐ Other: _____

7. Do you require any assistive technologies to use a computer?

   ☐ No   ☐ Yes   If yes, please describe: _____

Professional Demographics

8. What is your current position and title?

   ☐ RN: Specialty: _____

   ☐ Provider: (circle)   MD   DO   NP   MW

              Specialty: _____

☐ Ancillary: Specialty: _____

☐ Other: _____

9.   How long have you held this position?

☐ Less than 1 yr. ☐ 1 to 5 yrs.   ☐ 5 to 10 yrs.   ☐ More than 10 yrs.

10. Describe your work location (or affiliation) and environment? (check all that apply)

☐ Private practice   ☐ Public health system   ☐ Government health system

☐ Acute care hospital   ☐ Ambulatory clinic   ☐ University/research affiliation

☐ Other: _____

11. Which of the following describes your highest level of education?

☐ High school graduate/GED   ☐ Some college   ☐ College graduate

☐ Postgraduate   ☐ Other: _____

Computer Expertise

12. How many years have you been using computer for both professional and personal activities (reading email, online shopping, web browsing, etc.)?

☐ <5 years   ☐ 5 to 10 yrs.   ☐ 10 to 20 yrs.   ☐ More than 20 yrs.

13. Besides reading email, what professional activities do you do on the computer?

☐ Access EHR   ☐ Clinical Research   ☐ System Configuration/Administration

☐ Word processing   ☐ Training/Education   ☐ Other: _____

14. About how many hours per week do you spend on a computer?

☐ 0 to 10   ☐ 11 to 25   ☐ 26+ hours per week

15. What computer platform do you usually use?

☐ Windows   ☐ Mac   ☐ Linux

☐ Other: _____

16. What Internet browser(s) do you usually use?

☐ Internet Explorer   ☐ Safari ☐ Chrome

☐ Firefox   ☐ Other: _____

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

☐ 0 to 4 days   ☐ 4 to 12 days   ☐ More than 12 days   ☐ Everyday

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

☐ Less than 1 yr. ☐ 1 to 5 yrs.   ☐ 5 to 10 yrs.   ☐ More than 10 yrs.

19. How does your work environment handle patient records?

☐ On paper   ☐ Some paper, some electronic   ☐All electronic

20. Which EHRs do you use or are you familiar with? (please list)

☐ Essentris   ☐ _____   ☐ _____

☐ CHCS ☐ _____   ☐ _____

☐ AHLTA   ☐ _____   ☐ _____

☐ VistA ☐ _____   ☐ _____

21. What clinical systems and/or applications do you currently utilize at your facility?

☐ Flowsheets   ☐ Medication administration   ☐ Interdisciplinary care plans

☐ e-Prescribing   ☐ Order Entry (CPOE)   ☐ Outpatient Support

☐ Lab Integration   ☐ Pharmacy Integration   ☐ Radiology Information System

☐ Quality/Metrics Reporting   ☐ Other: _____

Usability Test

Informed Consent

CliniComp Intl. would like to thank you for participating in this study. The purpose of this study is to evaluate an electronic health records system. If you decide to participate, you will be asked to perform several tasks using the prototype and give your feedback. The study will take place in a computer lab alongside other participants. At the conclusion of the test, you will be compensated for your time.

Agreement

I understand and agree that as a voluntary participant in the present study conducted by *CliniComp Intl.* I am free to withdraw consent or discontinue participation at any time.

I understand and agree that the purpose of this study is to make software applications more useful and usable in the future.

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

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

Please check one of the following:

☐   YES, I have read the above statement and agree to be a participant.

☐   NO, I choose not to participate in this study.

Signature: _____   **Date:** _____

Printed Name: _____   **Participant ID:** _____

Usability Test

Non-Disclosure Agreement

THIS AGREEMENT is entered into as of December 7, 2016, between _____ ("The Participant") and the testing organization *CliniComp Intl.* located at *9655 Towne Centre Dr., San Diego, CA 92121.*

The Participant acknowledges his or her voluntary participation in today's usability study may bring the Participant into possession of Confidential Information. The term "Confidential Information" means all technical and commercial information of a proprietary or confidential nature which is disclosed by *CliniComp Intl.*, or otherwise acquired by the Participant, in the course of today's study.

By way of illustration, but not limitation, Confidential Information includes trade secrets, processes, formulae, data, know-how, products, designs, drawings, computer aided design files and other computer files, computer software, ideas, improvements, inventions, training methods and materials, marketing techniques, plans, strategies, budgets, financial information, or forecasts.

Any information the Participant acquires relating to this product during this study is confidential and proprietary to *CliniComp, Intl.* and is being disclosed solely for the purposes of the Participant's participation in today's usability study. By signing this form the Participant acknowledges that s/he will receive monetary compensation for feedback and will not disclose this confidential information obtained today to anyone else or any other organizations.

Participant Signature: _____   **Date: _____**

Printed Name: _____   **Participant ID: _____**

Usability Test

Moderator's Guide

Test Name: _____

Date: _____ **Time:** _____

Administrator: _____

Data Logger: _____

Terminal ID: _____   **Participant #** _____

PRIOR TO TESTING
☐ Confirm schedule with participants
☐ Ensure computer lab environment is running properly
☐ Ensure testing packets are printed: Moderator's Guide with Data Log Worksheets, Participant Questionnaire, SUS, Informed Consent, and Non-Disclosure Agreement

PRIOR TO EACH PARTICIPANT
☐ Ensure a session of the EHR can be launched with
☐ Ensure session is in Full Screen Mode (press F11)
☐ Confirm participant has an assigned participant number
☐ Ensure participant UN and PW are valid
☐ Log-out to ensure Log-on screen is on the workstation
☐ Save a blank .DOCX on the workstation desktop named: Part xx PC-xxxx (where xx is the participant #, and xxxx is the terminal ID)

PRIOR TO EACH TASK
☐ Ensure corresponding data log worksheet will be used
☐ Ensure participant understands instructions
☐ Ensure timer is reset and started once "Begin" has been announced

AFTER EACH TASK
☐ Stop timer when the participant announces "Done"
☐ Capture screenshot and paste it to the .DOCX on the workstation desktop
☐ Collect Task Rating from participant
☐ Complete Data Log Worksheet for the corresponding task

AFTER TEST
☐ Ensure participant packet is complete including:
☐Moderator's Guide with Data Log Worksheets, ☐Participant Questionnaire, ☐SUS, ☐Informed Consent, and ☐Non-Disclosure Agreement

Orientation (10 minutes)

Thank you for participating in this test. Your input is very important to us. Our session today will last approximately two working days. During that time you will use an instance of an electronic health record.

There will be a number of tasks that will need to be completed as well as a few questions that will need to be answered. Each tasks will need to be completed on your own, at your own pace with minimal possible errors or deviations. We ask that you do them as quickly and efficiently as possible with the instructions that we have provided. Please complete the task and do not attempt to do more than what is instructed.

We must emphasize that we are not testing you or your ability to use the system- we are evaluating the usability of the system. We are not able to instruct or provide you with help on how to use the application beyond the provided instructions, but we may be able to provide help on other related issues. Please save your detailed comments until the end of the task or at the end of the session when we can discuss freely as a group.

Overall, we are interested in how easy (or how difficult) this system is to use, what features or functionality are useful to you, and how we could improve it. Please be honest with your opinions.

The information you provide us will be kept confidential. Your name and any other identifying information will be omitted and not be associated with your comments. Should you feel it necessary, you are able to withdraw your participation at any time during the testing.

The product you will be testing today includes the following applications within the CliniComp EHR: CPOE, Implantable Devices, Clinical Decision Support, Clinical Information Reconciliation, and Electronic Prescribing. Since we are testing specific functionality, the workflow many not seem complete, or the data may not make sense compared to your normal work processes.

To access the system you will be using a demo user and test patient record that correlate with your assigned participant number.

For each task, I will read the description to you and say "Begin." At that point, please perform the task and say "Done" once you believe you have successfully completed the task. I would like to request that you not talk aloud or verbalize while you are doing the tasks. I will ask you your impressions about the task once you are done.

Do you have any questions or concerns?

Preliminary Questionnaire (10 minutes)

Before beginning the EHR tasks we would like to collect some information for participant classification purposes. Again, all of the information that you provide will be kept confidential and your name will be omitted from your data.

Please take a moment to complete the Participant Questionnaire found in your test packet. If you have any questions, please do not hesitate to ask.

(Administer Participant Questionnaire)

CliniComp, Intl.

Task 1: **First Impression** (10 minutes)

Please log in to the system using your assigned username and password. From the first page please select the PRODUCTION unit and then select your patient. This is the patient record with which you will be working with.

Please don't click on anything more

From this page please take a look at the EHR.

What do you notice? What are you able to do here? At first glance is anything that you would expect missing?

_____
_____
_____
_____
_____

Notes / Comments:

_____
_____
_____
_____
_____

Testing Scenario

James is a 65 year old male presenting to the hospital after suffering a near fall at home. He tripped and had a near fall, but hit his chest against the wall and is now complaining of some localized pain to the area. There is some bruising and swelling noted.

Task 2: Demographics (45 seconds)   Cycle 1

You are interviewing the patient and need to ask a few demographic questions. Under the MU3 Demographics tab, please chart the following details:

Date of Birth: 01/15/1951
Sexual Orientation: Straight or heterosexual
Gender Identity: Identifies as Male
Sex: M

Participant Steps Recording   *(Start timer)*

Task 2 Optimal Path (6 steps) (check box as participant completes the step)	Deviations (check a box for each deviation and describe below)							Total
☐ Clicks [MU 3 Demographics] tab	☐	☐	☐	☐	☐	☐	☐	**Task Time:** (in seconds) _____
☐ Types in Date Of Birth	☐	☐	☐	☐	☐	☐	☐	
☐ Chooses correct Sexual Orientation	☐	☐	☐	☐	☐	☐	☐	
☐ Chooses correct Gender Identity	☐	☐	☐	☐	☐	☐	☐	
☐ Chooses M	☐	☐	☐	☐	☐	☐	☐	
☐ Clicks on the Save button	☐	☐	☐	☐	☐	☐	☐	**# of Steps:** (sum of all step checkboxes) _____

(Stop timer and capture a screenshot after the participant completes the task)

Participant's Path

☐ Correct   ☐ Minor Deviations   ☐ Major Deviations *(describe deviations below)*

Deviation description and observations: _____

_____

_____

_____

Task Completion

☐ Success: ☐ Failure:

    ☐ Easily Completed   ☐ Did not reach desired outcome

    ☐ Completed with Difficulty   ☐ Abandoned

                                              ☐ Allotted time expired

Participant Rating

Overall, on a scale of 1 to 5, where 1 is "Very Easy" and 5 is "Very Difficult," this task was: _____

Comments:

_____

_____

_____

_____

Task 3: Clinical Decision Support (CDS) (80 seconds)   Cycle 1

In the Overview tab there is a CDS notification from the information you entered in Task 2. Please respond to the system's CDS notification and place/save an order based on the recommendation. The medication and provider is listed below:

Order: PREVNAR (PEDIATRIC PNEUMOCOCCAL CONJ VACCINE)
Provider: Spencer, John MD

Participant Steps Recording   *(Start timer)*

Task 3 Optimal Path (7 steps) (check box as participant completes the step)	Deviations (check a box for each deviation and describe below)							Total
☐ Highlights notification and reviews message	☐	☐	☐	☐	☐	☐	☐	
☐ Clicks on [Rx] button	☐	☐	☐	☐	☐	☐	☐	**Task Time:** (in seconds)
☐ Enters and chooses new order: [PREVNAR]	☐	☐	☐	☐	☐	☐	☐	
☐ Clicks on Order	☐	☐	☐	☐	☐	☐	☐	_____
☐ Enters Provider's name	☐	☐	☐	☐	☐	☐	☐	
☐ Clicks [Apply/Close]	☐	☐	☐	☐	☐	☐	☐	
☐ Clicks on the Save button	☐	☐	☐	☐	☐	☐	☐	**# of Steps:** (sum of all step checkboxes) _____

(Stop timer and capture a screenshot after the participant completes the task)

Participant's Path

☐ Correct   ☐ Minor Deviations   ☐ Major Deviations *(describe deviations below)*

Deviation description and observations: _____

_____

_____

Task Completion

☐ Success: ☐ Failure:

    ☐ Easily Completed   ☐ Did not reach desired outcome

    ☐ Completed with Difficulty   ☐ Abandoned

                         ☐ Allotted time expired

Participant Rating

Overall, on a scale of 1 to 5, where 1 is "Very Easy" and 5 is "Very Difficult," this task was: _____

Comments:

_____

_____

_____

Task 4: **Medication Allergy List and Reconciliation (160 seconds)**   Cycle 1

The patient states he was seen at another health facility and had a reaction to another medication that he cannot recall. Under the MU2ReconcileMedAllergy please import and reconcile the outside list as well as his known medication allergy listed below:

Type:	Drug
Drug Name:	Penicillin G Sodium
Symptoms:	Skin Rashes Hives
Severity:	Mild

Participant Steps Recording   *(Start timer)*

Task 4 Optimal Path (11 steps) (check box as participant completes the step)	Deviations (check a box for each deviation and describe below)							Total
☐ Clicks [Medication Allergy] tab	☐	☐	☐	☐	☐	☐	☐	
☐ Chooses source option	☐	☐	☐	☐	☐	☐	☐	
☐ Clicks [Insert PDF]	☐	☐	☐	☐	☐	☐	☐	
☐ Uploads correct PDF file	☐	☐	☐	☐	☐	☐	☐	
☐ Clicks [Open]	☐	☐	☐	☐	☐	☐	☐	**Task Time:** (in seconds)
☐ Chooses type of allergy	☐	☐	☐	☐	☐	☐	☐	
☐ Chooses correct allergy	☐	☐	☐	☐	☐	☐	☐	_____
☐ Completes Symptom and Severity section	☐	☐	☐	☐	☐	☐	☐	
☐ Clicks [+] button	☐	☐	☐	☐	☐	☐	☐	
☐ Repeats steps for second allergy	☐	☐	☐	☐	☐	☐	☐	
☐ Clicks on the Save button	☐	☐	☐	☐	☐	☐	☐	**# of Steps:** (sum of all step checkboxes) _____

(Stop timer and capture a screenshot after the participant completes the task)

Participant's Path

☐ Correct   ☐ Minor Deviations   ☐ Major Deviations *(describe deviations below)*

Deviation description and observations: _____

_____

_____

_____

_____

_____

Task Completion

☐ Success: ☐ Failure:

    ☐ Easily Completed   ☐ Did not reach desired outcome

    ☐ Completed with Difficulty   ☐ Abandoned

                                                       ☐ Allotted time expired

Participant Rating

Overall, on a scale of 1 to 5, where 1 is "Very Easy" and 5 is "Very Difficult," this task was: _____

Comments:

_____

_____

_____

_____

Task 5: **Medication List and Reconciliation (180 seconds)** Cycle 1

The patient has provided his home medications, in addition to information from the other health facility. Under the MU2MedReconList1 please import and reconcile his medications into one list. (Two list into one)

Drug Name:	ASPIRIN CHEWABLE {81MG TBCH}pla
Dose:	81mg
Route:	PO
Frequency:	Daily

Drug Name:	CLOPIDOGREL {75MG TAB} (PLAVIX)
Dose:	75mg
Route:	PO
Frequency:	Daily

Participant Steps Recording *(Start timer)*

Task 5 Optimal Path (13 steps) (check box as participant completes the step)	Deviations (check a box for each deviation and describe below)							Total
☐ Clicks [Medications] tab	☐	☐	☐	☐	☐	☐	☐	
☐ Chooses source option	☐	☐	☐	☐	☐	☐	☐	
☐ Clicks [Insert PDF]	☐	☐	☐	☐	☐	☐	☐	
☐ Uploads correct PDF file	☐	☐	☐	☐	☐	☐	☐	
☐ Clicks [Open]	☐	☐	☐	☐	☐	☐	☐	
☐ Types in Medication name	☐	☐	☐	☐	☐	☐	☐	**Task Time:** (in seconds)
☐ Enters Dose	☐	☐	☐	☐	☐	☐	☐	
☐ Enters Route								
☐ Enters Frequency								_____
☐ Clicks [+] button	☐	☐	☐	☐	☐	☐	☐	
☐ Repeats steps for second medication	☐	☐	☐	☐	☐	☐	☐	
☐ Repeats steps for third medication								
☐ Repeats steps for fourth medication	☐	☐	☐	☐	☐	☐	☐	
☐ Saves	☐	☐	☐	☐	☐	☐	☐	**# of Steps:** (sum of all step checkboxes) _____

(Stop timer and capture a screenshot after the participant completes the task)

Participant's Path

☐ Correct ☐ Minor Deviations ☐ Major Deviations *(describe deviations below)*

Deviation description and observations: _____

_____

_____

_____

Task Completion

☐ Success: ☐ Failure:

    ☐ Easily Completed   ☐ Did not reach desired outcome

    ☐ Completed with Difficulty   ☐ Abandoned

        ☐ Allotted time expired

Participant Rating

Overall, on a scale of 1 to 5, where 1 is "Very Easy" and 5 is "Very Difficult," this task was: _____

Comments:

_____

_____

_____

_____

CliniComp, Intl.

Task 6A: **Computer Physician Order Entry (CPOE)- Diagnostic Imaging (80 seconds)**   **Cycle 1**

The patient needs a diagnostic imaging study of his chest. Using CPOE, place an order for an x-ray including the following details:

Diagnostic:	Chest X-ray PA	Category: Radiology: Radiology
Frequency:	x1	
Priority: STAT		
Provider:	Spencer, John MD	

Participant Steps Recording   *(Start timer)*

Task 6A Optimal Path (7 steps) (check box as participant completes the step)	Deviations (check a box for each deviation and describe below)							Total
☐ Clicks [Order Entry]	☐	☐	☐	☐	☐	☐	☐	**Task Time:** (in seconds) _____
☐ Enters correct xray in new order box and selects	☐	☐	☐	☐	☐	☐	☐	
☐ Opens pending order	☐	☐	☐	☐	☐	☐	☐	
☐ Changes Frequency x1	☐	☐	☐	☐	☐	☐	☐	
☐ Changes Priority STAT	☐	☐	☐	☐	☐	☐	☐	
☐ Chooses Provider	☐	☐	☐	☐	☐	☐	☐	
☐ Saves	☐	☐	☐	☐	☐	☐	☐	**# of Steps:** (sum of all step checkboxes) _____

(Stop timer and capture a screenshot after the participant completes the task)

Participant's Path

☐ Correct   ☐ Minor Deviations   ☐ Major Deviations *(describe deviations below)*

Deviation description and observations: _____

_____

_____

Task Completion

☐ Success: ☐ Failure:

    ☐ Easily Completed   ☐ Did not reach desired outcome

    ☐ Completed with Difficulty   ☐ Abandoned

                             ☐ Allotted time expired

Participant Rating

Overall, on a scale of 1 to 5, where 1 is "Very Easy" and 5 is "Very Difficult," this task was: _____

Comments:

_____

_____

_____

Task 6B: CPOE- Editing a Diagnostic Imaging Study (60 seconds)   Cycle 1

The x-ray tech comes to you asking if you want a lateral as well. Using CPOE, please rewrite the order to the new order listed below.

Diagnostic: Chest X-ray PA   and Lateral   Category: Radiology: Radiology

Participant Steps Recording   *(Start timer)*

Task 6B Optimal Path (5 steps) (check box as participant completes the step)	Deviations *(check a box for each deviation and describe below)*							Total
☐ Clicks [Order Entry]	☐	☐	☐	☐	☐	☐	☐	**Task Time:** (in seconds) _____
☐ Highlights Chest X-ray PA Order	☐	☐	☐	☐	☐	☐	☐	
☐ Click ReWrite Order icon	☐	☐	☐	☐	☐	☐	☐	
☐ Enters new order in order name field	☐	☐	☐	☐	☐	☐	☐	
☐ Saves	☐	☐	☐	☐	☐	☐	☐	**# of Steps:** (sum of all step checkboxes) _____

(Stop timer and capture a screenshot after the participant completes the task)

Participant's Path

☐ Correct   ☐ Minor Deviations   ☐ Major Deviations *(describe deviations below)*

Deviation description and observations: _____

_____

_____

_____

_____

_____

Task Completion

☐ Success: ☐ Failure:

    ☐ Easily Completed   ☐ Did not reach desired outcome

    ☐ Completed with Difficulty   ☐ Abandoned

                                  ☐ Allotted time expired

Participant Rating

Overall, on a scale of 1 to 5, where 1 is "Very Easy" and 5 is "Very Difficult," this task was: _____

Comments:

_____

_____

_____

_____

Usability Test Moderator's Guide
CliniComp, Intl. Confidential and Proprietary

Page 15 of 85

Task 7A: CPOE- Entering a Medication Order (60 seconds)   Cycle 1

The patient needs a dose of his warfarin. Using CPOE, place an order for the medication detailed below:

Medication: WARFARIN {10MG TAB} (COUMADIN)
Frequency: x1
Priority: STAT
Provider: Spencer, John MD

Participant Steps Recording   *(Start timer)*

Task 7A Optimal Path (5 steps) (check box as participant completes the step)	Deviations (check a box for each deviation and describe below)							Total
☐ Types medication into new order box	☐	☐	☐	☐	☐	☐	☐	**Task Time:** (in seconds)
☐ Changes Frequency x1	☐	☐	☐	☐	☐	☐	☐	
☐ Changes Priority STAT	☐	☐	☐	☐	☐	☐	☐	
☐ Chooses Provider	☐	☐	☐	☐	☐	☐	☐	_____
☐ Saves	☐	☐	☐	☐	☐	☐	☐	**# of Steps:** (sum of all step checkboxes) _____

(Stop timer and capture a screenshot after the participant completes the task)

Participant's Path

☐ Correct   ☐ Minor Deviations   ☐ Major Deviations *(describe deviations below)*

Deviation description and observations: _____

_____

_____

_____

Task Completion

☐ Success: ☐ Failure:

    ☐ Easily Completed   ☐ Did not reach desired outcome

    ☐ Completed with Difficulty   ☐ Abandoned

                                       ☐ Allotted time expired

Participant Rating

Overall, on a scale of 1 to 5, where 1 is "Very Easy" and 5 is "Very Difficult," this task was: _____

Comments:

_____

_____

_____

_____

CliniComp, Intl.

Task 7B: CPOE Drug-Drug, Drug-Allergy Interaction Checks (20 seconds)   **Cycle 1**

An order decision support has appeared for a possible drug-drug interaction. Please review and how you will proceed.

Participant Steps Recording   *(Start timer)*

Task 7B Optimal Path (2 steps) (check box as participant completes the step)	**Deviations** *(check a box for each deviation and describe below)*							**Total**
☐ Clicks [CDS] and reviews message tab	☐	☐	☐	☐	☐	☐	☐	**Task Time:** (in seconds)
☐ Clicks OK if appropriate	☐	☐	☐	☐	☐	☐	☐	_____
								# of Steps: (sum of all step checkboxes) _____

(Stop timer and capture a screenshot after the participant completes the task)

Participant's Path

☐ Correct   ☐ Minor Deviations   ☐ Major Deviations *(describe deviations below)*

Deviation description and observations: _____

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Task Completion

☐ Success: ☐ Failure:

     ☐ Easily Completed   ☐ Did not reach desired outcome

     ☐ Completed with Difficulty   ☐ Abandoned

                                       ☐ Allotted time expired

Participant Rating

Overall, on a scale of 1 to 5, where 1 is "Very Easy" and 5 is "Very Difficult," this task was: _____

Comments:

_____

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Task 7C: CPOE- Editing a Medication Order (60 seconds)   Cycle 1

The patient took some Tylenol earlier. Since he took Tylenol you need to discontinue the Tylenol order in CPOE. Using CPOE, please discontinue the medication that is listed below:

Medication: Tylenol {325mg TAB} (TYLENOL)
Details: 650 mg PO x1 STAT
Status: Active
Provider: Spencer, John MD

Participant Steps Recording   *(Start timer)*

Task 7C Optimal Path (5 steps) (check box as participant completes the step)	Deviations (check a box for each deviation and describe below)							Total
☐ Highlights Existing Active Order	☐	☐	☐	☐	☐	☐	☐	**Task Time:** (in seconds) _____
☐ Clicks [DC] button	☐	☐	☐	☐	☐	☐	☐	
☐ Enters Stop Time icon to enter current time as DC Time	☐	☐	☐	☐	☐	☐	☐	
☐ Enters Provider's name	☐	☐	☐	☐	☐	☐	☐	
☐ Clicks [OK]	☐	☐	☐	☐	☐	☐	☐	**# of Steps:** (sum of all step checkboxes) _____

(Stop timer and capture a screenshot after the participant completes the task)

Participant's Path

☐ Correct   ☐ Minor Deviations   ☐ Major Deviations *(describe deviations below)*

Deviation description and observations: _____

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Task Completion

☐ Success: ☐ Failure:

    ☐ Easily Completed   ☐ Did not reach desired outcome

    ☐ Completed with Difficulty   ☐ Abandoned

                                       ☐ Allotted time expired

Participant Rating

Overall, on a scale of 1 to 5, where 1 is "Very Easy" and 5 is "Very Difficult," this task was: _____

Comments:

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Task 8: CPOE- Entering a Laboratory Order (60 seconds)   Cycle 1

Since the patient is taking Plavix daily, you want to check if his range is range is therapeutic. Using CPOE, please order the lab that is listed below:

Laboratory Order: Prothrombin Time / International Normalized Ratio (PT/INR)
Frequency: x1
Priority: STAT
Provider: Spencer, John MD

Participant Steps Recording   *(Start timer)*

Task 8 Optimal Path (6 steps) (check box as participant completes the step)	Deviations (check a box for each deviation and describe below)							Total
☐ Enters and chooses correct laboratory order	☐	☐	☐	☐	☐	☐	☐	**Task Time:** (in seconds)
☐ Clicks on order	☐	☐	☐	☐	☐	☐	☐	
☐ Enters Frequency x1	☐	☐	☐	☐	☐	☐	☐	_____
☐ Enters Priority STAT	☐	☐	☐	☐	☐	☐	☐	
☐ Enters provider's name	☐	☐	☐	☐	☐	☐	☐	
☐ Clicks [Applu/Close] button	☐	☐	☐	☐	☐	☐	☐	
☐ Saves	☐	☐	☐	☐	☐	☐	☐	**# of Steps:** (sum of all step checkboxes) _____

(Stop timer and capture a screenshot after the participant completes the task)

Participant's Path

☐ Correct   ☐ Minor Deviations   ☐ Major Deviations *(describe deviations below)*

Deviation description and observations: _____

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Task Completion

☐ Success: ☐ Failure:

    ☐ Easily Completed   ☐ Did not reach desired outcome

    ☐ Completed with Difficulty   ☐ Abandoned

                                           ☐ Allotted time expired

Participant Rating

Overall, on a scale of 1 to 5, where 1 is "Very Easy" and 5 is "Very Difficult," this task was: _____

Comments:

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Task 9: Implantable Device List (60 seconds)   Cycle 1

The patient states he had a left hip replacement. You recall that there have been major hip replacement recalls for DePuy, Stryker, and Zimmer implant products. Please verify that the patient's implantable device list is current, his hip replacement is not one of those from a manufacturer listed above, and then mark that you have reviewed it.

Participant Steps Recording   *(Start timer)*

Task 9 Optimal Path (5 steps) (check box as participant completes the step)	Deviations (check a box for each deviation and describe below)							Total
☐ Clicks on [Implant Devices] tab	☐	☐	☐	☐	☐	☐	☐	**Task Time:** (in seconds) _____
☐ Clicks on [View Details] hyperlink under Actions column and reviews information	☐	☐	☐	☐	☐	☐	☐	
☐ Clicks on [Close] button	☐	☐	☐	☐	☐	☐	☐	
☐ Clicks on [Mark as Reviewed] button	☐	☐	☐	☐	☐	☐	☐	
☐ Clicks on [Yes] button	☐	☐	☐	☐	☐	☐	☐	**# of Steps:** (sum of all step checkboxes) _____

(Stop timer and capture a screenshot after the participant completes the task)

Participant's Path

☐ Correct   ☐ Minor Deviations   ☐ Major Deviations *(describe deviations below)*

Deviation description and observations: _____

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Task Completion

☐ Success: ☐ Failure:

    ☐ Easily Completed   ☐ Did not reach desired outcome

    ☐ Completed with Difficulty   ☐ Abandoned

                                  ☐ Allotted time expired

Participant Rating

Overall, on a scale of 1 to 5, where 1 is "Very Easy" and 5 is "Very Difficult," this task was: _____

Comments:

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Task 10: Problem List (180 seconds)   Cycle 1

After reviewing the radiology results, please document under the MU2ReconcileProblems tab the patient's new diagnosis that is listed below as well as upload and reconcile his problem list that was provided from another facility. If the field is UNKNOWN then please leave it blank (Two list into one)

    Date: 12/07/2016
    Problem: Closed fracture of metacarpal bone (disorder)
    Status: Active
    Acute/Chronic: Acute
    Diagnosed Date: 12/07/2016

Participant Steps Recording   *(Start timer)*

Task 10 Optimal Path (13 steps) (check box as participant completes the step)	Deviations (check a box for each deviation and describe below)							Total
☐ Clicks [Problems] tab	☐	☐	☐	☐	☐	☐	☐	
☐ Chooses source option	☐	☐	☐	☐	☐	☐	☐	
☐ Clicks [Insert PDF]	☐	☐	☐	☐	☐	☐	☐	
☐ Uploads correct PDF file	☐	☐	☐	☐	☐	☐	☐	
☐ Clicks [Open]	☐	☐	☐	☐	☐	☐	☐	**Task Time:** (in seconds)
☐ Types in Problem	☐	☐	☐	☐	☐	☐	☐	
☐ Enters Status	☐	☐	☐	☐	☐	☐	☐	
☐ Enters Acute	☐	☐	☐	☐	☐	☐	☐	_____
☐ Enters diagnosed date	☐	☐	☐	☐	☐	☐	☐	
☐ Clicks [+] button	☐	☐	☐	☐	☐	☐	☐	
☐ Repeats steps for second problem	☐	☐	☐	☐	☐	☐	☐	
☐ Repeats steps for third problem	☐	☐	☐	☐	☐	☐	☐	
☐ Saves	☐	☐	☐	☐	☐	☐	☐	**# of Steps:** (sum of all step checkboxes) _____

(Stop timer and capture a screenshot after the participant completes the task)

Participant's Path

☐ Correct   ☐ Minor Deviations   ☐ Major Deviations *(describe deviations below)*

Deviation description and observations: _____

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Task Completion

☐ Success: ☐ Failure:

    ☐ Easily Completed   ☐ Did not reach desired outcome

    ☐ Completed with Difficulty   ☐ Abandoned

                                          ☐ Allotted time expired

Participant Rating

Overall, on a scale of 1 to 5, where 1 is "Very Easy" and 5 is "Very Difficult," this task was: _____

Comments:

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CliniComp, Intl.

Task 11: Medication Reconciliation (45 seconds)   Cycle 1

Please complete the discharge medication reconciliation and mark what medications will be continued and stopped by following the instructions listed below:

Tylenol: Continue
Plavix: Continue
Lipitor: Continue
Aspirin: Continue

Participant Steps Recording   *(Start timer)*

Task 11 Optimal Path (6 steps) (check box as participant completes the step)	Deviations (check a box for each deviation and describe below)							Total
☐ Clicks [Discharge] tab	☐	☐	☐	☐	☐	☐	☐	**Task Time:** (in seconds)
☐ Continues Tylenol	☐	☐	☐	☐	☐	☐	☐	
☐ Continues Plavix	☐	☐	☐	☐	☐	☐	☐	_____
☐ Continues Lipitor	☐	☐	☐	☐	☐	☐	☐	
☐ Continues Aspirin	☐	☐	☐	☐	☐	☐	☐	
☐ Clicks on [Reconcile and Sign]	☐	☐	☐	☐	☐	☐	☐	**# of Steps:** (sum of all step checkboxes) _____

(Stop timer and capture a screenshot after the participant completes the task)

Participant's Path

☐ Correct   ☐ Minor Deviations   ☐ Major Deviations *(describe deviations below)*

Deviation description and observations: _____

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Task Completion

☐ Success: ☐ Failure:

   ☐ Easily Completed   ☐ Did not reach desired outcome

   ☐ Completed with Difficulty   ☐ Abandoned

                                          ☐ Allotted time expired

Participant Rating

Overall, on a scale of 1 to 5, where 1 is "Very Easy" and 5 is "Very Difficult," this task was: _____

Comments:

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Task 12: e-Prescribing (180 seconds)   Cycle 1

The patient is now ready to go home and is requesting some tylenol. There is no pharmacy listed, but he provided you with the one he would like to use. Using eRx, place an order for the medication below as well as choose the pharmacy he requested:

Medication:	ACETAMINOPHEN {325MG TAB} (TYLENOL)
Directions:	take 3 tabs PO Q6H PRN for pain
Quantity:	100
Form:	Tablet
Refills:	0 (Zero)
Pharmacy:	VA Pharmacy 10.6MU

Participant Steps Recording   *(Start timer)*

Task 12 Optimal Path (15 steps) (check box as participant completes the step)	Deviations (check a box for each deviation and describe below)							Total
☐ Types and chooses correct medication	☐	☐	☐	☐	☐	☐	☐	
☐ Enters prescription directions	☐	☐	☐	☐	☐	☐	☐	
☐ Enters correct Quantity	☐	☐	☐	☐	☐	☐	☐	
☐ Enters correct Form	☐	☐	☐	☐	☐	☐	☐	
☐ Enters correct refills	☐	☐	☐	☐	☐	☐	☐	**Task Time:** (in seconds)
☐ Clicks [Review] button	☐	☐	☐	☐	☐	☐	☐	
☐ Clicks [Change Dispensing Pharmacy]	☐	☐	☐	☐	☐	☐	☐	
☐ Types in pharmacy name and clicks [Search]	☐	☐	☐	☐	☐	☐	☐	_____
☐ Highlights the pharmacy resulted	☐	☐	☐	☐	☐	☐	☐	
☐ Clicks [Select] button	☐	☐	☐	☐	☐	☐	☐	
☐ Clicks [Send] button	☐	☐	☐	☐	☐	☐	☐	
☐ Saves	☐	☐	☐	☐	☐	☐	☐	**# of Steps:** (sum of all step checkboxes) _____

(Stop timer and capture a screenshot after the participant completes the task)

Participant's Path

☐ Correct   ☐ Minor Deviations   ☐ Major Deviations *(describe deviations below)*

Deviation description and observations: _____

_____

_____

_____

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_____

Task Completion

☐ Success: ☐ Failure:

    ☐ Easily Completed   ☐ Did not reach desired outcome

    ☐ Completed with Difficulty   ☐ Abandoned

                                              ☐ Allotted time expired

Participant Rating

Overall, on a scale of 1 to 5, where 1 is "Very Easy" and 5 is "Very Difficult," this task was: _____

Comments:

_____

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_____

(this concludes the first cycle)

Usability Test b(11)

Moderator's Guide

Test Name: _____

Date: _____ **Time:** _____

Administrator: _____

Data Logger: _____

Terminal ID: _____ **Participant #** _____

PRIOR TO TESTING
Confirm schedule with participants
Ensure computer lab environment is running properly
Ensure testing packets are printed: Moderator's Guide with Data Log Worksheets, Participant Questionnaire, SUS, Informed Consent, and Non-Disclosure Agreement

PRIOR TO EACH PARTICIPANT
Ensure a session of the EHR can be launched with
Ensure session is in Full Screen Mode (press F11)
Confirm participant has an assigned participant number
Ensure participant UN and PW are valid
Log-out to ensure Log-on screen is on the workstation
Save a blank .DOCX on the workstation desktop named: Part xx PC-xxxx (where xx is the participant #, and xxxx is the terminal ID)

PRIOR TO EACH TASK
Ensure corresponding data log worksheet will be used
Ensure participant understands instructions
Ensure timer is reset and started once "Begin" has been announced

AFTER EACH TASK
Stop timer when the participant announces "Done"
Capture screenshot and paste it to the .DOCX on the workstation desktop
Collect Task Rating from participant
Complete Data Log Worksheet for the corresponding task

AFTER TEST
Ensure participant packet is complete including:
☐Moderator's Guide with Data Log Worksheets, ☐Participant Questionnaire, ☐SUS, Informed Consent, and ☐Non-Disclosure Agreement

Orientation (10 minutes)

Thank you for participating in this test. Your input is very important to us. Our session today will last approximately four hours. During that time you will use an instance of an electronic health record.

There will be a number of tasks that will need to be completed as well as a few questions that will need to be answered. Each tasks will need to be completed on your own, at your own pace with minimal possible errors or deviations. We ask that you do them as quickly and efficiently as possible with the instructions that we have provided. Please complete the task and do not attempt to do more than what is instructed.

We must emphasize that we are not testing you or your ability to use the system- we are evaluating the usability of the system. We are not able to instruct or provide you with help on how to use the application beyond the provided instructions, but we may be able to provide help on other related issues. Please save your detailed comments until the end of the task or at the end of the session when we can discuss freely as a group.

Overall, we are interested in how easy (or how difficult) this system is to use, what features or functionality are useful to you, and how we could improve it. Please be honest with your opinions.

The information you provide us will be kept confidential. Your name and any other identifying information will be omitted and not be associated with your comments. Should you feel it necessary, you are able to withdraw your participation at any time during the testing.

The product you will be testing today includes the Decision Support Intervention application within the CliniComp EHR. Since we are testing specific functionality, the workflow many not seem complete, or the data may not make sense compared to your normal work processes.

To access the system you will be using a demo user and test patient record that correlate with your assigned participant number.

For each task, I will read the description to you and say "Begin." At that point, please perform the task and say "Done" once you believe you have successfully completed the task. I would like to request that you not talk aloud or verbalize while you are doing the tasks. I will ask you your impressions about the task once you are done.

Do you have any questions or concerns?

Preliminary Questionnaire (10 minutes)

Before beginning the EHR tasks we would like to collect some information for participant classification purposes. Again, all of the information that you provide will be kept confidential and your name will be omitted from your data.

Please take a moment to complete the Participant Questionnaire found in your test packet. If you have any questions, please do not hesitate to ask.

(Administer Participant Questionnaire)

Task 1: **First Impression** (10 minutes)

Please log in to the system using your assigned username and password. From the first page please select the PRODUCTION unit and then select your patient. This is the patient record with which you will be working with.

Please don't click on anything more

From this page please take a look at the EHR.

What do you notice? What are you able to do here? At first glance is anything that you would expect missing?

_____

_____

_____

_____

_____

Notes / Comments:

_____

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Testing Scenario

James is a 78 year old male admitted to the hospital with complaint of chest pain. James has a history of a cochlear implant surgery within the last year as well as chronic kidney disease.

Task 2: Activate evidence based decision support intervention when ordering a procedure (65 seconds)

Place an order for a Chest MRI, which will activate the evidence based decisions support intervention

Participant Steps Recording   *(Start timer)*

Task 2 Optimal Path (5 steps) (check box as participant completes the step)	Deviations (check a box for each deviation and describe below)							Total
Selects patient from the patient list								
Clicks on Order Entry application								**Task Time:** (in seconds)
Searches for Chest MRI order								
Completes required order form fields								_____
Clicks on the Submit button which activates alert for evidence based decision support intervention								
								# of Steps: (sum of all step checkboxes) _____

(Stop timer and capture a screenshot after the participant completes the task)

Participant's Path

Correct   ☐ Minor Deviations   ☐ Major Deviations *(describe deviations below)*

Deviation description and observations: _____

_____

_____

_____

Task Completion

Success: ☐ Failure:

    Easily Completed   ☐ Did not reach desired outcome

    Completed with Difficulty   ☐ Abandoned

                                     Allotted time expired

Participant Rating

Overall, on a scale of 1 to 5, where 1 is "Very Easy" and 5 is "Very Difficult," this task was: _____

Comments:

_____

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Task 3: Activate user-supplied predictive decision support when ordering a procedure (65 seconds)

Place an order for a Chest CT w/ IV Contrast, which will activate the user supplied predictive decision support intervention

Participant Steps Recording   *(Start timer)*

Task 3 Optimal Path (5 steps) (check box as participant completes the step)	Deviations (check a box for each deviation and describe below)							Total
Selects patient from the patient list								
Clicks on Order Entry application								**Task Time:** (in seconds) _____
Searches for Chest CT w/ IV Contrast order								
Completes required order form fields								
Clicks on the Submit button which activates alert for user supplied predictive decision support intervention								
								# of Steps: (sum of all step checkboxes) _____

(Stop timer and capture a screenshot after the participant completes the task)

Participant's Path

Correct ☐ Minor Deviations ☐ Major Deviations *(describe deviations below)*

Deviation description and observations: _____

_____

_____

Task Completion

Success: ☐ Failure:

    Easily Completed   ☐ Did not reach desired outcome

    Completed with Difficulty   ☐ Abandoned

                    Allotted time expired

Participant Rating

Overall, on a scale of 1 to 5, where 1 is "Very Easy" and 5 is "Very Difficult," this task was: _____

Comments:

Task 4: Access plain language description for evidence based decision support intervention (15 seconds)

Access the plain language description for evidence based intervention via the CDS tab

Participant Steps Recording *(Start timer)*

Task 4 Optimal Path (3 steps) (check box as participant completes the step)	Deviations (check a box for each deviation and describe below)							Total
Click on the CDS tab								
Click on CDS Notification – Implantable Device Interaction								
View the plain language description in the right side panel								**Task Time:** (in seconds)
								# of Steps: (sum of all step checkboxes)

(Stop timer and capture a screenshot after the participant completes the task)

Participant's Path

Correct ☐ Minor Deviations ☐ Major Deviations *(describe deviations below)*

Deviation description and observations: _____

_____

_____

_____

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Task Completion

Success: ☐ Failure:

    Easily Completed   ☐ Did not reach desired outcome

    Completed with Difficulty   ☐ Abandoned

                                                      Allotted time expired

Participant Rating

Overall, on a scale of 1 to 5, where 1 is "Very Easy" and 5 is "Very Difficult," this task was: _____

Comments:

_____

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Task 5: Access plain language description for user-supplied predictive decision support (15 seconds)

Access the plain language description for user-supplied predictive decision support intervention via the Predictive CDS tab

Participant Steps Recording *(Start timer)*

Task 5 Optimal Path (3 steps) (check box as participant completes the step)	Deviations (check a box for each deviation and describe below)							Total
Click on the Predictive CDS tab								
Click on CDS Notification – Implantable Device Interaction								
View the plain language description in the right side panel								**Task Time:** (in seconds)
								# of Steps: (sum of all step checkboxes)

(Stop timer and capture a screenshot after the participant completes the task)

Participant's Path

Correct   ☐ Minor Deviations   ☐ Major Deviations *(describe deviations below)*

Deviation description and observations: _____

_____

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_____

Task Completion

Success: ☐ Failure:

     Easily Completed   ☐ Did not reach desired outcome

     Completed with Difficulty   ☐ Abandoned

                                   Allotted time expired

Participant Rating

Overall, on a scale of 1 to 5, where 1 is "Very Easy" and 5 is "Very Difficult," this task was: _____

Comments:

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CliniComp, Intl.

Task 6: **Access, record and change source attributes for evidence based decision support intervention (75)   Cycle 1**

Use the CDS rules engine configuration tool to access, record and change source attributes for the implantable device interaction rule.

Participant Steps Recording   *(Start timer)*

Task 6 Optimal Path (8 steps) (check box as participant completes the step)	**Deviations** (check a box for each deviation and describe below)							**Total**
Click on the drop down arrow next to your user name in top right of screen								
Click on Tools								**Task Time:** (in seconds) _____
Click on CDS Configuration Tool								
Search for Implantable Device Interaction rule								
Select Implantable Device Interaction Rule								
View the source attributes in the right panel								
Click in the Source Attributes field								
Change the source attribute to https://www.uptodate.com/contents/cardiac-implantable-electronic-device-interactions-with-electromagnetic-fields-in-the-nonhospital-environment and click save								
								# of Steps: (sum of all step checkboxes) _____

(Stop timer and capture a screenshot after the participant completes the task)

Participant's Path

Correct   ☐ Minor Deviations   ☐ Major Deviations *(describe deviations below)*

Deviation description and observations: _____

_____

Task Completion

Success: ☐ Failure:

     Easily Completed   ☐ Did not reach desired outcome

     Completed with Difficulty   ☐ Abandoned

                                      Allotted time expired

Participant Rating

Overall, on a scale of 1 to 5, where 1 is "Very Easy" and 5 is "Very Difficult," this task was: _____

Comments:

_____

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Task 7: **Access, record and change source attributes for user-supplied predictive decision support intervention (75 seconds)**

Use the CDS rules engine configuration tool to access, record and change source attributes for the procedure risk rule

Participant Steps Recording *(Start timer)*

Task 7 Optimal Path (8 steps) (check box as participant completes the step)	Deviations (check a box for each deviation and describe below)							Total
Click on the drop down arrow next to your user name in top right of screen								**Task Time:** (in seconds)
Click on Tools								
Click on CDS Configuration Tool								_____
Search for Procedure Risk rule								
Select Procedure Risk Rule								
View the source attributes in the right panel								
Click in the Source Attributes field								
Change the source attribute to <u>Patient Safety - Contrast Material</u> and click save								
								# of Steps: (sum of all step checkboxes) _____

(Stop timer and capture a screenshot after the participant completes the task)

Participant's Path

Correct   ☐ Minor Deviations   ☐ Major Deviations *(describe deviations below)*

Deviation description and observations: _____

_____

_____

_____

Task Completion

Success: ☐ Failure:

    Easily Completed   ☐ Did not reach desired outcome

    Completed with Difficulty   ☐ Abandoned

                                  Allotted time expired

Participant Rating

Overall, on a scale of 1 to 5, where 1 is "Very Easy" and 5 is "Very Difficult," this task was: _____

Comments:

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CliniComp, Intl.

Task 8: **Provide feedback response for evidence based decision support intervention (60 seconds)**

After reviewing the implantable device interaction alert, provide feedback for the evidence based decision support intervention

Participant Steps Recording *(Start timer)*

Task 8 Optimal Path (6 steps) (check box as participant completes the step)	**Deviations** *(check a box for each deviation and describe below)*							**Total**
Click on the CDS tab								**Task Time:** (in seconds) _____
Click on CDS Notification – Implantable Device Interaction								
Review the description, intervention and source attributes								
Click the Feedback button								
Complete the required fields								
Click Submit								
	☐	☐	☐	☐	☐	☐	☐	**# of Steps:** (sum of all step checkboxes) _____

(Stop timer and capture a screenshot after the participant completes the task)

Participant's Path

Correct   ☐ Minor Deviations   ☐ Major Deviations *(describe deviations below)*

Deviation description and observations: _____

_____

_____

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Task Completion

Success: ☐ Failure:
    Easily Completed   ☐ Did not reach desired outcome
    Completed with Difficulty   ☐ Abandoned
                                  Allotted time expired

Participant Rating

Overall, on a scale of 1 to 5, where 1 is "Very Easy" and 5 is "Very Difficult," this task was: _____

Comments:

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_____

_____

[1] Brooke, J.: SUS: A "quick and dirty" usability scale. In: Jordan, P. W., Thomas, B., Weerdmeester, B. A., McClelland (eds.) Usability Evaluation in Industry pp. 189--194. Taylor & Francis, London, UK (1996). SUS is copyrighted to Digital Equipment Corporation, 1986.

[2] Lewis, J R & Sauro, J. (2009) "The Factor Structure Of The System Usability Scale." in Proceedings of the Human Computer Interaction International Conference (HCII 2009), San Diego CA, USA

Usability Test b (3)

Moderator's Guide

Test Name: _____

Date: _____ **Time:** _____

Administrator: _____

Data Logger: _____

Terminal ID: _____   **Participant #** _____

PRIOR TO TESTING
Confirm schedule with participants Ensure computer lab environment is running properly Ensure testing packets are printed: Moderator's Guide with Data Log Worksheets, Participant Questionnaire, SUS, Informed Consent, and Non-Disclosure Agreement

PRIOR TO EACH PARTICIPANT
Ensure a session of the EHR can be launched with Ensure session is in Full Screen Mode (press F11) Confirm participant has an assigned participant number Ensure participant UN and PW are valid Log-out to ensure Log-on screen is on the workstation Save a blank .DOCX on the workstation desktop named: Part xx PC-xxxx (where xx is the participant #, and xxxx is the terminal ID)

PRIOR TO EACH TASK
Ensure corresponding data log worksheet will be used Ensure participant understands instructions Ensure timer is reset and started once "Begin" has been announced

AFTER EACH TASK
Stop timer when the participant announces "Done" Capture screenshot and paste it to the .DOCX on the workstation desktop Collect Task Rating from participant Complete Data Log Worksheet for the corresponding task

AFTER TEST
Ensure participant packet is complete including: Moderator's Guide with Data Log Worksheets, □Participant Questionnaire, □SUS, Informed Consent, and □Non-Disclosure Agreement

Orientation (10 minutes)

Thank you for participating in this test. Your input is very important to us. Our session today will last approximately four hours. During that time you will use an instance of an electronic health record.

There will be a number of tasks that will need to be completed as well as a few questions that will need to be answered. Each tasks will need to be completed on your own, at your own pace with minimal possible errors or deviations. We ask that you do them as quickly and efficiently as possible with the instructions that we have provided. Please complete the task and do not attempt to do more than what is instructed.

We must emphasize that we are not testing you or your ability to use the system- we are evaluating the usability of the system. We are not able to instruct or provide you with help on how to use the application beyond the provided instructions, but we may be able to provide help on other related issues. Please save your detailed comments until the end of the task or at the end of the session when we can discuss freely as a group.

Overall, we are interested in how easy (or how difficult) this system is to use, what features or functionality are useful to you, and how we could improve it. Please be honest with your opinions.

The information you provide us will be kept confidential. Your name and any other identifying information will be omitted and not be associated with your comments. Should you feel it necessary, you are able to withdraw your participation at any time during the testing.

The product you will be testing today includes the Decision Support Intervention application within the CliniComp EHR. Since we are testing specific functionality, the workflow many not seem complete, or the data may not make sense compared to your normal work processes.

To access the system you will be using a demo user and test patient record that correlate with your assigned participant number.

For each task, I will read the description to you and say "Begin." At that point, please perform the task and say "Done" once you believe you have successfully completed the task. I would like to request that you not talk aloud or verbalize while you are doing the tasks. I will ask you your impressions about the task once you are done.

Do you have any questions or concerns?

Preliminary Questionnaire (10 minutes)

Before beginning the EHR tasks we would like to collect some information for participant classification purposes. Again, all of the information that you provide will be kept confidential and your name will be omitted from your data.

Please take a moment to complete the Participant Questionnaire found in your test packet. If you have any questions, please do not hesitate to ask.

(Administer Participant Questionnaire)

Task 1: First Impression (10 minutes)

Please log in to the system using your assigned username and password. From the first page please select the PRODUCTION unit and then select your patient. This is the patient record with which you will be working with.

Please don't click on anything more

From this page please look at the EHR.

What do you notice? What are you able to do here? At first glance is anything that you would expect missing?

_____

_____

_____

_____

_____

Notes / Comments:

_____

_____

_____

_____

_____

Testing Scenario

Maria Thompson, 68-year-old female
History: Hypertension, Type 2 Diabetes, Hyperlipidemia
Allergies: NKDA
Currently admitted for medication review following discharge from another facility.

Task 2: Access Patient Record & Navigate to Medication Reconciliation / eRx

(Target Time: 60 seconds)

Open the assigned patient record, and navigate to the Medication Reconciliation or Electronic Prescribing area.

Participant Steps Recording   *(Start timer)*

Task 2 Optimal Path (5 steps) (check box as participant completes the step)	Deviations (check a box for each deviation and describe below)							Total
Selects patient from the patient list								**Task Time:** (in seconds) _____
Open patient Chart								
Navigate to Orders (CPOE)								
Select Medication Reconciliation								
Access eRx workflow screen								
								# of Steps: (sum of all step checkboxes) _____

(Stop timer and capture a screenshot after the participant completes the task)

Participant's Path

Correct   ☐ Minor Deviations   ☐ Major Deviations *(describe deviations below)*

Deviation description and observations: _____

_____

_____

_____

Task Completion

Success: □ Failure:

    Easily Completed   □ Did not reach desired outcome

    Completed with Difficulty   □ Abandoned

                                                     Allotted time expired

Participant Rating

Overall, on a scale of 1 to 5, where 1 is "Very Easy" and 5 is "Very Difficult," this task was: _____

Comments:

_____

_____

_____

_____

Task 3: Review & Reconcile Existing Prescriptions

(Target Time: 120 seconds)

Review the imported medication list and reconcile medications by marking them as Continue, Discontinue, or Modify.

Participant Steps Recording *(Start timer)*

Task 3 Optimal Path (6 steps) (check box as participant completes the step)	Deviations (check a box for each deviation and describe below)							Total
View imported medication list								
Compare with current active meds								**Task Time:** (in seconds) _____
Select Continue for appropriate meds								
Discontinue duplicate or inappropriate med								
Modify dose/frequency where applicable								
Save reconciliation updates								
								# of Steps: (sum of all step checkboxes) _____

(Stop timer and capture a screenshot after the participant completes the task)

Participant's Path

Correct   ☐ Minor Deviations   ☐ Major Deviations *(describe deviations below)*

Deviation description and observations: _____

_____

_____

Task Completion

Success: ☐ Failure:

    Easily Completed   ☐ Did not reach desired outcome

    Completed with Difficulty   ☐ Abandoned

                                               Allotted time expired

Usability Test b(11) Moderator's Guide (P/N: 250-70027-1.3, Rev. A) CliniComp, Intl. Confidential and Proprietary

Page 6 of 18

Participant Rating

Overall, on a scale of 1 to 5, where 1 is "Very Easy" and 5 is "Very Difficult," this task was: _____

Comments:

_____

_____

_____

Task 4: Enter New Medication Order & Complete Prescription Details

(Target Time: 90 seconds)

Enter a new prescription for Lisinopril 10 mg PO daily and complete all required prescription details.

Participant Steps Recording *(Start timer)*

Task 4 Optimal Path (7 steps) (check box as participant completes the step)	Deviations (check a box for each deviation and describe below)							Total
Select Add Medication								
Select correct strength								
Enter Sig (10 mg PO daily)								
Enter quantity & refills								
Select pharmacy								**Task Time:** (in seconds)
Submit prescription								_____
								# of Steps: (sum of all step checkboxes) _____

(Stop timer and capture a screenshot after the participant completes the task)

Participant's Path

Correct ☐ Minor Deviations ☐ Major Deviations *(describe deviations below)*

Deviation description and observations: _____

_____

_____

Usability Test b(11) Moderator's Guide (P/N: 250-70027-1.3, Rev. A) CliniComp, Intl. Confidential and Proprietary

Page 8 of 18

_____

_____

_____

Task Completion

Success: ☐ Failure:

    Easily Completed   ☐ Did not reach desired outcome

    Completed with Difficulty   ☐ Abandoned

                                      Allotted time expired

Participant Rating

Overall, on a scale of 1 to 5, where 1 is "Very Easy" and 5 is "Very Difficult," this task was: _____

Comments:

_____

_____

_____

_____

Task 5: Associate Diagnosis with Medication

(Target Time: 45 seconds)

Associate the appropriate diagnosis with the newly prescribed medication

Participant Steps Recording *(Start timer)*

Task 5 Optimal Path (4 steps) (check box as participant completes the step)	Deviations (check a box for each deviation and describe below)							Total
Click Diagnosis Link field								
Search for Hypertension								
Select correct ICD-10 code								
Confirm association								
								Task Time: (in seconds)
								# of Steps: (sum of all step checkboxes) _____

(Stop timer and capture a screenshot after the participant completes the task)

Usability Test b(11) Moderator's Guide (P/N: 250-70027-1.3, Rev. A) CliniComp, Intl. Confidential and Proprietary

Page 10 of 18

Participant's Path

Correct ☐ Minor Deviations ☐ Major Deviations *(describe deviations below)*

Deviation description and observations: _____

_____

_____

_____

Task Completion

Success: ☐ Failure:

    Easily Completed   ☐ Did not reach desired outcome

    Completed with Difficulty   ☐ Abandoned

                                              Allotted time expired

Participant Rating

Overall, on a scale of 1 to 5, where 1 is "Very Easy" and 5 is "Very Difficult," this task was: _____

Comments:

_____

_____

_____

_____

Task 6: Select Prescription Fulfillment Mode
(Target Time: 45 seconds)

Select the prescription fulfillment mode (eRx, Print, or Patient Obtained) and complete the workflow.

Participant Steps Recording _(Start timer)_

Task 6 Optimal Path (4 steps) (check box as participant completes the step)	Deviations (check a box for each deviation and describe below)							Total
Review fulfillment options								**Task Time:** (in seconds) _____
Select eRx								
Confirm pharmacy								
Submit								
								# of Steps: (sum of all step checkboxes) _____

(Stop timer and capture a screenshot after the participant completes the task)

Participant's Path

Correct ☐ Minor Deviations ☐ Major Deviations _(describe deviations below)_

Deviation description and observations: _____

_____

_____

Task Completion

Success: ☐ Failure:
    Easily Completed   ☐ Did not reach desired outcome
    Completed with Difficulty   ☐ Abandoned
                                   Allotted time expired

Participant Rating

Overall, on a scale of 1 to 5, where 1 is "Very Easy" and 5 is "Very Difficult," this task was: _____

Comments:

_____

_____

_____

Task 7: Complete Medication Reconciliation
(Target time:60 Seconds)

Finalize and sign the medication reconciliation process.

Participant Steps Recording *(Start timer)*

Task 7 Optimal Path (3 steps) (check box as participant completes the step)	Deviations (check a box for each deviation and describe below)							Total
Review reconciliation summary								**Task Time:** (in seconds)
Click Complete/Sign								
Confirm electronic signature								
								# of Steps: (sum of all step checkboxes)

(Stop timer and capture a screenshot after the participant completes the task)

Participant's Path

Correct ☐ Minor Deviations ☐ Major Deviations *(describe deviations below)*

Deviation description and observations: _____

_____

_____

_____

_____

Task Completion

Success: ☐ Failure:

    Easily Completed   ☐ Did not reach desired outcome

    Completed with Difficulty   ☐ Abandoned

                                              Allotted time expired

Participant Rating

Overall, on a scale of 1 to 5, where 1 is "Very Easy" and 5 is "Very Difficult," this task was: _____

Comments:

_____

_____

_____

_____

Task 8: Reopen Completed Medication Reconciliation & Update Prescription

(Target Time: 75 seconds)

Reopen the completed medication reconciliation and update the Lisinopril dose to 20 mg daily.

Participant Steps Recording   *(Start timer)*

Task 8 Optimal Path (6 steps) (check box as participant completes the step)	Deviations (check a box for each deviation and describe below)							Total
Navigate to Medication Reconciliation history								**Task Time:** (in seconds) _____
Select completed reconciliation								
Click Reopen/Edit								
Modify Lisinopril dose								
Save changes								
Re-complete reconciliation								
	☐	☐	☐	☐	☐	☐	☐	**# of Steps:** (sum of all step checkboxes) _____

(Stop timer and capture a screenshot after the participant completes the task)

Participant's Path

Correct   ☐ Minor Deviations   ☐ Major Deviations *(describe deviations below)*

Deviation description and observations: _____

_____

_____

_____

Task Completion

Success: ☐ Failure:
    Easily Completed   ☐ Did not reach desired outcome
    Completed with Difficulty   ☐ Abandoned
                                                    Allotted time expired

Participant Rating

Overall, on a scale of 1 to 5, where 1 is "Very Easy" and 5 is "Very Difficult," this task was: _____

Comments:

_____

_____

_____

_____

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1 Brooke, J.: SUS: A "quick and dirty" usability scale. In: Jordan, P. W., Thomas, B., Weerdmeester, B. A., McClelland (eds.) Usability Evaluation in Industry pp. 189--194. Taylor & Francis, London, UK (1996). SUS is copyrighted to Digital Equipment Corporation, 1986.

2 Lewis, J R & Sauro, J. (2009) "The Factor Structure Of The System Usability Scale." in Proceedings of the Human Computer Interaction International Conference (HCII 2009), San Diego CA, USA

Usability Test

Participant Instructions

Preliminary Questionnaire

Before beginning the EHR tasks we would like to collect some information for participant classification purposes.   Again, all of the information that you provide will be kept confidential and your name will not be associated with your data at any time.

Please take a moment to complete the Participant Questionnaire found in your test packet. If you have any questions, please do not hesitate to ask.

Below is a brief scenario that goes along with the tasks that you will be asked to complete. Once again we must emphasize that we are not testing you or your ability to use the system- we are evaluating the usability of the system. We are not able to instruct or provide you with help on how to use each application or how to complete each task. You will be taken to the starting point for each task. Once you have completed a task please do not attempt to do more than what is instructed.

Test System Access

The system you will be using today will test specific applications within the CliniComp|EHR. Since we are testing specific functionality the data may not make sense as it is a placeholder. The workflow many not seem complete, or it may not make sense compared to your normal work processes.

Username:	*UTxx*	(replace *xx* with two-digit participant number)
Password:	*123*	
Patient name:	*Test, Patientxx*	(first name includes your two-digit participant #)

Scenario

James is a 65 year old male presenting to the hospital after suffering a near fall at home. He tripped and had a near fall, but hit his left hand against the edge of the counter and is now complaining of left hand pain. There is some bruising and swelling noted to the posterior aspect of his left hand with a small 3cm lac to his 4th metacarpal.

Task 1: First Impression

Please log in to the system using your assigned username and password. From the first page please select the PRODUCTION unit and double click on your assigned patient name. This is the patient record that you will be working with.

Please don't click on anything more

What do you notice?

What are you able to do here?

At first glance is anything that you would expect missing?

Task 2: Demographics

You are interviewing the patient and need to ask a few demographic questions. Under the demographic tab, please chart the following details:

    Date of Birth: 01/15/1951
    Sexual Orientation: Straight of heterosexual
    Gender Identity: Identifies as Male

Task 3: Clinical Decision Support (CDS)

From the information you entered in Task 2 there is a new notification. Please respond to the system's CDS notification and place an order based on the recommendation.

Task 4: Medication Allergy List and Reconciliation

The patient states that he is allergic to something, but that he was seen at another health facility and had a reaction to another medication that he cannot recall. Please import and reconcile the outside list as well as his known medication allergy listed below:

    Type: Drug
    Drug Name: Penicillin G Sodium
    Symptoms: Skin Rashes Hives
    Severity: Mild

Task 5: Medication List and Reconciliation

The patient has provided his home medications, in addition to information from the other health facility. Please import and reconcile his medications into one list. (Two list into one)

    Patient's home medications:
    Drug Name: ASPIRIN CHEWABLE {81MG TBCH}
    Dose: 81mg
    Route: PO
    Frequency: Daily

    Drug Name: CLOPIDOGREL {75MG TAB} (PLAVIX)
    Dose: 75mg
    Route: PO
    Frequency: Daily

Task 6: Computerized Physician Order Entry (CPOE)- Diagnostic Imaging

A. The patient needs a diagnostic imaging study of his hand. Using CPOE, place an order for an x-ray including the following details:

    Diagnostic: X-ray: Hand, right
    Frequency: x1
    Priority: STAT
    Provider: Eagle, John MD

B. The x-ray tech comes to you stating that the order for your patient is for the wrong side. Using CPOE, please rewrite the order to the correct laterality.

    Diagnostic: X-ray: Hand, left

Task 7: CPOE- Medications

A. The patient said he would like something for pain. You see in CPOE that Tylenol was ordered earlier, but has not yet been given to him. You decide that you are going to give him a different medication for pain. Using CPOE, place an order for the medication detailed below:

    Medication: ACETAMINOPHEN/CODEINE #3 U/D {30/300MG TAB} (TYL #3)
    Frequency: x1
    Priority: STAT
    Provider: Eagle, John MD

B. An order decision support has appeared for a possible drug-drug interaction. Please review and how you will proceed.

C. As stated in Task 7A, Tylenol was ordered for the patient, but never given to him. Since he took the Tylenol #3 you need to cancel regular Tylenol order. Using CPOE, please discontinue the medication that is listed below:

    Medication: Tylenol {325mg TAB} (TYLENOL)
    Details: 650 mg PO x1 STAT
    Status: Active

Task 8: CPOE- Laboratory

Since the patient is taking Plavix daily, you want to check if his range is therapeutic. Using CPOE, place an order for the lab that is listed below:

    Laboratory Order: Prothrombin Time / International Normalized Ratio (PT/INR)
    Frequency: x1
    Priority: STAT
    Provider: Eagle, John MD

Task 9: Implantable Device List

The patient states he had a left hip replacement. You recall that there have been major hip replacement recalls for DePuy, Stryker, and Zimmer implant products. Please verify that the patient's implantable device list is current, his hip replacement is not one of those from a manufacturer listed above, and then mark that you have reviewed it.

Task 10: Problem List

After reviewing the radiology results, document the patient's new diagnosis that is listed below as well as upload and reconcile his problem list that was provided from another facility. (Two list into one)

> Date: 07DEC2016
> Problem: Closed fracture of metacarpal bone (disorder)
> Status: Active
> Acute/Chronic: Acute
> Diagnosed Date: 07DEC2016

Task 11: Medication Reconciliation

Please complete the discharge medication reconciliation and mark what medications will be continued and stopped by following the instructions listed below:

> Tylenol: STOP
> Plavix: Continue
> Lipitor: Continue
> Aspirin: Continue

Task 12: e-Prescribing

The patient is now ready to go home and is requesting pain medication. He would like to use another pharmacy instead of the one that is currently listed in the system. Using eRx, place an order for the medication below as well as change his pharmacy as requested:

> Medication: INDOMETHACIN {25MG CAP} (INDOCIN)
> Directions: take 5ml PO Q6H PRN for pain
> Quantity: 500
> Form: Mililiter
> Refills: None
>
> Pharmacy: VA Pharmacy 10.6MU

Final Question and Comments

- What was your overall impression of this EHR application?
- What aspects of the system did you like most?
- What aspects of the system did you like least?
- Were there any features that you were surprised to see?
- What features did you expect to encounter but did not see? That is, is there anything that is missing in this application?
- Compare this system to other systems you have used.
- Would you recommend this system to your colleagues?

System Usability Scale (SUS) Questionnaire

Please take a moment to complete the SUS Questionnaire.

In 1996, Brooke published a "low-cost usability scale that can be used for global assessments of systems usability" known as the System Usability Scale or SUS.[1] Lewis and Sauro (2009) and others have elaborated on the SUS over the years.[2]

SUS is technology independent and has since been tested on hardware, consumer software, websites, cell-phones, IVRs and even the yellow-pages.

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[1] Brooke, J.: SUS: A "quick and dirty" usability scale. In: Jordan, P. W., Thomas, B., Weerdmeester, B. A., McClelland (eds.) Usability Evaluation in Industry pp. 189--194. Taylor & Francis, London, UK (1996). SUS is copyrighted to Digital Equipment Corporation, 1986.

[2] Lewis, J R & Sauro, J. (2009) "The Factor Structure Of The System Usability Scale." in Proceedings of the Human Computer Interaction International Conference (HCII 2009), San Diego CA, USA

Usability Test b(11)

Participant Instructions

Preliminary Questionnaire

Before beginning the EHR tasks we would like to collect some information for participant classification purposes. Again, all of the information that you provide will be kept confidential and your name will not be associated with your data at any time.

Please take a moment to complete the Participant Questionnaire found in your test packet. If you have any questions, please do not hesitate to ask.

Below is a brief scenario that goes along with the tasks that you will be asked to complete. Once again we must emphasize that we are not testing you or your ability to use the system- we are evaluating the usability of the system. We are not able to instruct or provide you with help on how to use each application or how to complete each task. You will be taken to the starting point for each task. Once you have completed a task please do not attempt to do more than what is instructed.

Test System Access

The system you will be using today will test specific applications within the CliniComp|EHR. Since we are testing specific functionality the data may not make sense as it is a placeholder. The workflow many not seem complete, or it may not make sense compared to your normal work processes.

Username:	**UTxx**	(replace *xx* with two-digit participant number)
Password:	**123**	
Patient name:	**Test, Patientxx**	(first name includes your two-digit participant #)

Scenario

James is a 78 year old male admitted to the hospital with complaint of chest pain. James has a history of a cochlear implant surgery within the last year as well as chronic kidney disease.

Task 1: First Impression

Please log in to the system using your assigned username and password. From the first page please select the PRODUCTION unit and double click on your assigned patient name. This is the patient record that you will be working with.

Please don't click on anything more

What do you notice?

What are you able to do here?

At first glance is anything that you would expect missing?

Task 2: Activate evidence based decision support intervention when ordering a procedure

Place an order for a Chest MRI, which will activate the evidence based decisions support intervention

Task 3: Activate user-supplied predictive decision support when ordering a procedure

Place an order for a Chest CT w/ IV Contrast, which will activate the user supplied predictive decision support intervention

Task 4: Access plain language description for evidence based decision support intervention

Access the plain language description for evidence based intervention via the CDS tab

Task 5: Access plain language description for user-supplied predictive decision support

Access the plain language description for user-supplied predictive decision support intervention via the Predictive CDS tab.

Task 6: Access, record and change source attributes for evidence based decision support intervention

Use the CDS rules engine configuration tool to access, record and change source attributes for the implantable device interaction rule. Enter the following url for the new source attributes: https://www.uptodate.com/contents/cardiac-implantable-electronic-device-interactions-with-electromagnetic-fields-in-the-nonhospital-environment

Task 7: Access, record and change source attributes for user-supplied predictive decision support intervention

Use the CDS rules engine configuration tool to access, record and change source attributes for the procedure risk rule. Enter the following url for the new source attributes: Patient Safety - Contrast Material

Task 8: Provide feedback response for evidence based decision support intervention

After reviewing the implantable device interaction alert, provide feedback for the evidence based decision support intervention

Final Question and Comments

- What was your overall impression of this EHR application?
- What aspects of the system did you like most?
- What aspects of the system did you like least?
- Were there any features that you were surprised to see?
- What features did you expect to encounter but did not see? That is, is there anything that is missing in this application?
- Compare this system to other systems you have used.
- Would you recommend this system to your colleagues?

System Usability Scale (SUS) Questionnaire

Please take a moment to complete the SUS Questionnaire.

In 1996, Brooke published a "low-cost usability scale that can be used for global assessments of systems usability" known as the System Usability Scale or SUS.[1] Lewis and Sauro (2009) and others have elaborated on the SUS over the years.[2]

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[1] Brooke, J.: SUS: A "quick and dirty" usability scale. In: Jordan, P. W., Thomas, B., Weerdmeester, B. A., McClelland (eds.) Usability Evaluation in Industry pp. 189--194. Taylor & Francis, London, UK (1996). SUS is copyrighted to Digital Equipment Corporation, 1986.

[2] Lewis, J R & Sauro, J. (2009) "The Factor Structure Of The System Usability Scale." in Proceedings of the Human Computer Interaction International Conference (HCII 2009), San Diego CA, USA

Usability Test b (3)

Participant Instructions

**Prior to the commencement of the EHR usability tasks, participant classification information was collected through a Participant Questionnaire. All information provided by participants was kept confidential, and no personal identifiable information was associated with the data collected during the study. Participants were informed that questions could be asked at any time during the session.

Below is a brief scenario that goes along with the tasks that you will be asked to complete. Once again we must emphasize that we are not testing you or your ability to use the system- we are evaluating the usability of the system. We cannot instruct or provide you with help on how to use each application or how to complete each task. You will be taken to the starting point for each task. Once you have completed a task, please do not attempt to do more than what is instructed.

Test System Access

The system you will be using today will test specific applications within the CliniComp|EHR. Since we are testing specific functionality, the workflow may seem incomplete, or it may not make sense compared to your normal work processes.

Username:	**UTxx**	(replace *xx* with two-digit participant number)
Password:	**123**	

Scenario

Maria is a 72-year-old female admitted to the hospital for shortness of breath and worsening lower extremity edema. Her medical history is significant for congestive heart failure, type 2 diabetes mellitus, hypertension, chronic kidney disease, and atrial fibrillation. Maria takes multiple prescription medications to manage her symptoms.

Task 1: First Impression

Please log in to the system using your assigned username and password. From the first page please select the TEST unit and double click on your assigned patient name. This is the patient record that you will be working with.

- What are you able to do here?

- At first glance anything that you would expect to be missing?

- What do you notice?

Task 2: Access Medication Reconciliation / eRx Workspace

Navigate to the Medication Reconciliation / ePrescribing workspace for the patient.

- What information is immediately visible to you?
- Is it clear what actions you can take from this screen?

Task 3: Review and Reconcile Existing Medications

Review the patient's existing medication list.
1. Identify medications that require action.
2. Discontinue (DC) at least one existing prescription.
3. Continue at least one existing prescription.
4. Review any alerts or messages presented during reconciliation.

Do not complete reconciliation yet.

Task 4: Enter a New Medication Order

Enter a new medication order for the patient.
1. Search for and select medication.
2. Complete the required prescription details:
    o Dose
    o Route
    o Frequency
    o Duration
3. Review any clinical decision support alerts that appear.

Task 5: Associate Diagnosis

For the newly entered medication:
1. Associate an appropriate diagnosis, if prompted.

Task 6: Select Prescription Mode

1. Select a prescription fulfillment mode:
    - ePrescribe
    - Print
    - Patient Obtained
2. Review the prescription details for accuracy.

Task 7: Complete Medication Reconciliation

Finalize the medication reconciliation process.
- Confirm that the medication list reflects your selected actions.
- Complete the reconciliation.

Task 8: Edit Completed Medication Reconciliation

Reopen the completed medication reconciliation.
1. Update prescription details for existing medications.
2. Review any alerts generated by the update.
3. Save your changes.

Post-Test Questionnaire

At the conclusion of the session, please complete the **System Usability Scale (SUS) Questionnaire** included in your test packet.
Thank you for participating. Your feedback is valuable and will be used solely to evaluate and improve the usability of the system.

Final Question and Comments

- What was your overall impression of this EHR application?

- What aspects of the system did you like most?

- What aspects of the system did you like least?

- Were there any features that you were surprised to see?

- What features did you expect to encounter but did not see? That is, is there anything that is missing in this application?

- Compare this system to other systems you have used.

- Would you recommend this system to your colleagues?

System Usability Scale (SUS) Questionnaire

Please take a moment to complete the SUS Questionnaire.

In 1996, Brooke published a "low-cost usability scale that can be used for global assessments of systems usability" known as the System Usability Scale or SUS.[1] Lewis and Sauro (2009) and others have elaborated on the SUS over the years.[2]

SUS is technology independent and has since been tested on hardware, consumer software, websites, cell-phones, IVRs and even the yellow-pages.

Usability Testing Participant Scenario and Instructions b(3) (P/N: 250-70027-2.2, Rev. A) CliniComp, Intl. Confidential and Proprietary

Page 4 of 5

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[1] Brooke, J.: SUS: A "quick and dirty" usability scale. In: Jordan, P. W., Thomas, B., Weerdmeester, B. A., McClelland (eds.) Usability Evaluation in Industry pp. 189--194. Taylor & Francis, London, UK (1996). SUS is copyrighted to Digital Equipment Corporation, 1986.

[2] Lewis, J R & Sauro, J. (2009) "The Factor Structure Of The System Usability Scale." in Proceedings of the Human Computer Interaction International Conference (HCII 2009), San Diego CA, USA

Usability Test

System Usability Scale (*SUS*) Questionnaire

Test Name: _____   **Test Date:** _____   **Participant #:_____**

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

Usability Test

Final Question and Comments

What was your overall impression of this EHR system?

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What was your overall impression of the applications you tested (CPOE, eRx, etc.)?

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What aspects of the system did you like most?

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What aspects of the system did you like least?

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_____

Were there any features that you were surprised to see?

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_____

What features did you expect to encounter but did not see? That is, is there anything that is missing in this application?

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Compare this system to other systems you have used.

_____

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_____

Would you recommend this system to your colleagues?

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