

**PRACTICE DIRECTOR EHR USABILITY TEST REPORT**

**Product: Practice Director Version 6.0**

Testing based on ISO 9241-210: *Ergonomics of Human System Interaction* standards  
Report based on NISTIR 7742 template: *Customized Common Industry Format Template for Electronic  
health Record Usability Testing*

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## EXECUTIVE SUMMARY

A usability test of Practice Director Version 6.0 was conducted during October 2017. The purpose of the test was to analyze the usability of the current user interface and to identify areas where improvements could be made.

During the test, 10 healthcare industry workers participated in testing the tasks of Practice Director, as laid out in this report.

The study collected performance data on 50 tasks throughout the EHR and other areas of the application. The tasks conducted were related to the following areas of the application:

- 170.315(a)(1) 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
- 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

During the testing sessions, the participants were asked to review and sign and informed consent/release form (see Appendix). Participants had some level of experience working with EHRs. The test administrator gave instructions to complete the given tasks, one at a time. The administrator also timed the tests as the data logger recorded any deviations or areas where the participant was unable to complete the tasks. Neither the administrator nor the data logger gave any specific aid to the participants in completing the tasks.

During completion of the tasks, the following data was collected:

- Time to complete the task
- Number of errors
- Types of errors
- Path deviations
- Tasks completed
- Comments from the participants

All participant data was de-identified so that no correspondence could be made from the identity of the participant to the data collected. Following the conclusion of the testing, participants were asked to complete a post-test questionnaire. The following is a summary of the performance and rating data collected on Practice Director.

## INTRODUCTION

Practice Director, version 6.0, was used for this testing cycle. Practice Director’s EHR is used for ambulatory patients in the Optometric industry. Practice Director also uses a third party application for e-prescribing functions.

The purpose of this study was to look at, and test, the current user interface in a variety of areas that represent tasks that the average user would need to complete in an average day for patients. During the testing cycle, efficiency, effectiveness and the overall satisfaction of the users were taken into account. The data was also used to identify areas in the application that could be improved for usability and satisfaction of the user.

Task	Task Rating	Task Success	Time to Complete (Avg Sec)	Errors		Deviations	
				Total Errors	Average Errors	Total Deviations	Average Deviations
170.315(a)(1) CPOE: Launch e-prescribing portal and record a medication for a patient	4.5	10	92.9	0	0%	73	7.3
170.315(a)(1) CPOE: Launch e-prescribing portal and change a medication for a patient	4.6	10	48.1	0	0%	26	2.6
170.315(a)(1) CPOE: Launch e-prescribing portal display the changed medication for the patient	4.5	10	25.7	0	0%	19	1.9
170.315(a)(2) CPOE-Lab: Create a new lab order for patient	4.1	8	83.6	2	20%	21	2.1
170.315(a)(2) CPOE-Lab: Change a lab order for patient	4.1	8	73.2	2	20%	11	1.1
170.315(a)(2) CPOE-Lab: Access a lab order for patient	4.1	8	68.8	2	20%	6	.6
170.315(a)(3) CPOE-Imaging: Create an imaging order for patient	3.9	8	100.4	2	20%	42	4.2
170.315(a)(3) CPOE-Imaging: Change an imaging order for patient	4.1	8	77.6	2	20%	20	2.0

Task				Errors		Deviations	
	Task Rating	Task Success	Time to Complete (Avg Sec)	Total Errors	Average Errors	Total Deviations	Average Deviations
170.315(a)(3) CPOE-Imaging: Access an imaging order for patient	4.1	8	65.3	2	20%	7	.7
170.315(a)(4) Drug-drug, drug-allergy interactions: Launch e-prescribing portal and trigger a drug-drug interaction by entering a new medication order for a patient	4	9	102.5	1	10%	85	8.5
170.315(a)(4) Drug-drug, drug-allergy interactions: Launch e-prescribing portal and trigger a drug-allergy interaction by entering a new medication order for a patient	4.6	10	58.4	0	0%	84	8.4
170.315(a)(4) Drug-drug, drug-allergy interactions: Launch e-prescribing portal and adjust the severity level of the drug-drug interaction warnings for the location	2.9	6	160.4	4	40%	33	3.3
170.315(a)(5) Demographics: Enter a new patient and add patient responses to Race, Ethnicity, Preferred Language, Date of Birth, Sex, Gender Identity and Sexual Orientation	4.5	10	120.3	0	0%	72	7.2
170.315(a)(5) Demographics: Change the patient's Race, Ethnicity, Preferred Language, Date of Birth, Sex, Gender Identity and Sexual Orientation	5	10	54.9	0	0%	27	2.7
170.315(a)(5) Demographics: Display the patient's Race, Ethnicity, Preferred Language, Date of Birth, Sex, Gender Identity and Sexual Orientation	5	10	8.9	0	0%	4	.4

Task	Task Rating	Task Success	Time to Complete (Avg Sec)	Errors		Deviations	
				Total Errors	Average Errors	Total Deviations	Average Deviations
170.315(a)(6) Problem List: Record a Diagnosis for a patient in the EHR	4.7	10	28.2	0	0%	20	2.0
170.315(a)(6) Problem List: Change a Diagnosis for a patient with an EHR	4.9	10	30.1	0	0%	4	.4
170.315(a)(6) Problem List: View an active Patient Diagnosis	4.8	10	9.3	0	0%	4	.4
170.315(a)(6) Problem List: View a Patient Diagnosis history	5	10	15.7	0	0%	29	2.9
170.315(a)(7) Medications: Launch e-prescribing portal and add medications to patient through drug search	4.3	9	80.8	1	10%	125	12.5
170.315(a)(7) Medications: Launch e-prescribing portal and change a medication for a patient	4.4	10	44.6	0	0%	31	3.1
170.315(a)(7) Medications: Launch e-prescribing portal and view an active medication	4.6	10	23.9	0	0%	6	.6
170.315(a)(7) Medications: Launch e-prescribing portal and view medication history	4.8	10	14.9	0	0%	4	.4
170.315(a)(8) Medication Allergy List: Launch e-prescribing portal and add a medication allergy	5	10	23.5	0	0%	17	1.7
170.315(a)(8) Medication Allergy List: Launch e-prescribing portal and change a medication allergy	4.9	10	22.7	0	0%	12	1.2

Task				Errors		Deviations	
	Task Rating	Task Success	Time to Complete (Avg Sec)	Total Errors	Average Errors	Total Deviations	Average Deviations
170.315(a)(8) Medication Allergy List: Launch e-prescribing portal and display active medication allergies	4.8	10	31.7	0	0%	2	.2
170.315(a)(8) Medication Allergy List: Launch e-prescribing portal and display medication allergy history	4.7	9	55.2	1	10%	19	1.9
170.315(a)(9) Clinical Decision Support: Set administration individual filters for Clinical Decision Support for Provider interventions	3.6	6	137.2	4	40%	20	2.0
170.315(a)(9) Clinical Decision Support: Set administration combination filters for Clinical Decision Support for Provider interventions (Problem List & Vital Signs)	3.5	7	111.9	3	30%	23	2.3
170.315(a)(9) Clinical Decision Support: Trigger an intervention for patient for Problem List (Hypertension)	3.1	7	123.9	3	30%	38	3.8
170.315(a)(9) Clinical Decision Support: Trigger an intervention for patient for Medication List (Smoking Cessation)	1.8	3	201.2	7	70%	56	5.6
170.315(a)(9) Clinical Decision Support: Trigger an intervention for patient for Allergy List (Penicillin)	1.7	3	193.3	7	70%	77	7.7
170.315(a)(9) Clinical Decision Support: Trigger an intervention for patient for Demographics (BMI)	3	5	183.2	5	50%	96	9.6

Task				Errors		Deviations	
	Task Rating	Task Success	Time to Complete (Avg Sec)	Total Errors	Average Errors	Total Deviations	Average Deviations
170.315(a)(9) Clinical Decision Support: Trigger an intervention for patient for Lab Test (High Cholesterol)	2.4	4	205	6	60%	62	6.2
170.315(a)(9) Clinical Decision Support: Trigger an intervention for patient for Vital Signs (Blood Sugar)	1.9	3	223.3	7	70%	60	6.0
170.315(a)(9) Clinical Decision Support: Trigger an intervention for patient for a combination of items(Hypertension/H BP)	.8	3	225.3	7	70%	55	5.5
170.315(a)(9) Clinical Decision Support: View the intervention information using the Infobutton in the problem list, medication list, and demographics areas	2.7	5	170.5	5	50%	25	2.5
170.315(a)(9) Clinical Decision Support: Trigger the CDS interventions based on data elements in the problem list, medication list, and medication allergy list by incorporating patient information from a transition of care/referral summary	2.4	4	198.4	6	60%	48	4.8
170.315(a)(9) Clinical Decision Support: Access the following attributes for one of the triggered CDS interventions: bibliographic citation, developer, funding source, release/revision date	4.4	8	79.2	2	20%	39	3.9
170.315(a)(14) Implantable Device List: Enter an implantable device UDI for a patient in the HER	4.8	8	91.1	2	20%	47	4.7

Task				Errors		Deviations	
	Task Rating	Task Success	Time to Complete (Avg Sec)	Total Errors	Average Errors	Total Deviations	Average Deviations
170.315(a)(14) Implantable Device List: Change an implantable device UDI status for a patient in the EHR	4.7	8	74.3	2	20%	69	6.9
170.315(a)(14) Implantable Device List: View the UDI information	4.7	8	67.7	2	20%	14	1.7
170.315(b)(2) Clinical Information Reconciliation and Incorporation: Reconcile a patient's current record with a newly imported record from another source	3.3	6	167.4	4	40%	69	6.9
170.315(b)(2) Clinical Information Reconciliation and Incorporation: Generate a new CCDA with the reconciled information	3.3	6	144	4	40%	58	5.8
170.315(b)(3) Electronic Prescribing: Launch e-prescribing portal and create a new prescription	4.1	10	73.5	0	0%	106	10.6
170.315(b)(3) Electronic Prescribing: Launch e-prescribing and change a prescription dosage or duration	4.5	10	29.2	0	0%	67	6.7
170.315(b)(3) Electronic Prescribing: Launch e-prescribing and Cancel a prescription	4.5	10	21.3	0	0%	4	.4
170.315(b)(3) Electronic Prescribing: Launch e-prescribing and Refill a prescription	4.3	9	52.3	1	10%	17	1.7
170.315(b)(3) Electronic Prescribing: Launch e-prescribing and Receive fill status notification	3.2	5	156.6	5	50%	18	1.8



Task				Errors		Deviations	
	Task Rating	Task Success	Time to Complete (Avg Sec)	Total Errors	Average Errors	Total Deviations	Average Deviations
170.315(b)(3) Electronic Prescribing: Launch e-prescribing and Request and receive medication history information	4.3	10	25.6	0	0%	30	3.0

Other than the structured data shown in the table, the following qualitative observations were made:

- Major Findings
- Areas for Improvements

## METHOD

### Participants

A total of 10 participants were tested on the EHR within Practice Director. Participants work in a variety of ambulatory healthcare jobs. Participants had no direct involvement in the development or design of the Practice Director EHR. Participants were not Practice Director Staff members. All participants were similar to an end user of the Practice Director Application and EHR.

The table below shows participants by characteristics, including demographics, user role, and product experience. Participant names were replaced with IDs so that individual data could not be associated with an individual.

Participant ID Number	Gender	Age	Education	End User Role	Professional Experience	Computer Experience	Product Experience (Years)
620171	Male	30-39	Trade/technical/vocational training	Optician	120	120	2.5
620172	Female	20-29	Some college credit, no degree	Office Assistant	60	60	4
620173	Female	20-29	Some college credit, no degree	Optical Tech	48	48	1.5
620174	Male	20-29	Associate degree	Office Assistant	24	24	.5
620175	Male	50-59	Bachelor's Degree	Optical Tech	300	300	5
620176	Female	40-49	Bachelor's Degree	Office Manager	240	240	15
620177	Male	30-39	Bachelor's Degree	Billing Manager	180	180	.75
620178	Male	30-39	Trade/technical/vocational training	Office Staff	200	200	7
620179	Female	40-49	Bachelor's Degree	Pretest Tech	270	270	16
620170	Female	40-49	Doctorate degree (e.g., MD, DNP, DMD, PhD)	Doctor	250	250	12

All participants scheduled showed for their test times.

Participants were scheduled for a 90 minute time slot to complete the testing as well as the supplemental questionnaire and consent forms.

## **STUDY DESIGN**

Overall, the objective of this test was to uncover areas where the application performed well – that is, effectively, efficiently, and with satisfaction – and areas where the application failed to meet the needs of the participants. The data from this test may serve as a baseline for future tests with an updated version of the same EHR and/or comparison with other EHRs provided the same tasks are used. In short, this testing serves as both a means to record or benchmark current usability, but also to identify areas where improvements must be made.

During the usability test, participants interacted with 1 EHR. Each participant used the system in the same location, and was provided with the same instructions. The system was evaluated for effectiveness, efficiency and satisfaction as defined by measures collected and analyzed for each participant:

Number of tasks successfully completed within the allotted time without assistance

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

## **TASKS**

A number of tasks were constructed that would be realistic and representative of the kinds of activities a user might do with this EHR, including:

- Launch e-prescribing portal and record a medication for a patient
- Launch e-prescribing portal and change a medication for a patient
- Launch e-prescribing portal and display the changed medication for the patient
- Create a new lab order for patient
- Change an existing lab order for patient
- Access an existing lab order for patient
- Create a new imaging order for patient
- Change an existing imaging order for patient
- Access an existing imaging order for patient
- Launch e-prescribing portal and trigger a drug-drug interaction by entering a new medication order for a patient
- Launch e-prescribing portal and trigger a drug-allergy interaction by entering a new medication order for a patient
- Launch e-prescribing portal and adjust the severity level of the drug-drug interaction warnings for the location
- Enter a new patient and add patient responses to Race, Ethnicity, Preferred Language, Date of Birth, Sex, Gender Identity and Sexual Orientation
- Change the patient's Race, Ethnicity, Preferred Language, Date of Birth, Sex, Gender Identity and Sexual Orientation
- Display the patient's Race, Ethnicity, Preferred Language, Date of Birth, Sex, Gender Identity and Sexual Orientation
- Record a diagnosis for a patient in the EHR
- Change a diagnosis for a patient in the EHR
- View an active Patient Diagnosis

- View a diagnosis history for a patient in the EHR
- Launch e-prescribing portal and add medications to patient through drug search
- Launch e-prescribing portal and change a medication for a patient
- Launch e-prescribing portal and view an active medication
- Launch e-prescribing portal and view medication history
- Launch e-prescribing portal and add a medication allergy
- Launch e-prescribing portal and change a medication allergy
- Launch e-prescribing portal and display active medication allergies
- Launch e-prescribing portal and display medication allergy history
- Set administration individual filters for Clinical Decision Support for Provider interventions
- Set administration combination filters for Clinical Decision Support for Provider interventions (Problem Lists and Vitals)
- Trigger an intervention for patient for Problem List (Hypertension)
- Trigger an intervention for patient for Medication List (Smoking Cessation Medication)
- Trigger an intervention for patient for Allergy List (Penicillin)
- Trigger an intervention for patient for Demographics (BMI)
- Trigger an intervention for patient for Lab Test (High Cholesterol)
- Trigger an intervention for patient for Vital Signs (Blood Sugar)
- Trigger an intervention for patient for a combination of areas (Hypertension/HBP)
- View the intervention information using the Infobutton in the problem list, medication list, and demographics areas
- Trigger the CDS interventions based on data elements in the problem list, medication list, and medication allergy list by incorporating patient information from a transition of care/referral summary
- Access the following attributes for one of the triggered CDS interventions: bibliographic citation, developer, funding source, release/revision date
- Enter an Implantable Device for a patient in the EHR
- Change an implantable device UDI status for a patient in the EHR
- View the UDI information
- Reconcile a patient's current record with a newly imported record from another source
- Generate a new CCDA with the reconciled information
- Launch e-prescribing portal and create a new prescription
- Launch e-prescribing and change a prescription dosage or duration
- Launch e-prescribing and Cancel a prescription
- Launch e-prescribing and Refill a prescription
- Launch e-prescribing and Receive fill status notification
- Launch e-prescribing and Request and receive medication history information

Tasks were selected based on their frequency of use, criticality of function, requirements of certification body, and those that may be most troublesome for users or that pose a higher risk for errors.

## **PROCEDURES**

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

To ensure that the test ran smoothly, Practice Director Staff members participated in the administration of this test. The test administrator provided the instructions for each test, and noted all comments from the participants; while the data loggers noted all times, deviations and errors.

Participants were instructed to perform the tasks:  
After listening to the instructions from the testing administrator  
As quickly as possible  
Without assistance

For each task, the participants were given a written copy of the task. Task timing began once the administrator finished reading the question. The task time was stopped once the participant indicated they had successfully completed the task. Following the session, the administrator gave the participant the post-test questionnaire and thanked them for their time and participation.

## **TEST LOCATION**

The test facility was a quiet conference room where participants were isolated from others in the study. Only the test administrator and loggers were with the participants while the study was being administered. To ensure that the environment was comfortable for users, noise levels were kept to a minimum.

## **TEST ENVIRONMENT**

The computers used for the testing were PCs running Windows 10 or MacOS Sierra. Users also used a mouse and keyboard to complete the tasks. The Practice Director application was accessed through local servers and the performance was similar to end user performance expectations.

## **TEST FORMS AND TOOLS**

During the usability tests, the following instruments and documents were used:

- Informed consent forms
- Moderator guide
- Post-test questionnaires

Examples of these documents can be found in the Appendix to this report.

## **PARTICIPANT INSTRUCTIONS**

The Administrator read the following instruction aloud to each participant:

“Thank you for participating in today’s usability study of Practice Director. In a few moments, you will be asked to perform a series of tasks and complete a user survey. Please attempt to complete each task as quickly as possible. The idea behind this study is for Practice Director to obtain information as to the usability of certain enhancements and if there are any improvements that can be made to help with how quickly and easily a task can be performed.

When it is time to perform each task, I will state the instructions and then tell you to begin. Once you have completed the task, please say ‘Done’. After you have completed the task, I will ask for feedback on the actions you had taken during the task. You should complete the tasks as quickly as possible with as few errors as possible. Remember, we are testing the system, not the user. I will be here during the test, but cannot give you specific help in completing the task.”

## **USABILITY METRICS**

The goals of this test were to assess:

- The efficiency of Practice Director by measuring the length of time it took a participant to complete a task; as well as logging the deviations from the optimal path that a participant took while completing the tasks.
- The effectiveness of Practice Director by measuring the number of errors and types of errors the participants experienced during the completion of tasks.
- The satisfaction of the user with Practice Director by logging their comments made while completing the tasks.

## DATA SCORING

The table below details how each task was scored in the given areas.

Measure	Rationale and Scoring
Efficiency: Task Time	Time was counted from the administrator saying, "Begin" to the participant saying, "Done". If the participant could not complete the task, time was recorded, but not used to measure the efficiency for that task.
Efficiency: Deviations	<p>Deviations from the optimal path to complete the task were logged as the participants completed the task.</p> <p>Path deviations were calculated by taking the total number of observed deviations and dividing that number by the total number of steps taken to complete the tasks using the optimal path.</p>
Effectiveness: Success	<p>A task was counted as a "Success" if the participant was able to achieve the correct outcome, without assistance, within the time allotted on a per task basis.</p> <p>The total number of successes were calculated for each task and then divided by the total number of times that task was attempted. The results are provided as a percentage.</p> <p>Task times were recorded for successes. Observed task times divided by the optimal time for each task is a measure of optimal efficiency.</p>
Effectiveness: Failure	A task was counted as a "Failure" if the participant was unable to achieve the correct outcome or could not complete the task without assistance.
Satisfaction: Task Rating	<p>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 to rate "Overall, this task was:" on a scale of 1 (Very Difficult) to 5 (Very Easy).</p> <p>These data are averaged across participants.</p>

## RESULTS

### Data Analysis and Reporting

The results of the usability test for Practice Director were calculated according to the methods specified in the Usability Metrics section above.

The testing results are listed below. The table below easily identifies the tasks performed and the performance level for each task.

Task				Errors		Deviations	
	Task Rating	Task Success	Time to Complete (Avg Sec)	Total Errors	Average Errors	Total Deviations	Fraction Deviations
170.315(a)(1) CPOE: Launch e-prescribing portal and record a medication for a patient	4.5	10	92.9	0	0%	73	7.3
170.315(a)(1) CPOE: Launch e-prescribing portal and change a medication for a patient	4.6	10	48.1	0	0%	26	2.6
170.315(a)(1) CPOE: Launch e-prescribing portal and display the changed medication for the patient	4.5	10	25.7	0	0%	19	1.9
170.315(a)(2) CPOE-Lab: Create a new lab order for patient	4.1	8	83.6	2	20%	21	2.1
170.315(a)(2) CPOE-Lab: Change a lab order for patient	4.1	8	73.2	2	20%	11	1.1
170.315(a)(2) CPOE-Lab: Access a lab order for patient	4.1	8	68.8	2	20%	6	.6
170.315(a)(3) CPOE-Imaging: Create an imaging order for patient	3.9	8	100.4	2	20%	42	4.2
170.315(a)(3) CPOE-Imaging: Change an imaging order for patient	4.1	8	77.6	2	20%	20	2.0
170.315(a)(3) CPOE-Imaging: Access an imaging order for patient	4.1	8	65.3	2	20%	7	.7
170.315(a)(4) Drug-drug, drug-allergy interactions: Launch e-prescribing portal and trigger a drug-drug interaction by entering a new medication order for a patient	4	9	102.5	1	10%	85	8.5

Task				Errors		Deviations	
	Task Rating	Task Success	Time to Complete (Avg Sec)	Total Errors	Average Errors	Total Deviations	Fraction Deviations
170.315(a)(4) Drug-drug, drug-allergy interactions: Launch e-prescribing portal and trigger a drug-allergy interaction by entering a new medication order for a patient	4.6	10	58.4	0	0%	84	8.4
170.315(a)(4) Drug-drug, drug-allergy interactions: Launch e-prescribing portal and adjust the severity level of the drug-drug interaction warnings for the location	2.9	6	160.4	4	40%	33	3.3
170.315(a)(5) Demographics: Enter a new patient and add patient responses to Race, Ethnicity, Preferred Language, Date of Birth, Sex, Gender Identity and Sexual Orientation	4.5	10	120.3	0	0%	72	7.2
170.315(a)(5) Demographics: Change the patient's Race, Ethnicity, Preferred Language, Date of Birth, Sex, Gender Identity and Sexual Orientation	5	10	54.9	0	0%	27	2.7
170.315(a)(5) Demographics: Display the patient's Race, Ethnicity, Preferred Language, Date of Birth, Sex, Gender Identity and Sexual Orientation	5	10	8.9	0	0%	4	.4
170.315(a)(6) Problem List: Record a Diagnosis for a patient in the EHR	4.7	10	28.2	0	0%	20	2.0
170.315(a)(6) Problem List: Change a Diagnosis for a patient with an EHR	4.9	10	30.1	0	0%	4	.4

Task				Errors		Deviations	
	Task Rating	Task Success	Time to Complete (Avg Sec)	Total Errors	Average Errors	Total Deviations	Fraction Deviations
170.315(a)(6) Problem List: View an active Patient Diagnosis	4.8	10	9.3	0	0%	4	.4
170.315(a)(6) Problem List: View a Patient Diagnosis history	5	10	15.7	0	0%	29	2.9
170.315(a)(7) Medications: Launch e-prescribing portal and add medications to patient through drug search	4.3	9	80.8	1	10%	125	12.5
170.315(a)(7) Medications: Launch e-prescribing portal and change a medication for a patient	4.4	10	44.6	0	0%	31	3.1
170.315(a)(7) Medications: Launch e-prescribing portal and view an active medication	4.6	10	23.9	0	0%	6	.6
170.315(a)(7) Medications: Launch e-prescribing portal and view medication history	4.8	10	14.9	0	0%	4	.4
170.315(a)(8) Medication Allergy List: Launch e-prescribing portal and a medication allergy	5	10	23.5	0	0%	17	1.7
170.315(a)(8) Medication Allergy List: Launch e-prescribing portal and change a medication allergy	4.9	10	22.7	0	0%	12	1.2
170.315(a)(8) Medication Allergy List: Launch e-prescribing portal and display active medication allergies	4.8	10	31.7	0	0%	2	.2



Task				Errors		Deviations	
	Task Rating	Task Success	Time to Complete (Avg Sec)	Total Errors	Average Errors	Total Deviations	Fraction Deviations
170.315(a)(8) Medication Allergy List: Launch e-prescribing portal and display medication allergy history	4.7	9	55.2	1	10%	19	1.9
170.315(a)(9) Clinical Decision Support: Set administration individual filters for Clinical Decision Support for Provider interventions	3.6	6	137.2	4	40%	20	2.0
170.315(a)(9) Clinical Decision Support: Set administration combination filters for Clinical Decision Support for Provider interventions	3.5	7	111.9	3	30%	23	2.3
170.315(a)(9) Clinical Decision Support: Trigger an intervention for patient for Problem List (Hypertension)	3.1	7	123.6	3	30%	38	3.8
170.315(a)(9) Clinical Decision Support: Trigger an intervention for patient for Medication List (Smoking Cessation)	1.8	3	201.2	7	70%	56	5.6
170.315(a)(9) Clinical Decision Support: Trigger an intervention for patient for Allergy List (Penicillin)	1.7	3	193.3	7	70%	77	7.7
170.315(a)(9) Clinical Decision Support: Trigger an intervention for patient for Demographics (BMI)	3	5	183.2	5	50%	96	9.6
170.315(a)(9) Clinical Decision Support: Trigger an intervention for patient for Lab Test(High Cholesterol)	2.4	4	205	6	60%	62	6.2

Task				Errors		Deviations	
	Task Rating	Task Success	Time to Complete (Avg)	Total Errors	Average Errors	Total Deviations	Fraction Deviations
170.315(a)(9) Clinical Decision Support: Trigger an intervention for patient for Vital Signs (Blood Sugar)	1.9	3	223.3	7	70%	60	6.0
170.315(a)(9) Clinical Decision Support: Trigger an intervention for patient for a combination of items(Hypertension/H BP)	1.8	3	225.3	7	70%	55	5.5
170.315(a)(9) Clinical Decision Support: View the intervention information using the Infobutton in the problem list, medication list, and demographics areas	2.7	5	170.5	5	50%	25	2.5
170.315(a)(9) Clinical Decision Support: Trigger the CDS interventions based on data elements in the problem list, medication list, and medication allergy list by incorporating patient information from a transition of care/referral summary	2.4	4	198.4	6	60%	48	4.8
170.315(a)(9) Clinical Decision Support: Access the following attributes for one of the triggered CDS interventions: bibliographic citation, developer, funding source, release/revision date	4.4	8	79.2	2	20%	39	3.9
170.315(a)(14) Implantable Device List: Enter an implantable device UDI for a patient in the EHR	4.8	8	91.1	2	20%	47	4.7
170.315(a)(14) Implantable Device List: Change an implantable device UDI status for a patient in the EHR	4.7	8	74.3	2	20%	69	6.9

Task				Errors		Deviations	
	Task Rating	Task Success	Time to Complete (Avg Sec)	Total Errors	Average Errors	Total Deviations	Fraction Deviations
170.315(a)(14) Implantable Device List: View the UDI information	4.7	8	67.7	2	20%	14	1.4
170.315(b)(2) Clinical Information Reconciliation and Incorporation: Reconcile a patient's current record with a newly imported record from another source	3.3	6	167.4	4	40%	69	6.9
170.315(b)(2) Clinical Information Reconciliation and Incorporation: Generate a new CCDA with the reconciled information	3.3	6	144	4	40%	58	5.8
170.315(b)(3) Electronic Prescribing: Launch e-prescribing portal and create a new prescription	4.1	10	73.5	0	0%	106	10.6
170.315(b)(3) Electronic Prescribing: Launch e-prescribing and change a prescription dosage or duration	4.5	10	29.2	0	0%	67	6.7
170.315(b)(3) Electronic Prescribing: Launch e-prescribing and Cancel a prescription	4.5	10	21.3	0	0%	4	.4
170.315(b)(3) Electronic Prescribing: Launch e-prescribing and Refill a prescription	4.3	9	52.3	1	10%	17	1.7
170.315(b)(3) Electronic Prescribing: Launch e-prescribing and Receive fill status notification	3.2	5	156.6	5	50%	18	1.8
170.315(b)(3) Electronic Prescribing: Launch e-prescribing and Request and receive medication history information	4.3	10	25.6	0	0%	30	3.0

## **EFFECTIVENESS**

Participants in the study experiences errors in the following areas of the test:

1. E-prescribing, third party application, either experiencing an error in that system launch or not finding the screen to set options.
2. Clinical Decision Support administration screen. This screen is within the General Administration screen and users were unable to locate it during testing.
3. Clinical Decision Support triggering interventions. Since users were unable to set the intervention filters in administration, they were unable to trigger any interventions in the system.
4. Clinical Decision Support triggering interventions. Those users who do not understand what/how the interventions would/should trigger had a hard time knowing what information to enter and/or where to enter the information.
5. Implantable Device. Users not familiar with the EHR screen had a difficult time locating the entry point for devices.
6. Reconciliation of reports from other sources. This screen was hard to locate during testing. Those participants who did locate the screen, found the actual reconciliation easy to complete.

Each of these areas is being studied for enhancements to increase the effectiveness of the end user in the future.

## **EFFICIENCY**

Deviations from the optimal paths during this usability test were minimal when the participant was able to complete the task, and based on the users experience with medical records. The areas that deviations were recorded were within the third party e-prescribing application, within Practice Director trying to locate the reconciliation screen, and within the EHR for users not familiar with medical records.

## **SATISFACTION**

7/10 participants stated that the application was easy to use, the users not satisfied were frustrated because he/she could not find the areas to complete the tasks, and/or were frustrated with using the third party e-prescribing screens they were not familiar with.

## **MAJOR FINDINGS**

Throughout the application, users suggested a search function for finding areas that may be new to the system and/or new to the user. Users suggested trying something other than the current third party application for e-prescribing. Another finding was that maybe there should be a help area for interventions with definitions and guidance for users not familiar with triggering those events.

## **AREAS FOR IMPROVEMENT**

Enhancements will be made to the administration areas mentioned in this report to facilitate the end user being able to locate the Clinical Support Decision screens as well as the Reconciliation screens and other new areas. Other enhancements in training and communication will be used to educate the end users on triggering interventions once properly set and filtered in the system.

As for the usability of the third party e-prescribing system, we will work with that party to improve the effectiveness and efficiency of the link and the application for the end users. At the time of this report, it is unknown what those improvement will be.

## **APPENDICES**

The following appendices include supporting data for this usability study.

### **SAMPLE CONSENT FORM**

#### Practice Director EHR Usability Study

#### Consent Form

Practice Director would like to thank you for your participation in our Usability Study. Within this study we are testing the usability of the Practice Director EHR and components of the e-prescribing system linked to Practice Director. Within the testing period, you will be asked to perform specific tasks to help us analyze the usability of certain areas of the application. The tasks should take approximately 90 minutes to complete. After completion of the tasks, we would also like to ask that you complete a short survey. Your participation is 100% voluntary, and you have the right to withdraw at any time.

By signing below, I agree to participate in this Usability Study of Practice Director.

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

#### Preliminary Questions of Participants:

1. What is your age?
2. What is your job title?
3. How long have you been in this role?
4. What is your highest education level?
5. What is your computer experience?
6. Tell me about your experience with electronic health records.

## **SAMPLE POST-TEST QUESTIONNAIRE**

### Practice Director User Survey

1. What was your overall impression of Practice Director and the EHR section?
2. What area of the application did you find you like most?
3. What area of the application did you like least?
4. If you could add one improvement to the system after using it today...what would it be?
5. What features did you expect to encounter but did not see?
6. Compare this system to other systems you have used.
7. In general, did you feel comfortable performing the task within the study?
8. Would you recommend this application to other users of EHR applications?

**MODERATOR GUIDE**

**170.315(a)(1) CPOE**

Preparations: A new patient will be created for each participant. The test will begin with the EHR screen opened and the patient selected.

Tasks:

1. Launch e-prescribing portal and record a medication for a patient
2. Launch e-prescribing portal and change a medication for a patient
3. Launch e-prescribing portal and display the changed medication for the patient

Optimal Paths:

1. Launch e-prescribing, Manage Medications, Favorites drop down, Select, Use (5 optimal steps)
2. Launch e-prescribing, Manage Medications, Modify, Change at least one item, Continue (5 optimal steps)
3. Launch e-prescribing, View the medications for patient (2 optimal steps)

Post Task Question: On a scale of 1 (Very Difficult) to 5 (Very Easy)

1. "Overall, this task was?" \_\_\_\_\_
2. "Overall, this task was?" \_\_\_\_\_
3. "Overall, this task was?" \_\_\_\_\_

**170.315(a)(2) CPOE – Laboratory**

Preparations: A new patient will be created for each participant. The test will begin with the EHR screen opened and the patient selected.

Tasks:

1. Create a new lab order for patient
2. Change a lab order for patient
3. Access a lab order for patient

Optimal Paths:

1. EHR Options, Optometry, Lab Order Entry, Select Patient, Select lab, enter date, save (7 optimal steps)
2. EHR Options, Optometry, Lab Order Entry, Select Patient, highlight lab, edit, save (7 optimal steps)
3. EHR Options, Optometry, Lab Order Entry, Select Patient (4 optimal steps)

Post Task Question: On a scale of 1 (Very Difficult) to 5 (Very Easy)

1. "Overall, this task was?" \_\_\_\_\_
2. "Overall, this task was?" \_\_\_\_\_
3. "Overall, this task was?" \_\_\_\_\_

### **170.315(a)(3) CPOE – Diagnostic Imaging**

Preparations: A new patient will be created for each participant. The test will begin with the EHR screen opened and the patient selected.

Tasks:

1. Create a new imaging order for patient
2. Change an imaging order for patient
3. Access an imaging order for patient

Optimal Paths:

1. EHR Options, Other Specialties, Image Entry, Select Patient, Select order, enter date, save (7 optimal steps)
2. EHR Options, Other Specialties, Image Entry, Select Patient, highlight order, edit, save ( 7 optimal steps)
3. EHR Options, Other Specialties, Image Entry, Select Patient (4 optimal steps)

Post Task Question: On a scale of 1 (Very Difficult) to 5 (Very Easy)

1. "Overall, this task was?" \_\_\_\_\_
2. "Overall, this task was?" \_\_\_\_\_
3. "Overall, this task was?" \_\_\_\_\_

### **170.315(a)(4) Drug-drug, drug-allergy interactions**

Preparations: A new patient will be created for each participant. The test will begin with the EHR screen opened and the patient selected.

Tasks:

1. Launch e-prescribing portal and trigger a drug-drug interaction by entering a new medication order for a patient
2. Launch e-prescribing portal and trigger a drug-allergy interaction by entering a new medication order for a patient
3. Launch e-prescribing portal and adjust the severity level of the drug-drug interaction warnings for the location

Optimal Paths:

1. Launch e-prescribing, Manage Medications, Prescribe a Medication (like a blood thinner), Prescribe a Medication that is contrary (like a blood clotting agent) (4 Optimal Path)



2. Launch e-prescribing, Manage Allergies, Add Common Drug Allergy, Add Reaction and Onset Date, Add, Manage Medications, Add a medication for the same as the allergy (7 Optimal Path)
3. Launch e-prescribing, Additional Options, Preferences-Location, When checking for drug-drug interactions, Change Selection, Click on Make These Changes at bottom (6 Optimal Path)

Post Task Question: On a scale of 1 (Very Difficult) to 5 (Very Easy)

1. "Overall, this task was?" \_\_\_\_\_
2. "Overall, this task was?" \_\_\_\_\_
3. "Overall, this task was?" \_\_\_\_\_

### **170.315(a)(5) Demographics**

Preparations: A new patient will be created for each participant. The test will begin with the Patient Demographics screen opened.

Tasks:

1. Enter a new patient and add patient responses to Race, Ethnicity, Preferred Language, Date of Birth, Sex, Gender Identity and Sexual Orientation
2. Change the patient's Race, Ethnicity, Preferred Language, Date of Birth, Sex, Gender Identity and Sexual Orientation
3. Display the patient's Race, Ethnicity, Preferred Language, Date of Birth, Sex, Gender Identity and Sexual Orientation

Optimal Paths:

1. Click New, Enter Last Name, Enter First Name, Enter Street Line 1, Enter City, Enter Zip Code, Enter Date of Birth, Enter Sex, Enter Sexual Orientation, Enter Gender Identity, Enter Race, Enter Ethnicity, Enter Preferred Language, Enter Phone Number, Select an Eye Care Provider, Click Save (16 optimal steps)
2. Click Edit, Change Date of Birth, Change Sex, Change Sexual Orientation, Change Gender Identity, Change Race, Change Ethnicity, Change Preferred Language, Click Save (9 optimal steps)
3. Display patient record (1 Optimal Steps)

Post Task Question: On a scale of 1 (Very Difficult) to 5 (Very Easy)

1. "Overall, this task was?" \_\_\_\_\_
2. "Overall, this task was?" \_\_\_\_\_
3. "Overall, this task was?" \_\_\_\_\_

### **170.315(a)(6) Problem List**

Preparations: A new patient will be created for each participant. The test will begin with the EHR screen opened and the patient selected.

Tasks:

1. Enter a diagnosis code within the patient EHR
2. Change a diagnosis code within the patient EHR

3. View an active Patient Diagnosis
4. View the diagnosis code table for the patient within the EHR

Optimal Steps:

1. Click New, Navigate to Coding/Final Tab, Enter an ICD-10 code in DX field, Save EHR. (4 optimal steps)
2. Click on EHR Lookup, Highlight EHR, Click Edit, Navigate to Coding Final Tab, Select DX Code to Change, Change the DX Code, Save EHR. (7 optimal steps)
3. Click on Diagnoses Header Button, Select Active in Status Drop Down (2 Optimal steps)
4. Click on Diagnoses Header Button. (1 optimal steps)

Post Task Question: On a scale of 1 (Very Difficult) to 5 (Very Easy)

1. "Overall, this task was?" \_\_\_\_\_
2. "Overall, this task was?" \_\_\_\_\_
3. "Overall, this task was?" \_\_\_\_\_
4. "Overall, this task was?" \_\_\_\_\_

**170.315(a)(7) Medication List**

Preparations: A new patient will be created for each participant. The test will begin with the EHR screen opened and the patient selected.

Tasks:

1. Launch e-prescribing portal and add medications to patient through drug search
2. Launch e-prescribing portal and change a medication for a patient
3. Launch e-prescribing portal and view an active medication
4. Launch e-prescribing portal and view medication history

Optimal Paths:

1. Launch e-prescribing, Manage Meds, Type in Med or Favorites dropdown, Add, Fill in Rx, Continue (6 optimal steps)
2. Launch e-prescribing, Manage Meds, Stop, Enter date and reason, Stop Medication (5 optimal steps)
3. Launch e-prescribing, Manage Meds (2 optimal steps)
4. Launch e-prescribing, Manage Meds, History (3 optimal steps)

Post Task Question: On a scale of 1 (Very Difficult) to 5 (Very Easy)

1. "Overall, this task was?" \_\_\_\_\_
2. "Overall, this task was?" \_\_\_\_\_
3. "Overall, this task was?" \_\_\_\_\_
4. "Overall, this task was?" \_\_\_\_\_

**170.315(a)(8) Medication Allergy List**

Preparations: A new patient will be created for each participant. The test will begin with the EHR screen opened and the patient selected.

Tasks:

1. Launch e-prescribing portal and add a medication allergy
2. Launch e-prescribing portal and change a medication allergy
3. Launch e-prescribing portal and display active medication allergies
4. Launch e-prescribing portal and display history of medication allergy

Optimal Paths:

1. Launch e-prescribing, Manage Allergies, Select Medication Allergy, Add Allergy, Enter Reaction and Onset Date, Add (6 optimal steps)
2. Launch e-prescribing, Manage Allergies, Modify an Allergy, Select Change (4 optimal steps)
3. Launch e-prescribing, Manage Allergies (2 optimal steps)
4. Launch e-prescribing, Manage Allergies (2 optimal steps)

Post Task Question: On a scale of 1 (Very Difficult) to 5 (Very Easy)

1. "Overall, this task was?" \_\_\_\_\_
2. "Overall, this task was?" \_\_\_\_\_
3. "Overall, this task was?" \_\_\_\_\_
4. "Overall, this task was?" \_\_\_\_\_

### **170.315(a)(9) Clinical Decision Support**

Preparations: A new patient will be created for each participant. Each patient will have one EHR already saved as complete within the system. The test will begin from the main screen for Practice Director.

Tasks:

1. Set administration individual filters for Clinical Decision Support for Provider interventions
2. Set administration combination filters for Clinical Decision Support for Provider interventions (Problem List & Vital Signs)
3. Trigger an intervention for patient for Problem List (Hypertension)
4. Trigger an intervention for patient for Medication List (Smoking Cessation)
5. Trigger an intervention for patient for Allergy List (Penicillin)
6. Trigger an intervention for patient for Demographics (BMI)
7. Trigger an intervention for patient for Lab Test (High Cholesterol)
8. Trigger an intervention for patient for Vital Signs (Blood Sugar)
9. Trigger an intervention for patient for a combination of areas (Hypertension/HBP)
10. View the intervention information using the Infobutton in the problem list, medication list, and demographics areas
11. Trigger the CDS interventions based on data elements in the problem list, medication list, and medication allergy list by incorporating patient information from a transition of care/referral summary
12. Access the following attributes for one of the triggered CDS interventions: bibliographic citation, developer, funding source, release/revision date

Optimal Paths:

1. Administration, General Administration, Clinical Decision Support, Click on all 6 check boxes (8 optimal steps)

2. Administration, General Administration, Clinical Decision Support, Click on at least two checkboxes within the combination table (5 optimal steps)
3. Open EHR, Select patient, Create New, Enter Diagnosis of Hypertension(I10), Enter OV Procedure Code, Save EHR as Complete (6 optimal steps)
4. Open EHR, Select patient, Create New, Enter Smoking Status (Current), Launch E-prescribing, Manage Meds(Nicitol), Return to EHR, Save EHR (8 optimal steps)
5. Open EHR, Select patient, Create New, Launch e-prescribing, Manage Allergies, Enter allergy, return to EHR, Save as Complete (8 optimal steps)
6. Open EHR, Select patient, Create New, Enter vitals (BMI out of norm), Save EHR as Complete, Go to Demographics screen, Edit Patient, Save (8 optimal steps)
7. Open EHR Options, Select Lab Results, Import Lab result, Save (4 optimal steps)
8. Open EHR, Select patient, Create New, Enter Vitals (high blood sugar), Save as Complete, Open Demographics, Edit, Save (8 optimal steps)
9. Open EHR, Select patient, Create New, Enter HBP diagnosis (I10), Enter 99201 Procedure Code, Enter Vitals with HBP data, Save as Complete (7 optimal steps)
10. Open Intervention Box, Click on specific patient intervention, Click on InfoButton (3 optimal steps)
11. Open EHR Options, Select Transition of Care, Select Patient Lookup, Type in patient Last Name, Select Patient, Import, Select incoming file, Save (7 optimal steps)
12. Open Intervention Box, Click on specific patient intervention, View Bibliography, Developer, Funding Source and/or Release information (3 optimal steps)

Post Task Question: On a scale of 1 (Very Difficult) to 5 (Very Easy)

1. "Overall, this task was?" \_\_\_\_\_
2. "Overall, this task was?" \_\_\_\_\_
3. "Overall, this task was?" \_\_\_\_\_
4. "Overall, this task was?" \_\_\_\_\_
5. "Overall, this task was?" \_\_\_\_\_
6. "Overall, this task was?" \_\_\_\_\_
7. "Overall, this task was?" \_\_\_\_\_
8. "Overall, this task was?" \_\_\_\_\_
9. "Overall, this task was?" \_\_\_\_\_
10. "Overall, this task was?" \_\_\_\_\_
11. "Overall, this task was?" \_\_\_\_\_
12. "Overall, this task was?" \_\_\_\_\_

### **170.315(a)(14) Implantable Device List**

Preparations: A new patient will be created for each participant. The test will begin on the main screen.

Tasks:

1. Add a new Implantable Device to the Patient EHR
2. Change the status of the Device
3. View the Devices Information

Optimal Paths:

1. EHR Options, EHR Form, Select a patient, Click the Devices Icon, Click Add, Enter the following valid UDI: **(01)00643169007222(17)160128(21)BLC200461H**, Click Add, Close Devices Window (8 Optimal Steps)
2. EHR Options, EHR Form, Select a patient, Click the Devices Icon, Select a Device, Deactivate the Device (6 optimal steps)

3. EHR Options, EHR Form, Select a patient, Click the Devices Icon, Select a Device, Click View (6 Optimal Steps)

Post Task Question: On a scale of 1 (Very Difficult) to 5 (Very Easy)

1. "Overall, this task was?" \_\_\_\_\_
2. "Overall, this task was?" \_\_\_\_\_
3. "Overall, this task was?" \_\_\_\_\_

### **170.315(b)(2) Clinical Information Reconciliation and Incorporation**

Preparations: A new patient will be created for each participant. The test will begin on the main screen. Have a CCDAs on system ready to import.

Tasks:

1. Reconcile a patient's current record with a newly imported record from another source
2. Generate a new CCDAs for the reconciled information

Optimal Path:

1. EHR Options, Transition of Care, Patient Look up, Import, Reconcile Import to System, Save (6 optimal path)
2. EHR Options, Transition of Care, Patient Look up, Save CCDAs, Select folder, Save (6 optimal steps)

Post Task Question: On a scale of 1 (Very Difficult) to 5 (Very Easy)

1. "Overall, this task was?" \_\_\_\_\_
2. "Overall, this task was?" \_\_\_\_\_

### **170.315(b)(3) Electronic Prescribing**

Preparations: A new patient will be created for each participant. The test will begin with the EHR screen opened and the patient selected.

Tasks:

1. Launch e-prescribing portal and create a new prescription
2. Launch e-prescribing and change a prescription dosage or duration
3. Launch e-prescribing and Cancel a prescription
4. Launch e-prescribing and Refill a prescription
5. Launch e-prescribing and Receive fill status notification
6. Launch e-prescribing and Request and receive medication history information

Optimal Paths:

1. Launch e-prescribing, Type the name of medication to prescribe, Find, Select Medication, Enter the information for RX, Continue, Ok, Enter password and Sign RX (9 optimal path)

2. Launch e-prescribing, Manage Medications, Stop a medication (3 optimal path)
3. Launch e-prescribing, Manage Medications, Stop a medication, Cancel last RX written (4 optimal path)
4. Launch e-prescribing, Prescribe, Renew, Enter Password and Sign (5 optimal path)
5. Launch e-prescribing, Prescribe, wait for fill status notification (3 optimal path)
6. Launch e-prescribing, Select Medication History (2 optimal path)

Post Task Question: On a scale of 1 (Very Difficult) to 5 (Very Easy)

1. "Overall, this task was?" \_\_\_\_\_
2. "Overall, this task was?" \_\_\_\_\_
3. "Overall, this task was?" \_\_\_\_\_
4. "Overall, this task was?" \_\_\_\_\_
5. "Overall, this task was?" \_\_\_\_\_
6. "Overall, this task was?" \_\_\_\_\_