

Thursday, December 27, 2018

To Whom It May Concern:

The following report reflects the results of a true and authentic usability test that was concluded on December 27, 2018. The purpose of this test was to test and validate the usability of the current user interface and provide evidence of usability in the EHR Under Test (EHRUT). During the usability test, 21 healthcare users matching the target demographic criteria served as participants and used the EHRUT in simulated, but representative tasks.

Sincerely,



Micah Jones
Chief Information Officer
Phoenix Ortho
214-427-1501
mjones@phoenixortho.net

EHR Usability Test Report of Phoenix Ortho EHR Version 5

Name and version of the product: Phoenix Ortho 5

Data and location of the usability test: From 12/19/2018-12/27/2018 Remote Using the Internet

Test Environment:

Typically, the EHRUT will be used in a healthcare office or facility. Since hardware can vary between facilities and even PCs, allowing participants to use their own PC replicates that diverse environment. The vendor either set up the application via remote control tools on each participant’s PC according to the vendor documentation or supplied a terminal server environment where appropriate.

Description of intended users: Staff in an Orthopedic healthcare office or facility

Total number of participants: 21

Description of participants: Participants were given the opportunity to have the same orientation and level of training as the actual end users would have received. The following is a table of participants by characteristics, including demographics, professional experience and computing experience. Participant names were replaced with Participant IDs so that an individual’s data cannot be tied back to individual identities. Participants were mostly volunteers and generally not compensated for their efforts. Any that were compensated were awarded a gift card. Clinical and support staff from varying backgrounds were chosen to assess broad usability of the system.

Participant Identifier	Participant Gender	Participant Age	Participant Education	Participant Occupation/ Role	Participant Professional Experience	Participant Computer Experience	Participant Product Experience
1	Female	20-29	Associate degree	Medical Assistant	60	120	60
2	Female	50-59	Some college credit, no degree	Clinical IT Manager	360	360	120
3	Female	20-29	Some college credit, no degree	Medical Assistant	72	72	60
4	Female	20-29	Some college credit, no degree	Medical Assistant	60	60	60
5	Female	30-39	Bachelor's Degree	Medical Assistant	96	120	120

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6	Female	50-59	Master's Degree	Administrator	324	324	120
7	Female	30-39	Some college credit, no degree	Medical Assistant	96	180	72
8	Female	30-39	Some college credit, no degree	Office Manager - Ortho Clinic	120	18	18
9	Female	60-69	Bachelor's Degree	Administrator	492	300	72
10	Female	50-59	Some college credit, no degree	Compliance, Contracts & Systems Manager	360	360	60
11	Female	50-59	Some college credit, no degree	Clinical Manager	396	396	32
12	Female	40-49	Associate degree	Medical Billing Spec	120	30	60
13	Female	40-49	Bachelor's Degree	Administrator	312	240	9
14	Male	30-39	Bachelor's Degree	Clinical IT Manager	84	360	84
15	Female	60-69	Bachelor's Degree	Medical Bookkeeping	96	420	12
16	Female	50-59	High school graduate, diploma or the equivalent (for example: GED)	Practice Manager	348	300	48
18	Male	30-39	Bachelor's Degree	Medical Revenue Control	96	84	240
19	Female	40-49	Master's Degree	Practice Manager	240	240	96
20	Female	40-49	High school graduate, diploma or the equivalent (for example: GED)	Practice Manager	300	300	12
21	Male	40-49	Associate degree	Clinical IT Manager	360	360	60
22	Male	60-69	Doctorate degree (e.g., MD, DNP, DMD, PhD)	Doctor	408	360	84

Description of the user tasks that were tested:

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Having been trained, participants were simply given the below list and asked to complete the contained tasks. See APPENDIX A for the verbatim tasks as given to the participants. Due to the fact that participants were trained, no other instructions were given beyond the content and instructions contained in APPENDIX A.

- (a.1) CPOE –Meds
 - Record medication via CPOE
 - Change medication via CPOE
 - Display changed CPOE medication order
- (a.2) CPOE – Labs
 - Record Lab order via CPOE
 - Change Lab order via CPOE
 - Display changed CPOE Lab order
- (a.3) CPOE – Diagnostic Imaging
 - Record Imaging order via CPOE
 - Change Imaging order via CPOE
 - Display changed CPOE Imaging order
- (a.4) Drug-drug, drug-allergy interaction checks for CPOE
 - Using CPOE, trigger a drug-drug interaction by entering a new medication order
 - Using CPOE, trigger a drug-allergy interaction by entering a new medication order
 - Adjust drug to drug interaction severity level
- (a.5) Demographics
 - Record a patient’s preferred language, date of birth, birth sex, race, ethnicity
 - Change the patient’s preferred language, date of birth, birth sex, race, ethnicity
 - Display the patient’s changed preferred language, date of birth, birth sex, race, ethnicity
- (a.6) Problem List
 - Record a problem to the problem list
 - Change a problem on the problem list
 - Display the active problem list
 - Display the historical problem list
- (a.7) Medication list
 - Record a medication to the medication list
 - Change a medication on the medication list
 - Display the active medication list
 - Display the historical medication list
- (a.8) Medication allergy list
 - Record a medication allergy
 - Change a medication allergy
 - Display the active medication allergy list
 - Display the historical medication allergy list
- (a.9) Clinical Decision support
 - Trigger Problem List Interventions/View Resources
 - Medication List Interventions/View Resources

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- Trigger Medication Allergy List Interventions
- Trigger Demographics Interventions/View Resources
- Trigger Lab Tests and Results Interventions
- Trigger Vital Signs Interventions
- Access the following attributes for one of the triggered CDS interventions/resources: bibliographic citation, developer, funding source, release/revision date
- (a.14) Implantable Device List
 - Record UDI
 - Change UDI Status
 - Access UDI, device description, identifiers, and attributes
- (b.2) Clinical Information Reconciliation and Incorporation
 - Incorporate a CCDA and conduct reconciliation of the medications, medication allergies, and problems in the CCDA with the information currently in the patient's record
 - Generate a new CCDA with reconciled data
- (b.3) e-Prescribing
 - Create new prescription
 - Change prescription
 - Cancel prescription
 - Refill prescription
 - Check fill status
 - Request and retrieve drug history

Metrics Captured:

Participants were asked to rate the following 3 metrics:

Effectiveness: Any time a task was unable to be completed or had to be attempted more than once, the participant was asked to mark down an error.

Efficiency: Participants were asked to time each action and count the number of "clicks" needed to complete it.

Satisfaction: They were asked to rate the ease of use of each task on a scale of 1-10 with one being extremely difficult and 10 being extremely easy.

Data scoring:

Measures	Rationale and Scoring
Effectiveness (Success)	A task was counted as a "Success" if the participant was able to achieve the correct outcome, without assistance, within

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	the time allotted on a per task basis.
Effectiveness (Failure)	If the participant abandoned the task, did not reach the correct answer or performed it incorrectly, had to attempt it multiple times or reached the end of the allotted time before successful completion, the task was counted as an "Error." For data scoring "Error" equates to "Failure"
Efficiency (Task Time)	Each task was timed by the participant and reported on the test sheet. Average time per task was calculated for each task.
Efficiency (Number of clicks)	Each participant counted the number of clicks it took to complete the task. The average number of clicks was calculated for each task.
Satisfaction (Task Rating)	Participant's subjective impression of the ease of use of the application was measured by a subjective scale. After each task, the participant was asked to rate "Overall, this task was:" on a scale of 1 (Very Difficult) to 10 (Very Easy). These data are averaged across participants. An error on a task automatically results in a satisfaction of 1.

Results of the test and data analysis:

The results of the usability test were calculated according to the methods specified in the Usability Metrics section above. Participants who failed to follow session and task instructions had their data excluded from the analyses.

The usability testing results for the EHRUT are detailed below (see Table). The results should be seen in light of the objectives and goals desired by Phoenix Ortho LLC. The data should yield actionable results that, if corrected, yield material, positive impact on user performance.

Each task was tested by exactly 10 participants.

Task	Task Success Mean (SD)	Errors Mean (SD)	Task Time Mean (SD)	Time Deviations (Observed / Optimal)	Task Path (Observed / Optimal)	Task Ratings (Satis.) 10 = Easy Mean (SD)
Record Medication Order	90 (32)	1 (32)	75	75 / 7	6 / 4	9.5 (.53)
Change Medication Order	100 (0)		43	43 / 10	5 / 2	9.5 (.53)

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Display Medication Order	100 (0)		22	22 / 7	3 / 1	9.5 (.53)
Record Laboratory Order	100 (0)		46 (44)	46 / 9	12 / 4	9.5 (.53)
Change Laboratory Order	100 (0)		35 (16)	35 / 10	8 / 2	9.5 (.53)
Display Laboratory Order	100 (0)		18 (13)	18 / 4	5 / 2	9.5 (.53)
Record Radiology/imaging Order	100 (0)		32 (20)	31 / 10	9 / 3	9.1 (.99)
Change Radiology/imaging Order	100 (0)		64 (135)	64 / 10	10 / 2	9.1 (.99)
Display Radiology/imaging Order	100 (0)		17 (12)	17 / 4	7 / 1	9.1 (.99)
Using CPOE, trigger a drug-drug interaction by entering a new medication order	100 (0)		59 (28)	59 / 20	8 / 5	9.1 (.99)
Using CPOE, trigger a drug-allergy interaction by entering a new medication order	100 (0)		55 (27)	55 / 20	9 / 3	9.1 (.99)
Adjust drug-to-drug interaction severity	100 (0)		37 (18)	37 / 10	6 / 4	10 (0)
Record a patient's preferred language...	100 (0)		35 (33)	35 / 5	5 / 1	9.5 (1.58)
Change the patient's preferred language...	100 (0)		40 (32)	40 / 5	5 / 3	9.5 (1.58)
Display the patient's changed preferred language...	100 (0)		18 (17)	18 / 5	3 / 1	9.5 (1.58)
Record a problem to the problem list	100 (0)		23 (26)	23 / 10	6 / 2	9.5 (.53)
Change a problem on the problem list	100 (0)		14 (8)	14 / 8	4 / 2	9.5 (.53)

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Display the active problem list	100 (0)		10 (4)	10 / 5	4 / 1	9.5 (.53)
Display the historical problem list	100 (0)		12 (8)	12 / 1	3 / 1	9.5 (.53)
Record a medication to the medication list	100 (0)		43 (27)	43 / 10	8 / 2	9.5 (.53)
Change a medication on the medication list	100 (0)		18 (11)	18 / 5	8 / 3	9.5 (.53)
Display Active Medication List	100 (0)		10 (5)	10 / 1	5 / 1	9.5 (.53)
Display Historical Medication List	100 (0)		13 (8)	13 / 5	2 / 1	9.5 (.53)
Record Medication Allergy List	100 (0)		53 (52)	53 / 20	5 / 2	9.5 (.53)
Change Medication Allergy List	100 (0)		37 (31)	37 / 19	6 / 2	9.5 (.53)
Display the active Medication Allergy list	100 (0)		20 (10)	20 / 5	4 / 1	9.5 (.53)
Display the historical Medication Allergy list	100 (0)		17 (16)	17 / 1	4 / 1	9.5 (.53)
Problem List Interv./Resources	90 (32)	1 (32)	12 (7)	12 / 3	3 / 1	9.5 (.53)
Medication List Interv./Resources	90 (32)	1 (32)	7 (4)	7 / 3	2 / 1	9.5 (.53)
Medication Allergy List Interventions	90 (32)	1 (32)	7 (4)	7 / 3	2 / 1	9.5 (.53)
Demographics Interv./Resources	90 (32)	1 (32)	8 (9)	8 / 3	2 / 1	9.5 (.53)
Lab Tests and Results Interventions	90 (32)	1 (32)	8 (6)	8 / 3	2 / 1	9.5 (.53)
Vital Signs Interventions	90 (32)	1 (32)	6 (4)	6 / 3	2 / 1	9.5 (.53)
Access the following attributes: bibliographic...	90 (32)	1 (32)	8 (8)	8 / 3	2 / 1	9.5 (.53)
Create eRx prescription	90 (32)	1 (32)	126	126 / 45	11 / 3	9.5 (.53)

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			(93)			
Change eRx prescription	100 (0)		56 (33)	56 / 20	8 / 2	9.5 (.53)
Cancel eRx prescription	100 (0)		26 (34)	26 / 1	3 / 1	9.5 (.53)
Refill eRx prescription	100 (0)		26 (34)	26 / 3	4 / 2	9.5 (.53)
eRx Fill Status	100 (0)		25 (18)	25 / 2	5 / 2	10 (0)
eRx Drug History	100 (0)		11 (8)	11 / 3	2 / 1	10 (0)
Record UDI	100 (0)		46 (20)	46 / 7	7 / 4	9.3 (.71)
Change UDI Status	100 (0)		15 (27)	15 / 2	3 / 1	9.3 (.71)
Access UDI, device description, identifiers, and attributes	100 (0)		17 (27)	17 / 2	3 / 1	9.3 (.71)
Incorporate and reconcile a CCDA	100 (0)		49 (21)	49 / 20	8 / 6	8.8 (1.58)
Generate a new CCDA	100 (0)		19 (12)	19 / 9	5 / 1	8.1 (2.30)

Analyses of the results show that tasks take an average of 30 seconds with an average of 5 clicks per task. Satisfaction is rated as a 9.4 overall. (The overall rating is an average of the satisfaction ratings.)

Effectiveness:

Based on the success and failure data the EHRUT is very effective with only minor numbers or errors in a minority of tasks.

Efficiency:

Based on the task time and number of clicks, recorded by the participants, most of the tested tasks in the EHRUT can be performed quickly. Tasks take an average of 30 seconds with an average of 5 clicks per task.

Satisfaction:

Based on the task ratings the EHRUT the overall satisfaction rating is 9.4 on a scale of 1 to 10 with 10 being defined as very easy.

Major test findings:

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Overall, the EHRUT scores as “very easy” (9.4) to use with the vast majority of tasks and areas scoring “very easy” (10). Most tasks are accomplished in around 30 seconds with about 5 clicks. The three areas most prone to errors and therefore at highest risk are CDS, record a medication and create an eRx prescription. The Clinical Information Reconciliation task scored below average for the EHRUT in satisfaction, as did CDS.

Identified area(s) of improvement(s):

The most attention needs to be paid to Clinical Information Reconciliation and improving its ease of use. Users currently find it a little more difficult to use than the rest of the EHRUT. Additionally, the number of clicks and length of time needed to complete an eRx task is above the average when compared to the other tasks tested within the EHRUT.

Clinical Decision Support also needs some refinement as it produced a high number of errors. This could be alleviated through more in-depth user training.

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APPENDIX A

Participant Information:

Clinical Role:

Professional Experience (years):

Computer Experience (years):

For each task below, please rate the following 3 metrics:

Effectiveness: Any time a task is unable to be completed or has to be attempted more than once, mark down an error. (Do not spend more than 5 minutes on a task. If a task reaches the 5 minute mark count it as a failure.)

Efficiency: Time each action and count the number of "clicks" needed to complete it.

Satisfaction: Rate the ease of use of each task on a scale of 1-10 with one being extremely difficult and 10 being extremely easy.

For all tasks, use the sample patients that were used during training.

CPOE

- Record Medication Order

Effectiveness	Efficiency (time)	Efficiency (clicks)	Satisfaction

- Change Medication Order

Effectiveness	Efficiency (time)	Efficiency (clicks)	Satisfaction

- Display Medication Order

Effectiveness	Efficiency (time)	Efficiency (clicks)	Satisfaction

- Record Laboratory Order

Effectiveness	Efficiency (time)	Efficiency (clicks)	Satisfaction

- Change Laboratory Order

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Effectiveness	Efficiency (time)	Efficiency (clicks)	Satisfaction

- Display Laboratory Order

Effectiveness	Efficiency (time)	Efficiency (clicks)	Satisfaction

- Record Radiology/imaging Order

Effectiveness	Efficiency (time)	Efficiency (clicks)	Satisfaction

- Change Radiology/imaging Order

Effectiveness	Efficiency (time)	Efficiency (clicks)	Satisfaction

- Display Radiology/imaging Order

Effectiveness	Efficiency (time)	Efficiency (clicks)	Satisfaction

Drug-drug, drug-allergy interactions checks

- Using CPOE, trigger a drug-drug interaction by entering a new medication order

Effectiveness	Efficiency (time)	Efficiency (clicks)	Satisfaction

- Using CPOE, trigger a drug-allergy interaction by entering a new medication order

Effectiveness	Efficiency (time)	Efficiency (clicks)	Satisfaction

- Display Radiology/imaging Order

Effectiveness	Efficiency (time)	Efficiency (clicks)	Satisfaction

Medication list

- Record a medication to the Medication List

Effectiveness	Efficiency (time)	Efficiency (clicks)	Satisfaction

- Change a Medication on the medication List

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Effectiveness	Efficiency (time)	Efficiency (clicks)	Satisfaction

- Display the Active Medication List

Effectiveness	Efficiency (time)	Efficiency (clicks)	Satisfaction

- Display the historical Medication List

Effectiveness	Efficiency (time)	Efficiency (clicks)	Satisfaction

Medication allergy list

- Record a Medication allergy

Effectiveness	Efficiency (time)	Efficiency (clicks)	Satisfaction

- Change a Medication allergy

Effectiveness	Efficiency (time)	Efficiency (clicks)	Satisfaction

- Display the active Medication Allergy list

Effectiveness	Efficiency (time)	Efficiency (clicks)	Satisfaction

- Display the historical Medication Allergy list

Effectiveness	Efficiency (time)	Efficiency (clicks)	Satisfaction

Problem (Diagnosis) list

- Record a problem to the problem list

Effectiveness	Efficiency (time)	Efficiency (clicks)	Satisfaction

- Change a problem on the problem list

Effectiveness	Efficiency (time)	Efficiency (clicks)	Satisfaction

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- Display the active problem list

Effectiveness	Efficiency (time)	Efficiency (clicks)	Satisfaction

- Display the historical problem list

Effectiveness	Efficiency (time)	Efficiency (clicks)	Satisfaction

Clinical decision support – This is alerts – like pregnancy or BMI

- Problem List Interventions

Effectiveness	Efficiency (time)	Efficiency (clicks)	Satisfaction

- Medication List Interventions

Effectiveness	Efficiency (time)	Efficiency (clicks)	Satisfaction

- Medication Allergy List Interventions

Effectiveness	Efficiency (time)	Efficiency (clicks)	Satisfaction

- Demographics Interventions

Effectiveness	Efficiency (time)	Efficiency (clicks)	Satisfaction

- Lab Tests and Results Interventions

Effectiveness	Efficiency (time)	Efficiency (clicks)	Satisfaction

- Vital Signs Interventions

Effectiveness	Efficiency (time)	Efficiency (clicks)	Satisfaction

- Identify User Diagnostic and Therapeutic Reference Information (Access the following attributes for one of the triggered CDS interventions/resources: bibliographic citation, developer, funding source, release/revision date)

Effectiveness	Efficiency (time)	Efficiency (clicks)	Satisfaction

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Electronic prescribing

- Create prescription

Effectiveness	Efficiency (time)	Efficiency (clicks)	Satisfaction

- Change prescription

Effectiveness	Efficiency (time)	Efficiency (clicks)	Satisfaction

- Cancel prescription

Effectiveness	Efficiency (time)	Efficiency (clicks)	Satisfaction

- Refill prescription

Effectiveness	Efficiency (time)	Efficiency (clicks)	Satisfaction

- Receive Fill Status Notification

Effectiveness	Efficiency (time)	Efficiency (clicks)	Satisfaction

- Request and Receive Medication history information

Effectiveness	Efficiency (time)	Efficiency (clicks)	Satisfaction

Clinical information reconciliation

- Incorporate a CCDA and conduct reconciliation of the medications, medication allergies, and problems in the CCDA with the information currently in the patient's record

Effectiveness	Efficiency (time)	Efficiency (clicks)	Satisfaction

- Generate a new CCDA with reconciled data

Effectiveness	Efficiency (time)	Efficiency (clicks)	Satisfaction

Implantable Device list

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- Record UDI

Effectiveness	Efficiency (time)	Efficiency (clicks)	Satisfaction

- Change UDI Status

Effectiveness	Efficiency (time)	Efficiency (clicks)	Satisfaction

- Access UDI, device description, identifiers, and attributes

Effectiveness	Efficiency (time)	Efficiency (clicks)	Satisfaction

Demographics

- Record a patient's preferred language, date of birth, birth sex, race, or ethnicity

Effectiveness	Efficiency (time)	Efficiency (clicks)	Satisfaction

- Change a patient's preferred language, date of birth, birth sex, race, or ethnicity

Effectiveness	Efficiency (time)	Efficiency (clicks)	Satisfaction

- Display a patient's preferred language, date of birth, birth sex, race, or ethnicity

Effectiveness	Efficiency (time)	Efficiency (clicks)	Satisfaction