EHR Usability Test Report of the Physicians' Assistance System (PAS) Version 2018

Report based on ISO/IEC 25062:2006 Common Industry Format for Usability Test Reports

PAS Version 2018

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EXECUTIVE SUMMARY

A usability test of the 2018 Version of the Patient First Corporation electronic medical record, referred to as the Physicians' Assistance System or "PAS," was conducted on November 6, 2018, in Richmond, Virginia, by the Patient First Training Department. 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, ten health care clinical and non-clinical staff matching the target demographic criteria served as participants and used the EHRUT in simulated, but representative tasks.

This study collected performance data on the following tasks typically conducted on an EHR:

- (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 the severity level of a displayed drug-drug interaction
- (a.5) Demographics
  - Record a patient's preferred language, date of birth, birth sex, race, ethnicity, sexual orientation, gender identity, preliminary cause of death (inpatient only), and preliminary date of death (inpatient only)
  - Change the patient's preferred language, date of birth, birth sex, race, ethnicity, sexual orientation, gender identity, preliminary cause of death (inpatient only), and preliminary date of death (inpatient only)
  - Display the patient's changed preferred language, date of birth, birth sex, race, ethnicity, sexual orientation, gender identity, preliminary cause of death (inpatient only), and preliminary date of death (inpatient only)
- (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

- o Record a medication to the medication list
- o Change a medication on the medication list
- o Display the active medication list
- o Display the historical medication list
- (a.8) Medication allergy list
  - o Record a medication allergy
  - o Change a medication allergy
  - o Display the active medication allergy list
  - o Display the historical medication allergy list
- (a.9) Clinical Decision support
  - o Configure a CDS intervention and/or reference resource for each of the required elements
    - ▪ Problem list
    - ▪ Medication list
    - ▪ Medication Allergy List
    - ▪ At least one Demographic
    - ▪ Laboratory Test
    - ▪ Vital Signs
    - ▪ And a combination of at least 2 of the elements listed above
  - o Trigger the CDS interventions/resources added using the applicable data elements from each of the required elements
  - o View the intervention/resource information using the Info button standard for data elements in the problem list, medication list, and demographics
  - o Trigger the CDS interventions/resources 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
  - o 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
  - o Record UDI
  - o Change UDI Status
  - o Access UDI, device description, identifiers, and attributes
- (b.2) Clinical Information Reconciliation and Incorporation
  - o 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
  - o Generate a new CCDA with reconciled data
- (b.3) e-Prescribing
  - o Create new prescription
  - o Change prescription (dosage or duration)
  - o Cancel prescription
  - o Refill prescription
  - o Receive fill status notification
  - o Request and receive medication history information

During the 60-minute one-on-one usability test, each participant was greeted by the administrator and asked to review and sign an informed consent/release form (included in Appendix 2); they were instructed that they could withdraw at any time. Participants had prior experience with the EHR. The administrator introduced the test, and instructed participants to complete a series of tasks (given one at a time) using the EHRUT. During the testing, the administrator timed the test and, along with the data logger(s), recorded user performance data. The administrator did not give the participants assistance on how to complete the task.

The following types of data were collected for each participant:

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

All participant data was de-identified – no correspondence could be made from the identity of the participant to the data collected. Following the conclusion of the testing, participants were asked to complete a post-test questionnaire and were compensated at their usual hourly rate for their time. Various recommended metrics, in accordance with the examples set forth in the *NIST Guide to the Processes Approach for Improving the Usability of Electronic Health Records*, were used to evaluate the usability of the EHRUT. A summary of the performance and rating data collected on the EHRUT is included in Appendix 6: Performance Data.

The results from the System Usability Scale scored the subjective satisfaction with the system based on performance with these tasks to be 96.5.

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

- o Major Findings
    - o Users described the system as follows:
        - ▪ User-friendly
        - ▪ Concise
        - ▪ Efficient
        - ▪ Accurate
        - ▪ Predictable
        - ▪ Intuitive
        - ▪ Systematic
        - ▪ Simple
        - ▪ Easy to use
    - o Users commented all needed options were available.

- o Users commented that the prompts were helpful.
  - o Areas for Improvement
    - o Users commented the user interface of the PAS does not appear modern.
    - o Users commented that the numbers at the bottom are variable.
    - o Users indicated the most difficult tasks was navigating the Problem List, as this list is normally accessed by trained providers.

INTRODUCTION

The EHRUT tested for this study was the 2018 Version of the Patient First Corporation electronic medical record, referred to as the Physicians' Assistance System or "PAS." Designed to present medical information to health care providers in the urgent and primary care clinic setting, the EHRUT consists of a proprietary software that is used by clinical and non-clinical personnel and has been under development and continuous user-focused refinement since 1981. The usability testing attempted to represent realistic exercises and conditions.

The purpose of this study was to test and validate the usability of the current user interface and provide evidence of usability in the EHR Under Test (EHRUT). To this end, measures of effectiveness, efficiency, and user satisfaction, such as time spent on task, deviations from the optimal navigation path, and user ratings, were captured during the usability testing method.

METHOD

3.1 Participants

A total of 10 participants were tested on the EHRUT. Participants in the test were administrative personnel, nurses, radiologic technologists, medical assistants, laboratory technologists, and patient service representatives. Participants were recruited by Lisa Baldwin and were compensated at their usual hourly rate for their time. In addition, participants had no direct connection to the development of or organization producing the EHRUT. Participants were not from the testing or supplier organization. Participants were given the opportunity to have the same orientation and level of training as the actual end users would have received.

Recruited participants had a mix of backgrounds and demographic characteristics. The following is a table of participants by characteristics, including demographics, professional experience, computing experience, and user needs for assistive technology. Participant names were replaced with Participant IDs so that an individual's data cannot be tied back to individual identities.

Participant Summary								
Participant Identifier	Participant Gender	Participant Age	Participant Education	Participant Occupation/Role	Participant Professional Experience (months)	Participant Computer Experience (months)	Participant Product Experience (months)	Participant Assistive Technology Needs (months)
PF001	Female	40-49	Associate degree	Front Office	216	276	216	No
PF002	Female	20-29	Bachelor's Degree	Administration	24	228	12	No
PF003	Male	50-59	High school graduate, diploma or the equivalent (for example: GED)	Medical Assisting	96	240	96	No
PF004	Male	40-49	Some college credit, no degree	Lab	276	300	138	No
PF005	Male	40-49	Bachelor's Degree	X-ray	180	312	156	No
PF006	Female	30-39	Master's Degree	Administration	30	384	30	No
PF007	Female	40-49	Bachelor's Degree	Nursing	240	300	24	No
PF008	Female	30-39	Bachelor's Degree	Nursing	156	252	72	No
PF009	Female	50-59	Master's Degree	Nursing	408	336	132	No
PF010	Female	20-29	High school graduate, diploma or the equivalent (for example: GED)	Front Office	36	96	36	No

10 participants were recruited and 10 participated in the usability test. 0 participants failed to show for the study.

Participants were scheduled for one 60-minute session including 10 minutes for debrief by the administrator and data logger.

3.2 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 end users. To do so, participants were tested individually using familiar technology in a familiar environment. Participants were evaluated separately to preserve the integrity of each participant's opinion.

3.3 Tasks
Tasks were selected based on their frequency of use, criticality of function, and difficulty for users. Tasks associated with registering and treating patients were structured so that the sub-tasks would review each required item, including demographics, medications, drug-drug and drug-allergy interactions, lab orders, x-ray orders, the Problem List, implantable devices, and ePrescribing.

3.4 Procedure

Upon arrival, participants were greeted; their identity was verified and matched with a name on the participant schedule. Participants were then assigned a participant ID. Each participant reviewed and signed an informed consent and release form (see Appendix 2). A representative from the test team witnessed the participant's signature.

To ensure that the test ran smoothly, two staff members participated in this test, the usability administrator and the data logger.

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

Participants were instructed to perform the tasks:

- o   As quickly as possible making as few errors and deviations as possible.
- o   Without assistance; administrators were allowed to give immaterial guidance and clarification on tasks, but not instructions on use.
- o   Without using a think-aloud technique.

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 stopped once the participant indicated they had successfully completed the task. Scoring is discussed below in Section 3.9.

Following the session, the administrator gave the participants the post-test questionnaire (e.g., the System Usability Scale, see Appendix 4), compensated them for their time, and thanked each individual for their participation. Participants signed a receipt and acknowledgement form (See Appendix 5) indicating that they had received the compensation.

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

3.5 Test Location

The test facility included a waiting area and a quiet testing room with a table and computer for the participant. To ensure that the environment was comfortable for users, noise levels were kept to a minimum with the ambient temperature within a normal range. All of the safety instruction and evacuation procedures were valid, in place, and visible to the participants.

3.6 Test Environment

The EHRUT would typically be used in the primary and urgent care medical center. In this instance, the testing was conducted in a typical training room for clinical and non-clinical

employees. For testing, the computer used was a desktop running Windows 7. The participants used a mouse and keyboard when interacting with the EHRUT.

The PAS used the same computer settings that are used in the medical centers. The application was set up by the Managed Information Systems (MIS) Department according to the vendor's documentation describing the system set-up and preparation. Technically, the system performance (i.e., response time) was representative to what actual users would experience in a 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 and instruments were used, including:

1. Informed Consent
2. Moderator's Guide
3. Post-Test Questionnaire
4. Incentive Receipt and Acknowledgment Form

Examples of these documents can be found in Appendices 2-5 respectively. The Moderator's Guide was devised so as to be able to capture required data.

3.8 Participant Instructions
The administrator read the following instructions aloud to each participant (also see the full moderator's guide in Appendix 3).

Thank you for participating in this study. Your input is very important. Our session today will last about 60 minutes. During that time, you will use an instance of an electronic health record. I will ask you to complete a few tasks using this system and answer some questions. You should complete the tasks as quickly as possible, making as few errors as possible. Please try to complete the tasks on your own, following the instructions very closely. Please note that we are not testing you; we are testing the system. Therefore, if you have difficulty, all this means is that something needs to be improved in the system. I will be here in case you need specific help, but I am not able to instruct you or provide help in how to use the application.

Overall, we are interested in how easy (or how difficult) this system is to use, what in it would be useful to you, and how we could improve it. I did not have any involvement in its creation, so please be honest with your opinions. All of the information that you provide will be kept confidential and your name will not be associated with your comments at any time. Should you feel it necessary, you are able to withdraw at any time during the testing.

Following the procedural instructions, participants were shown the EHR and as their first task, were given time (5 minutes) to explore the system and make comments. Once this task was complete, the administrator 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.*

Participants were then given tasks to complete. Tasks are listed in the moderator's guide in Appendix 3.

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 this test were to assess:

1. Effectiveness of the PAS by measuring participant success rates and errors
2. Efficiency of the PAS by measuring the average task time
3. Satisfaction with the PAS by measuring ease of use ratings

DATA SCORING

The following table (Table 1) details how tasks were scored, errors evaluated, and the time data analyzed.

Measures	Rationale and Scoring
Effectiveness: Task Success	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. Task times were recorded for successes.
Effectiveness: Task Failures	If the participant abandoned the task, did not reach the correct answer, performed the task incorrectly, or reached the end of the allotted time before successful completion, the task was counted as a "Failure." No task times were taken for errors.
Efficiency: Task Deviations	The participant's path (i.e., steps) through the application was recorded. Deviations occur if the participant, for example, went to a wrong screen, slicked 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.
Efficiency: Task Time	Each task was timed from when the administrator said, "Begin" until the participant said, "Done." If he or she failed to say, "Done," the time was stopped when the participant stopped performing the task. Only task times for tasks that were successfully completed were included in the average task time analysis. Average time per task was calculated for each task.
Satisfaction: Task 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 to rate "Overall, this task was:" on a scale of 1 (Very Difficult) to 5 (Very Easy). These data were averaged across participants. To measure participants' confidence in and likeability of the PAS overall, the testing team administered the System Usability Scale (SUS) post-test questionnaire. Questions included, "I think I would like to use this system frequently," "I thought the system was easy to use," and "I would imagine that most people would learn to use this system very quickly." See full System Usability Score questionnaire in Appendix 4.

Table 1. Details of how observed data were scored.

RESULTS

4.1 Data Analysis and Reporting

The results of the usability test were calculated according to the methods specified in the Usability Metrics section above. There were no participants who failed to follow session and task instructions and there were no testing irregularities or issues that affected data collection or interpretation of the results.

The usability testing results for the EHRUT are detailed in Appendix 6: Performance Data. The results should be seen in light of the objectives and goals outlined in Section 3.2 Study Design.

The results from the SUS (System Usability Scale) scored the subjective satisfaction with the system based on performance with these tasks to be 96.5, which is above average.

4.2 Discussion of the Findings

A discussion of the findings follows.

EFFECTIVENESS

Based on the success and failure data, the PAS is effective. Users are able to use navigation prompts and menus to quickly and easily follow the correct path to successfully complete tasks.

EFFICIENCY

Based on the observations of the task time data and the task deviations data, the PAS is efficient. Users are able to quickly and accurately locate the appropriate information. Task completion times are similar to times expected in the medical center environment.

SATISFACTION

Based on the task ratings and SUS results data, the PAS is a satisfactory system. Users indicated high ratings for ease of use and navigation.

MAJOR FINDINGS

The quantitative findings reflect a high level of success and satisfaction in using the PAS to complete the representative tasks. Users demonstrated no errors or path deviations.

Users described the system as easy to use, concise, efficient, accurate, intuitive, systematic, and predictable. Users expressed positive sentiment for the assistive prompts to navigate through the system and commented that all expected options and features needed to complete the tasks were present. All indicated they would recommend the system to a colleague.

The administrator and data logger observed that users did not appear to hesitate in navigating tasks.

The high rate of user successes, appropriate task completion times, and high satisfaction scores support the SUS result of 96.5 and indicate that the following tested measures are effective, efficient, and satisfactory for users:

- (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 the severity level of a displayed drug-drug interaction
- (a.5) Demographics
  - Record a patient's preferred language, date of birth, birth sex, race, ethnicity, sexual orientation, gender identity, preliminary cause of death (inpatient only), and preliminary date of death (inpatient only)
  - Change the patient's preferred language, date of birth, birth sex, race, ethnicity, sexual orientation, gender identity, preliminary cause of death (inpatient only), and preliminary date of death (inpatient only)
  - Display the patient's changed preferred language, date of birth, birth sex, race, ethnicity, sexual orientation, gender identity, preliminary cause of death (inpatient only), and preliminary date of death (inpatient only)
- (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
  - Configure a CDS intervention and/or reference resource for each of the required elements
    - Problem list
    - Medication list
    - Medication Allergy List
    - At least one Demographic
    - Laboratory Test
    - Vital Signs
    - And a combination of at least 2 of the elements listed above
  - Trigger the CDS interventions/resources added using the applicable data elements from each of the required elements

- View the intervention/resource information using the Info button standard for data elements in the problem list, medication list, and demographics
- Trigger the CDS interventions/resources 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/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 (dosage or duration)
  - Cancel prescription
  - Refill prescription
  - Receive fill status notification
  - Request and receive medication history information

AREAS FOR IMPROVEMENT

Users identified the following aspects of the system as those they liked the least:

- Users commented the user interface of the PAS does not appear modern.
- Users commented that the numbers at the bottom are variable.
- Users whose job roles less frequently access treatment information voiced more difficulty navigating treatment area tasks including the Problem List.

APPENDICES

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

1. Participant Demographics
2. Non-Disclosure Agreement (NDA) and Informed Consent Form
3. Example Moderator's Guide
4. System Usability Scale Questionnaire
5. Incentive Receipt and Acknowledgement Form
6. Performance Data

5.1 Appendix 1: Participant Demographics

Following is a high-level overview of the participants in this study.

Gender

Three participants were male. Seven participants were female.

Age

The average age of all participants was 39.4. The median age of all participants was 41.5. The age range of all participants was 23 to 54.

Education

The average education level of all participants was an associate degree. Two participants had master's degrees and two participants had a high school diploma. Most participants had an associate or bachelor's degree. Participants had between a high school diploma and a master's degree level of education.

Occupations/Role

Participants' roles were as follows:

Administration	2
Front Office	2
Medical Assisting	1
Laboratory	1
Radiology	1
Nursing	3

Professional Experience

The average years of professional experience for all participants was 13.85. The median years of professional experience for all participants was 14. The years of professional experience range for all participants was 2 to 34.

Computer Experience

The average years of computer experience for all participants was 22.7. The median years of computer experience for all participants was 24. The years of computer experience range for all participants was 8 to 32.

Product Experience

The average years of product experience for all participants was 7.6. The median years of product experience was for all participants was 7. The years of product experience range for all participants was 1 to 18.

Assistive Technology Needs

No participants needed assistive technology.

Participant Summary								
Participant Identifier	Participant Gender	Participant Age	Participant Education	Participant Occupation/Role	Participant Professional Experience (months)	Participant Computer Experience (months)	Participant Product Experience (months)	Participant Assistive Technology Needs (months)
PF001	Female	40-49	Associate degree	Front Office	216	276	216	No
PF002	Female	20-29	Bachelor's Degree	Administration	24	228	12	No
PF003	Male	50-59	High school graduate, diploma or the equivalent (for example: GED)	Medical Assisting	96	240	96	No
PF004	Male	40-49	Some college credit, no degree	Lab	276	300	138	No
PF005	Male	40-49	Bachelor's Degree	X-ray	180	312	156	No
PF006	Female	30-39	Master's Degree	Administration	30	384	30	No
PF007	Female	40-49	Bachelor's Degree	Nursing	240	300	24	No
PF008	Female	30-39	Bachelor's Degree	Nursing	156	252	72	No
PF009	Female	50-59	Master's Degree	Nursing	408	336	132	No
PF010	Female	20-29	High school graduate, diploma or the equivalent (for example: GED)	Front Office	36	96	36	No

5.2 Appendix 2: Non-Disclosure Agreement and Informed Consent Form

Non-Disclosure Agreement

THIS AGREEMENT is entered into as of _____ 2018, between _____ (the Participant) and the testing organization Patient First located at 5000 Cox Road, Glen Allen, VA 23060.

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 Patient First, 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 Patient First 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's printed name:

_____

Signature: _____   Date: _____

Informed Consent

Patient First would like to thank you for participating in this study. The purpose of this study is to evaluate an electronic health records system. If you decide to participate, you will be asked to perform several tasks using the prototype and give your feedback. The study will last about 60 minutes. 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 Patient First I am free to withdraw consent or discontinue participation at any time. I understand and agree to participate in the study conducted and recorded by Patient First.

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 Patient First and with Patient First's client. 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: _____

5.3 Appendix 3: Example Moderator's Guide
EHRUT Usability Test

Moderator's Guide

Administrator:

Data Logger:

Date: **Time:**

Participant #:

Location:

<u>Prior to testing</u>

- Confirm schedule with participants
- Ensure EHRUT lab environment is running properly
- Ensure lab and data recording equipment is running properly

<u>Prior to each participant</u>

- Reset application

<u>Prior to each task</u>

- Reset application to starting point for next task

<u>After all testing</u>

- Back up all video and data files

Orientation (5 minutes)

Thank you for participating in this study. Our session today will last 60 minutes. During that time, you will take a look at an electronic health record system.

I will ask you to complete a few tasks using this system and answer some questions. We are interested in how easy (or how difficult) this system is to use, what in it would be useful to you, and how we could improve it. You will be asked to complete these tasks on your own, trying to do them as quickly as possible with the fewest possible errors or deviations. Do not do anything more than asked. If you get lost or have difficulty, I cannot help you with anything regarding the system itself. Please save your detailed comments until the end of a task or the end of the session as a whole when we can discuss freely.

I did not have any involvement in its creation, so please be honest with your opinions.

The product you will be using today is the 2018 test version of the PAS. The data will be placeholder data from the training database and not actual patient data.

We are recording the audio and screenshots of our session today. All of the information that you provide will be kept confidential and your name will not be associated with your comments at any time.

Do you have any questions or concerns?

Preliminary Questions (5 minutes)

What is your job title/appointment?

How long have you been working in this role?

What are some of your main responsibilities?

Tell me about your experience with electronic health records.

Task 1: First Impressions (5 minutes)

This is the application you will be working with. Have you heard of it? _____ Yes   _____ No

Show participant the EHRUT.

Please don't click on anything just yet. What do you notice? What are you able to do here? Please be specific.

Notes/Comments:

Task 2: Registration (10 minutes)

Take the participant to the starting point for the task. For each sub-task, record the success (easily completed, completed with difficulty or help, or not completed), record the task time, record observed errors and verbalizations, and record the participant's rating (Show participant written scale: "Very Difficult" (1) to "Very Easy" (5)).

Use the following chart to record the information for each task during the testing and then transfer the information to the testing spreadsheet.

Success	Task Time	Deviations	Errors	Verbalizations	Part. Rating
❑ Easily completed ❑ Completed with difficulty or help :: describe below ❑ Not completed	**_____ min**				❑ 1 ❑ 2 ❑ 3 ❑ 4 ❑ 5
Comments:					

1.1. Please register a new patient using the following demographic data. Assign the patient as the guarantor and create insurance information and a reason for visit.
- Name: Firstname Lastname# (*moderator assigns a number to enter on the spreadsheet*).
- DOB: 03.30.1977
- Birth Gender: Female

- Race: Pacific Islander, Samoan
- Ethnicity: Non-Hispanic or Latine
- Sexual Orientation: Homosexual
- Gender Identity: Female

1.2. Navigate to the status screen and place the patient into a room, then assign a provider.

1.3. Select "6 Lab Order" and order any lab. Go into the medical record and verify that the lab has been ordered on page two.

1.4. Select "8 Xray Order" and order any x-ray. Go into the medical record and verify that the x-ray has been ordered on page two.

1.5. Select "14 Prescriptions" and then do the following:
- Enter in the Meds taking now (.1=Patient states "None")
- Enter Allergies now
  - Enter Penicillin, hives, moderate to severe, 2008
  - Enter Ceftriaxone, difficulty breathing, moderate, 2012
- Order the following prescriptions:
  - Ceftriaxone, powder for solution 250mg, Take 1 tsp twice daily, quantity 100, days supply 10 days, acknowledge the interactions, then exit
  - Tylenol, Take 1 tablet prn pain, quantity 60, days supply 30, acknowledge no interactions, then exit

1.6. Select "14 Prescriptions" and then do the following:
- Order the following prescriptions:
  - Ceftriaxone, powder for solution 250mg, Take 1 tsp twice daily, quantity 100, days supply 10 days, acknowledge the interactions and continue with the rx (print)
  - Tylenol, Take 1 tablet prn pain, quantity 60, days supply 30, acknowledge no interactions and continue with the rx (print)

1.7. Select "14 Prescriptions" and then do the following:
- Order the following prescriptions and ePrescribe to the pharmacy "Mail Order Pharmacy 10.6MU NCOS in the state if IL"
  - Ceftriaxone, powder for solution 250mg, Take 1 tsp twice daily, quantity 100, days supply 10 days, acknowledge the interactions and continue with the rx
  - Tylenol, Take 1 tablet prn pain, quantity 60, days supply 30, acknowledge no interactions and continue with the rx

1.8. Select "4 Medical Record" and then do the following:
   a) Select ".0" for the patient summary
   b) Select "1 Problem List"
   c) Select "2 Add Med Dx"
   d) Select "X=Diagnosis Search"
   e) Select "2=Snomed CT code"

f) Enter "59621000" for essential hypertension

g) Select the ICD10 Code

h) Select "2=Add to Problem List only" as an ongoing problem

i) Repeat steps c through h for snomed code "44054006"

1.9. Select "4 Medical Record" and then do the following:

a) Select ".0" for the patient summary

b) Select "17 Implantable Devices"

c) Select "A=Add Implantable Device"

d) Enter the UDI (01)10884521062856(11)141231(17)150707(10)A213B1(21)1234

e) Return to menu and select "4 Medical Record"

f) Repeat steps e, a, and b until the device displays in the list

Task 3: Treatment (20 minutes)

Take the participant to the starting point for the task. Instruct the participant to select Test Patientone, Test Patienttwo, etc. For each sub-task, record the success (easily completed, completed with difficulty or help, or not completed), record the task time, record observed errors and verbalizations, and record the participant's rating (Show participant written scale: "Very Difficult" (1) to "Very Easy" (5)).

Use the following chart to record the information for each task during the testing and then transfer the information to the testing spreadsheet.

Success	Task Time	Deviations	Errors	Verbalizations	Part. Rating
❑ Easily completed ❑ Completed with difficulty or help :: describe below ❑ Not completed	**_____ min**				❑ 1 ❑ 2 ❑ 3 ❑ 4 ❑ 5
Comments:					

2.1 Select the appropriate test patient from the status screen and do the following:

- Select Medical Protocols. This screen will display no "Meds Taking" on chart.

- Enter "5 Enter Meds taking"

- Add prescriptions not listed under "Patient still taking these rx(s)" with "Outside Provider rx(s)"

- Add from the cross reference the following rxs:
  - o Daraprim
  - o Amoxicillin
  - o Lisinipril

- At the .5=File prompt, fill in the Dosage, Quantity, Frequency, and Route for each medication.

- Enter security code

2.2   Add allergies from "Outside Provider" and do the following:

- This screen will display next no "Allergies" on chart.
- Enter "5 Enter Allergies"
- Add Carbamazepine; Reaction skin rash

2.3   Problems will display from "Outside Provider" – follow the prompts to add one or two to the Patient First List. The Problem List will display. Enter "return" to continue.

2.4   Prompt for Clinical Decision Support by doing the following:

- Select "0 Systemic"
- Select #11 Diabetes Mellitus and enter "return" through the information screens
- A D V I S O R Y – Diabetes Diagnosis will display
- Select "7 Reference info" at the prompt
- View the URL and next screen with more information about Diabetes Mellitus

Task 4: Final Questions (10 minutes)

What was your overall impression of this system?

What aspects of this system did you like most?

What aspects of this system did you like least?

Were there any features 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?

Administer the SUS

5.4 Appendix 4: System Usability Scale Questionnaire

The following System Usability Scale Questionnaire is based on the usability scale published in 1996 by J. Brooke in *Usability Evaluation in Industry* and elaborated on by J. R. Lewis and J. Sauro in *Proceedings of the Human Computer Interaction International Conference.*

SYSTEM USABILITY SCALE QUESTIONNAIRE

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

5.5 Appendix 5: Incentive Receipt and Acknowledgement Form

Acknowledgement of Receipt

I hereby acknowledge my receipt of my usual hourly rate for 60 minutes of time for my participation in a research study run by *Patient First*.

Printed Name: _____

Address: _____

_____

Signature: _____ Date: _____

Usability Researcher: _____

Signature of Usability Researcher: _____

Date: _____

Witness: _____

Witness Signature: _____

Date: _____

5.6 Appendix 6: Performance Data

Please reference the enclosed Excel spreadsheet for detailed evaluation data.