EHR Safety Enhanced Design Summary Report

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

Date of Usability Test: 1 AUG 2019 – 1 SEP 2019
19 DEC 2019 – 23 DEC 2019

Date of Report: 23 DEC 2019
Report Version 2.3

SYSTEM: Enablemypractice Version: EHR5

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1   Executive Summary

A usability test of Enablemypractice version EHR5, an ambulatory EHR, was conducted between August 1, 2019 and September 1, 2019 and December 19th and 23rd in the Rochester MN. office of EnableDoc LLC, and each provider's offices. The purpose of this test was to test and validate the usability of the current user interface for Computerized Provider Order Entry, and provide evidence of usability in the EHR Under Test (EHRUT). During the usability test, ten (10) healthcare providers and clinical staff that meet the target demographic and professional profile serve as participants and used Enablemypractice EHR in simulated, but representative tasks. This study collected performance data on the following these four tasks typically conducted in an EHR:

1. Computerized Provider Order Entry (CPOE) – medications
2. CPOE – Laboratory Order
3. CPOE – Diagnostic Imaging
4. Drug-drug, Drug-allergy Interaction Check
5. Demographics
6. Problem List
7. Medication List
8. Medication Allergy List
9. Clinical Decision Support
10. Implantable Device List
11. Clinical Information Reconciliation and Incorporation
12. Electronic Prescribing

All test participants conducted the test sessions remotely via on-line conferencing software. During the 12 one-on-one usability test, each participant was greeted by the administrator and asked to review and verbally acknowledge an informed consent/release form (included in Appendix 3); they were instructed that they could withdraw at any time. Participants had prior experience with the EHR as they are current users/customers. No additional training materials were provided other than that usually given to customers. The administrator introduced the test and instructed participants to complete a series of tasks (given one at a time) using the EHRUT. During the testing, the administrator timed the test and, along with the data logger(s) recorded user performance data on paper and electronically. The administrator did not give the participant assistance in how to complete the task. Participant screens and audio were recorded for subsequent analysis.

The following types of data were collected for each participant:
1. Number of tasks successfully completed within the allotted time without assistance
2. Time to complete the tasks
3. Participant's subjective assessment of the ease of each task
4. Number and types of errors
5. Path deviations
6. Participant's verbalizations

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 SUS questionnaire.

Target Users

The EHRUT tested for this study was Enablemypractice EHR5 Release, an ambulatory EHR. Designed to present medical information to healthcare providers in primarily group practices with a focus on family practice, surgery, eye, and PT/OT/Chiropractic medicine.

The EHRUT is used predominantly by physicians and clinical staff such as MA's, RN's, LPN's, etc. 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 of the entry and modification of electronic prescriptions, laboratory orders, and imaging orders in the EHR Under Test (EHRUT).To this end, measures of effectiveness, efficiency and user satisfaction, such as successful task completion rate, time on task, number and types of errors, and participant satisfaction were captured during the usability testing.

RESULTS

Various recommended metrics, in accordance with the examples set forth in the NIST 25062:2006 Guide to the Processes Approach for Improving the Usability of Electronic Health Records, were used to evaluate the usability of the EHRUT.

Tasks	Task Success	Path Deviations Observed/ Optimal	Task Time Mean (SD)	Task Time Deviations Observed/ Optimal	Errors	Task Rating 1 = Easy 5 = Hard
Add 3 Rx Medication Order	100% SD: 0	31.9/30	96.9 (8.8)	117/90	1.9 (1.1)	3.7 (0.5)
Add 3 Lab Order	100% SD: 0	11.6/11	25.3 (11.6)	75.4/55	0.6 (0.7)	4.1 (0.6)
Add 2 Imaging Order	100% SD: 0	8.4/8	26.8 (5.1)	44/30	0.4 (0.7)	4.6 (0.5)
3 Drug-to-Drug Interactions	100% SD: 0	14.3/13	72.0 (3.6)			
Demographics	100% SD: 0	11.3/11	16.6 (1.7)	16.6/15	1.8 (0.5)	5.9 (0.8)
Add 3 Problems	100% SD: 0	11.4/11	21.4 (1.6)	21.4/18	1.3 (0.5)	4.1 (0.8)
Add 6 Medications	100% SD: 0	27.4/26	244.2 (81)	244.2/240	1.3 (0.5)	4.1 (1.6)
Add 3	100%	20.5/19	81.3 (1.7)	81.3/79	1.9 (1.2)	4.1 (0.5)

Medication Allergies	SD: 0					
Clinical Decision Support	100% SD: 0	10.4/9.7	48.3 (2.8)	48.3/44.7	0.6 (0.7)	4.6 (0.4)
Implantable Devices	100% SD: 0	7.5/7	14.2 (1.1)	14.2/13	0.8 (0.5)	4.3 (0.8)
Clinical Information Reconcile	100% SD: 0	4.3/4	21.5 (0.9)	21.5/20	1.9 (1.1)	4.5 (0.5)
Eprescribe	100% SD: 0	13.6/13.3	84.5 (1.5)	84.5/82.33	1.0 (0.9)	4.3 (0.6)

Using the System Usability Scale, the subjective satisfaction score was calculated as: 92.1%
In addition to the performance data, the following qualitative observations were made:

Major findings:

- Users who have a long period of time using the system, that use the feature regularly, and that have a higher volume of patients are more comfortable and efficient with the system.
- We did not test the short cut features, such as order sets and plansets, which dramatically improve efficiency.
- Implantable devices were not difficult to add, but this is new to track this data in a dedicated screen.

Areas for improvement
- Utilizing speech recognition and artificial intelligence to provide recommendations on medications, lab and radiology orders based on the problems will speed this process.
- Collecting more data from the patient, other physicians and the pharmacy, which is automatically analyzed and condensed would find gaps in care and improve decision making.
- Adding a mobile app with a subset of features would improve efficiency.

User Centered Design Process
Enabledoc's UCD process focuses on quick and safe methods of performing functions in the EHR. Our goal is to make the user experience simple and easy to use, while flexible to handle different workflows. We take complex tasks and deploy them in intuitive and efficient ways.

The EHR Usability Protocol (EUP) is a three-step process as described in NIST 7804 Technical Evaluation, Testing and Validation of the Usability of Electronic Health Records
https://www.nist.gov/publications/nistir-7804-technical-evaluation-testing-and-validation-

[usability-electronic-health](#): (1) EHR Application Analysis, (2) EHR User Interface Expert Review, and (3) EHR User Interface Validation Testing.

1. EHR Application Analysis include a description of the application's basic functions, analysis of the user characteristics, task analysis describing the interactions between users and the application, analysis of the environment of use, and the identification of critical user tasks with identification of patient safety related issues. Steps to perform tasks are documented to examine efficiency and complexity.
2. User Interface Expert review is conducted by internal product and development team with periodic consultation with external experts. Each function or change to function design is reviewed prior to development and evaluated prior to release to test.
3. User interface validation testing is performed by internal usability test engineer and existing team of customers that will use the functionality. The goal of the validation test is to make sure that critical interface design issues are not causing patient safety-related use errors and that the functionality is efficient and not causing delays in performing functions. In this phase, we use The Task, User, Representation, and Function (TURF) framework for EHR usability developed by the National Center for Cognitive Informatics and Decision Making in Healthcare. NIST 7865 A Human Factors Guide to Enhance EHR Usability of Critical User Interactions when Supporting Pediatric Patient Care (https://www.nist.gov/publications/nistir-7865-human-factors-guide-enhance-ehr-usability-critical-user-interactions-when) information was used for immunizations, growth charts, pediatric physical exams, and electronic prescriptions, but the process followed NIST 7804.

METHOD
PARTICIPANTS
A total of 10 participants were tested on each of the 12 areas of the EHRUT. Participants in the test were physicians and clinical staff such as RNs and MAs. Participants were recruited by Enabledoc staff from existing customers and paid a $50 gift card for their help in testing.

Participants had no direct connection to the development of or organization producing the EHRUT other than being current customers. Participants were not from the testing or supplier organization. Participants were actual end users and thus have the same orientation and level of training as other non-participant customers. For the test purposes, end-user characteristics were identified and translated into an internal recruitment screener used to solicit potential participants.

Recruited participants had a mix of backgrounds and demographic characteristics conforming to the recruitment screener. 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 ID	Gender	Age Range	Occupation / role	Professional Experience (months)	Computer Experience (intermediate, advanced, expert)	Product Experience (Months)	Computer Experience (months)	Education	Assistive Technology
C1	M	50-59	MD	360	intermediate	84	300	Doctorate degree	No
C2	F	60-69	Medical Assistant	468	intermediate	84	240	Bachelor's degree	No
C3	F	40-49	Medical Assistant	240	intermediate	96	264	Bachelor's degree	No
C4	F	40-49	MD	240	intermediate	72	240	Doctorate degree	No
C5	F	50-59	MD	168	intermediate	72	264	Doctorate degree	No
C6	M	30-39	Medical Assistant	96	intermediate	72	120	Associate's degree	No
C7	F	20-29	Medical Assistant	108	intermediate	48	72	Associate's degree	No
C8	F	50-56	Office Manager	252	intermediate	36	180	Some College	No
C9	F	30-39	Medical Assistant	180	intermediate	36	144	Bachelor's degree	No
C10	F	30-39	Medical Assistant	96	Advanced	36	156	Associate's degree	No

Ten (10) participants (matching the demographics in the section on Participants) were recruited and all participated in the usability test. 3); they were instructed that they could withdraw at any time. Participants all had prior experience with the EHR. No participants failed to show for the study.

Participants were scheduled for 30 minute sessions with 30 minutes in between each session for debrief by the administrator and data logger, and to reset systems to proper test conditions. All testing was performed over several days to allow the participants to schedule time at their convenience. A spreadsheet was used to keep track of the participant schedule.

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

STUDY DESIGN
The objective of this test was to perform summative testing to measure the key usability metrics of effectiveness, efficiency, and user satisfaction. These metrics will uncover areas where the application performed well and areas where the application failed to meet the needs of the participants in achieving our internal usability goals. 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 should be made.

During the usability test, participants interacted exclusively with the EHRUT. Each participant used the system in their preferred location, and was provided with the same instructions. All sessions were conducted remotely with Zoom conferencing software. Screens with associated interaction and the audio stream were recorded for later analysis. 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

Additional information about the various measures can be found in Section 3.9 on Usability Metrics.

TASKS

Tasks were constructed that would be realistic and representative of the kinds of activities a user might do with this EHR for each of the 12 areas and based on the CMS test scripts for 2015 Certification. The tasks were specific for each area and detailed in each test specification.

Task Selection and Priority

Tasks were selected based on their frequency of use, criticality of function, and those that may be most troublesome for users.

Tasks were ordered and prioritized based on their impact on patient safety, in which the tasks that had the greatest potential for patient harm due to critical errors were performed first. Thus the entry of current medication allergies was followed by modifying some of the current allergies and finished with the reviews of current medications and then the reviewing medication history task.

The task scenario document is contained in the Appendix.

PROCEDURES

During the time a participant was scheduled, an email was sent to the participant that:
- Confirmed the time of the session
- Provided Zoom access codes
- A copy of the informed consent form
- A document containing the tasks for the test session

Just prior to the scheduled time, the test administrator started the join.me session and greeted the participant on arrival; their identity was verified and matched with a name on the participant schedule. Participants were then assigned a participant ID. Recording of the session was started using the join.me recording feature.

Each participant reviewed and agreed to the informed consent and release form via verbal acknowledgment. A representative from the test team witnessed the participant's verbal agreement.

To ensure that the test ran smoothly, testing was performed remotely by an experienced usability practitioner with over 25 years of experience in healthcare user interface and workflow design.

The administrator moderated the session including administering instructions and tasks. The administrator also monitored task times, obtained post-task rating data, took notes on participant comments, path deviations, number and type of errors, and comments.

Participants were instructed to perform the tasks:

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

For each session, the participants were given an electronic copy of the tasks for that session. They were requested to not read the tasks prior to the session. Participants were asked to read the task aloud prior to each task; task timing began once the participant finished reading the question and verbally indicated they were starting the task. The task time was stopped once the participant indicated they had successfully completed the task. Scoring is discussed below.

Following the session, the administrator gave the participant the post-test questionnaire, solicited any further comments, and thanked each individual for their participation.

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

TEST LOCATION
The test was conducted remotely through the use of Zoom virtual conferencing and screen sharing software. Thus the actual test location was at the discretion of the test participants. The test administrator conducted the test from Enabledoc LLC offices in Rochester MN.

TEST ENVIRONMENT
The EHRUT would be typically be used in a healthcare office or facility. In this instance, the testing was conducted in healthcare office. For testing, the computer used a Windows laptop running Windows OS and Chrome browser. The participants used a mouse and keyboard when interacting with the EHRUT. The Enablemypractice application was used on a 13 inch laptop with 1366 by 768 resolution and 32 bit color. The application was set up by the vendor according to the vendor's documentation describing the system set-up and preparation. The application itself was running on a Windows 2019 Server using a test database on a WAN connection. Technically, the system performance (i.e., response time) was representative to what actual users would experience in a field implementation with a minor lag caused by video

screen sharing and recording. Additionally, participants were instructed not to change any of the default system settings (such as control of font size).

TEST FORMS AND TOOLS
 During the usability test, various documents and instruments were used, including:
1. Informed Consent
2. Test task scenarios
3. Moderator's Guide
4. Observer's data collection template
5. Post-test SUS Questionnaire

The participant's interaction with the EHRUT was captured and recorded digitally using the screen recording capability of Zoom running on the test machine. This recording included the audio stream of verbalizations. The test sessions were electronically transmitted to any additional observers who logged into the Zoom session.

PARTICIPANT INSTRUCTIONS (example)

The administrator reads the following instructions aloud to the each participant (also see the full moderator's guide in Appendix 5):

Thank you for participating in this study. Your input is very important. Our session today will last about 30 minutes. During that time you will use a version of Enablemypractice EHR and work with specific features. Our goal is to determine where there are areas of difficulty and design aspects that can be improved.

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. There are no wrong answers! We will be here in case you need specific help, but we will not be able to instruct you or provide help in how to use the application; however we may provide specific hints as necessary.

Overall, we are interested in how easy (or how difficult) this system is to use, and how we could improve it. I did not have any involvement in its creation, so please be honest with your opinions.

We are recording the audio and screen interaction 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. Should you feel it necessary you are able to withdraw at any time during the testing for any reason.

Following the procedural instructions, participants were started with a specific patient's chart data. Prior to giving the participant mouse and keyboard control, the moderator gave the following instructions:

For each task, I will ask you to read the task and indicate when you 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. You may certainly ask questions if necessary and we may provide guidance or a hint, however we will not provide direct instruction during the tasks. I will ask you your impressions about the task once you are done.

Participants were then given 4 tasks to complete.

USABILITY METRICS

According to the NIST Guide to the Processes Approach for Improving the Usability of Electronic Health Records, EHRs should support a process that provides a high level of usability for all users. The goal is for users to interact with the system effectively, efficiently, and with an acceptable level of satisfaction. To this end, metrics for effectiveness, efficiency and user satisfaction were captured during the usability testing.

The goals of the test were to assess:

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

DATA SCORING

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

Measure	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 overall time allotted for the entire set of tasks. 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. Task times were recorded for successes. Observed task times divided by the optimal time for each task is a measure of optimal efficiency. Due to the variability of multiple correct paths and a large variety of user settable preferences, all of which can affect time on task, optimal task times and deviations from these times were unrealistic to assess. All participants were trained on Enablemypractice EHR and so the performance factor of 1.0 was use. The overall usability goal for any feature of the EHR is task time that is deemed acceptable by the end user with no critical errors. Thus, if expert, optimal performance on a task was [60] seconds then allotted task time performance was [60 * 1.0] seconds. This ratio is aggregated across tasks and reported with mean and variance scores.
Effectiveness: Task Failures	If the participant abandoned the task, did not reach the correct answer, performed it incorrectly, or was unsure if they had completed the task, the task was counted as a "Critical Failure." No task times were taken for failed tasks. Minor errors were defined as an errant click, initial selection of an incorrect menu option, or incorrect entries that the participant noticed and corrected. The total number of errors was calculated for each task and then divided by

	the total number of times that task was attempted. Minor errors and deviations were noted but not counted as significant errors. This is expressed as the mean number of failed tasks per participant.
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, clicked on an incorrect menu item, followed an incorrect link, or interacted incorrectly with an on-screen control. These path deviations were included in the minor error count. The minor error count is expressed as an average across all participants.
Efficiency: Task Time	Each task was timed from when the participant indicated they were beginning the task 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 as was variance (standard deviation).
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). Average difficulty ratings per task were calculated as was variance. Common convention is that average ratings for systems judged easy to use should be 3.3 or above. To measure participants' confidence in and likeability of the ENABLEMYPRACTICE EHR feature 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 7.

APPENDICES

The following appendices include supplemental example data for usability testing. The following is a list of the appendices provided:

1: Participant Recruiting Screener
2: Participant demographics
3: Informed Consent Form
4: Task Scenarios
5: Moderator's Guide
6: Sample data collection form
7: System Usability Scale Questionnaire

Appendix 1: PARTICIPANT RECRUITING SCREENER

Introduction

Hello, my name is __. Enabledoc is seeking doctors and clinicians who are users of

- • Electronic prescribing software
- • Computerized order entry (such as labs and imaging)
- • Medication list and medication allergy list management

to take part in a usability study of that portion of the Enablemypractice EHR.

This study will assist us in designing and developing a solution that meets your needs. Your experiences in using this particular design will greatly help our designers and developers. The testing of our design will take place in your office using remote meeting technology, requiring only your time, thoughts, and suggestions. We expect the session to last approximately 30 minutes.

Does this sound like something that interests you? Before I schedule you for a session, do you have a few moments to answer some questions?

General Questions

1. Are you male or female? [Recruit a mix of participants]
2. Have you participated in a focus group or usability test in the past three months? [Note but do not terminate if yes]
3. Which of the following best describes your age? [25 or less; 26 to 39; 40 to 59; 60 to 74; 75 and older][Recruit a mix of ages]

Professional Demographics

4. What is your current position/role in your practice?
5. How long have you been in this role?
6. Do you currently perform e-prescribing? [computerized order entry, manage medication and medication allergy lists – pick appropriate for test][Terminate if no to specific task for test] How many prescriptions [or lab orders – use appropriate choice for test] do you write per day (or week if that is a better estimate)?
7. What year did you receive your medical degree?

Computer Expertise

8. About how many hours per week do you spend on the computer that is medical practice related?
[Recruit a range of use, e.g., 0 to 10, 11 to 25, 26+ hours per week][Terminate if less than 5]
9. Do you use a computer outside of your medical work?
10. If so, about how many hours per week do spend using a computer for non-work related endeavors?
11. Regarding your use of Enablemypractice Practice Manager & EHR, what percentage of time is spent in each product? (per day)

Domain Knowledge

- Rate your expertise or comfort in using Enablemypractice software on a scale of 1 to 5 (1=just starting, 5=expert) for
    - PM
    - EHR (overall)
    - EHR e-Prescribing
    [Terminate if 1 or 2]

- If you have used similar or competing products, describe your level of expertise in those products [it is not necessary to name the product(s) unless they want to].

Contact Information

[If the person matches your qualifications, ask for any info we do not have] May I have your contact information?
- Name of participant:
- Office Key:
- Best phone number:
- Email address:

Those are all the questions I have for you. Your background matches the people we're looking for. Would you be able to participate on [date, time]?
Alternative: select from a list of sessions [ideal approach]
Alternative; What would be the best date and time for you?

Before your session starts, we will ask you to verbally acknowledge a release form allowing us to record
your session. The recording will only be used internally for further study if needed and will never be used for advertising or marketing purposes. Also, you will not be personally identified with any recording. Will you consent to be recorded? [Terminate if no]

This study will take place remotely via conferencing software, allowing you to participate in the session at the place of your choosing. I will confirm your appointment a couple of days before

your session and provide you with any additional information. What is the best time to contact you?

Appendix 2: PARTICIPANT DEMOGRAPHICS

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

Participant ID	Gender	Age Range	Occupation / role	Professional Experience (months)	Computer Experience (intermediate, advanced, expert)	Product Experience (Months)	Computer Experience (months)	Education	Assistive Technology
C1	M	50-59	MD	360	intermediate	84	300	Doctorate degree	No
C2	F	60-69	Medical Assistant	468	intermediate	84	240	Bachelor's degree	No
C3	F	40-49	Medical Assistant	240	intermediate	96	264	Bachelor's degree	No
C4	F	40-49	MD	240	intermediate	72	240	Doctorate degree	No
C5	F	50-59	MD	168	intermediate	72	264	Doctorate degree	No
C6	M	30-39	Medical Assistant	96	intermediate	72	120	Associate's degree	No
C7	F	20-29	Medical Assistant	108	intermediate	48	72	Associate's degree	No
C8	F	50-56	Office Manager	252	intermediate	36	180	Some College	No
C9	F	30-39	Medical Assistant	180	intermediate	36	144	Bachelor's degree	No
C10	F	30-39	Medical Assistant	96	Advanced	36	156	Associate's degree	No

Gender	
Men	2
Women	8
Total (participants)	10

Occupation/Role	
RN/NP/MA	7
Physician	3
Total (participants)	10

Years of Experience (average)	
Professional	23.71
EHR Product Use	2.86

Appendix 3: Informed Consent Form

Enabledoc 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 up to 60 minutes.

Agreement

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

I understand and consent to the use and release of the recording by Enabledoc. I understand that the information and recording is for research purposes only and that my name and image will not be used for any purpose other than research. I relinquish any rights to the recording and understand the recording may be copied and used by Enabledoc without further permission.

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 will not be shared outside of Enabledoc

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 or verbally indicate 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: _____
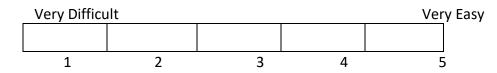
Appendix 4: Task Scenarios

Usability Task Scenarios – Medication List

Access the clinical information for a patient of your choice. Make note of the patient's name as that will be required in later tasks

1: Record Patient Active Medication List -- this patient provides their current medications. Each one below is selected and modified then saved:
    Simvastatin 20 mg tablet by mouth once daily
    Lorazepam 0.5 mg tablet by mouth three times daily
    Insulin Glargine 10 units mL once daily for 10 days
    Metoprolol Tartrate 50 mg tablet by mouth once daily
    Warfarin 5 mg tablet by mouth once daily Monday, Wednesday, Friday, Sunday
    Warfarin 2.5 mg tablet by mouth once daily Tuesday, Thursday, Saturday

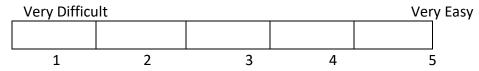Overall, how difficult or easy did you find this task?

Very Difficult				Very Easy
1	2	3	4	5

2: Change Patient Active Medication List – make the following changes to the patient's medication list.
Click Current Medications, then click Edit next to each one of the medications below and Update each one with these changes:
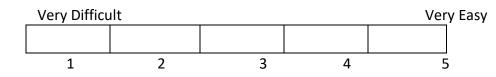- Simvastatin 20 mg tablet was discontinued (uncheck Taking box) and
- The frequency of Lorazepam 0.5 mg tablet was changed from three times daily to every six hours (select Frequency)
- The dose of Insulin Glargine was changed from 10 units to 20 units (make Dose amount 2)

Overall, how difficult or easy did you find this task?

Very Difficult				Very Easy
1	2	3	4	5

3: Access Patient Active Medication List – retrieve the clinical records for patient **Angelica C Taber** and review their active medications with the usability session facilitator
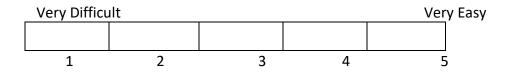
Overall, how difficult or easy did you find this task?

Very Difficult				Very Easy
1	2	3	4	5

4: Access Patient Medication History – Click Patient Center then click Medication tab and review the medications:

- Simvastatin 20 mg tablet by mouth once daily - Discontinued
- Lorazepam 0.5 mg tablet by mouth every six hours – Active
- Insulin Glargine 20 units once daily - Active
- Metoprolol Tartrate 50 mg tablet by mouth once daily - Active
- Warfarin Sodium 5 mg tablet by mouth once daily Monday, Wednesday, Friday, Sunday - Active
- Warfarin Sodium 2.5 mg tablet by mouth once daily Tuesday, Thursday, Saturday – Active

Overall, how difficult or easy did you find this task?

Very Difficult				Very Easy
1	2	3	4	5

Appendix 5: Usability Test Administration Moderator's Guide

1. Items often forgotten
   a. Stop watch for recording time on task
   b. Elapsed time timer to time code observations/comments in the recording

2. Office Key Setup
   a. Environment
   b. Obtain copy of user key database if required for test
   c. Any required feature access
   d. Create and enter any necessary test data
   e. Create Database / Office Key snapshot
3. Schedule Join.Me sessions
4. Schedule participants
5. Supply test participants with materials prior to test
   a. Join.Me access
   b. Task scenarios (be prepared to resend at the start of the test – do not assume the participant has multiple monitors, so they may also need to print the scenarios)
   c. Informed consent form (can be done verbally during the session)
6. Set up administrative / test PC
   a. Join.Me installed and up to date
   b. Shut down all programs not needed for the test – remember things like Communicator
   c. Turn off notifications – audible and screen – on any software that may be running during the test (e.g.: Outlook)
   d. Ensure the application installed and functional
7. Running a test session
   a. Ensure office key/database snapshot of base data exists
   b. Start EHR session on test PC and arrive at starting screen for test
   c. Select first patient if selection is not part of the task scenario
   d. Start Join.Me session
   e. Share appropriate screen
   f. Greet user
   g. Administer introductory materials to user (see below, following checklist)
   h. Start Join.Me recording
   i. Display informed consent form on shared screen
   j. Obtain consent via verbal acceptance
   k. Give mouse and keyboard control to ALL
   l. Have user work through tasks
   m. For each task, record
      i. Time on task
      ii. Critical errors (anything that constitutes task failure)

iii. Minor errors (anything the user detects and recovers)
iv. Deviation(s) from optimal path
v. Interesting comments (try to include recording time stamp for reference)

    n.   After each task or task set (see specific scenarios) ask for response to single ease of use
        question
    o.   Allow verbal response to any questions contained in task scenarios
    p.   At end of all tasks, display SUS questionnaire and have the participant place an X in
        appropriate response to each statement
                i. Save SUS with participant code as part of file name
    q.   Conduct debrief to solicit any additional feedback, comments, Q&A, etc.

Thank you for participating in this study. Your input is very important. Our session today will last about 45 minutes. During that time you will use a version of Enablemypractice EHR and work with specific features. Our goal is to determine where there are areas of difficulty and design aspects that can be improved.

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. There are no wrong answers! We will be here in case you need specific help, but we will not be able to instruct you or provide help in how to use the application, however we may provide specific hints as necessary.

Overall, we are interested in how easy (or how difficult) this system is to use, and how we could improve it. I did not have any involvement in its creation, so please be honest with your opinions.

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. Should you feel it necessary you are able to withdraw at any time during the testing for any reason.

Appendix 6: Sample data collection form

Summative Usability Test Data Log

Test type:

Participant:

Participant code:

Session Date/start time:

File name:

Task 1:

- Critical Error count:
- Minor error count:
- Optimal path deviations:
- Time on task:
- SEoUQ response:
- Comments/observations:

<repeat for each task>

Appendix 7: System Usability Scale Questionnaire

In 1996, Brooke published a "low-cost usability scale that can be used for global assessments of systems usability" known as the System Usability Scale or SUS. Lewis and Sauro (2009) and others have elaborated on the SUS over the years. Computation of the SUS score can be found in Brooke's paper, at http://www.usabilitynet.org/trump/documents/Suschapt.doc or in Tullis and Albert (2008).

	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

1	2	3	4	5

3. I thought the system was easy to use

1	2	3	4	5

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

1	2	3	4	5

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

1	2	3	4	5

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

1	2	3	4	5

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

1	2	3	4	5

8. I found the system very cumbersome to use

1	2	3	4	5

9. I felt very confident using the system

1	2	3	4	5

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

1	2	3	4	5