

# Elation Health Safety-Enhanced Design Usability Report

Report based on NISTIR 7742 Customized Common Industry Format Template for Electronic Health Record Usability Testing

Product	Elation EMR v3.0
Test Dates	Usability tests administered December 3, 2018 - December 12, 2018
Report Date	December 14, 2018
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# Executive Summary

Elation Health administered a usability study of the Elation EMR Version 3.0 (ElationEMR) from December 3, 2018 to December 12, 2018 as part of 2015 ONC EHR Certification. The EHR features selected for testing are outlined in §170.315.g.3 Safety-Enhanced Design requirements. The purpose of the study was to test and validate the usability of the current user interface with healthcare professionals. Ten active healthcare providers matching the target demographic criteria served as participants and used ElationEMR in simulated, but representative tasks.

The study collected performance data on the following EHR features, as specified by the Safety-Enhanced Design requirements:

- 170.315(a)(1) CPOE – Medications
- 170.315(a)(2) CPOE – Laboratory
- 170.315(a)(3) CPOE – Diagnostic Imaging
- 170.315(b)(3) Electronic Prescribing
- 170.315(a)(4) Drug-drug, Drug-allergy Interaction Checks
- 170.315(a)(5) Demographics
- 170.315(a)(6) Problem List
- 170.315(a)(7) Medication List
- 170.315(a)(8) Medication Allergy List
- 170.315(a)(9) Clinical Decision Support
- 170.315(a)(14) Implantable Device List
- 170.315(b)(2) Clinical Information Reconciliation and Incorporation

At the beginning of each 1-hour one-on-one usability test, participants were greeted virtually by the administrator in an online screen share and teleconference session, given a brief 3-minute introduction to the ElationEMR patient chart, and then instructed to start the test. Participants had experience with a previous version of ElationEMR. During the test, the administrator observed and recorded the participant via screen share, timed the test, and logged performance data electronically. The administrator did not assist the participant during the test.

The following types of data were collected for each participant:

- Number of tasks successfully completed without assistance
- Task ratings: Ease and efficiency
- Total time to complete the tasks
- Number and types of errors
- Path deviations
- Participant's verbalizations (comments)
- Participant's feedback on overall satisfaction with the system

Following the test, participants were asked to provide qualitative feedback on their overall satisfaction with the EHR. For this report, all participant data was de-identified. In the table below is a summary of the performance and rating data collected:

### Usability Test Result Summary

Task	Task Success	Total Task Time (in sec)	Deviation s	Errors	Task ease 1-5 (5 = very easy)	Task efficiency 1-5 (5 = very efficient)
<b>170.315(a)(1) CPOE – Medications</b>	Mean: 1	Mean: 123 SD: 40	Mean: .6 SD: .8	Mean: .1 SD: .3	Mean: 4.2 SD: .6	Mean: 4.4 SD: .6
<b>170.315(a)(2) CPOE – Laboratory</b>	Mean: 1	Mean: 158 SD: 49	Mean: 1.1 SD: 1.4	Mean: .2 SD: .4	Mean: 4.2 SD: .6	Mean: 4.4 SD: .6
<b>170.315(a)(3) CPOE – Diagnostic Imaging</b>	Mean: 1	Mean: 91 SD: 47	Mean: .1 SD: .3	Mean: 0 SD: 0	Mean: 4.2 SD: .6	Mean: 4.4 SD: .6
<b>170.315(b)(3) Electronic Prescribing</b>	Mean: .9	Mean: 270 SD: 119	Mean: 2.1 SD: 1.7	Mean: 1.1 SD: 1.3	Mean: 4.3 SD: .4	Mean: 4.4 SD: .4
<b>170.315(a)(4) Drug-drug, Drug-allergy Interaction Checks</b>	Mean: 1	Mean: 57 SD: 14	Mean: .1 SD: .3	Mean: .1 SD: .3	Mean: 4.3 SD: .7	Mean: 4.5 SD: .6
<b>170.315(a)(5) Demographics</b>	Mean: 1	Mean: 36 SD: 18	Mean: .1 SD: .3	Mean: 0 SD: 0	Mean: 4.3 SD: .7	Mean: 4.5 SD: .6
<b>170.315(a)(6) Problem List</b>	Mean: 1	Mean: 71 SD: 35	Mean: 1 SD: 1.2	Mean: .4 SD: .7	Mean: 4.4 SD: .5	Mean: 4.4 SD: .7
<b>170.315(a)(7) Medication List</b>	Mean: .7	Mean: 121 SD: 74	Mean: .9 SD: .9	Mean: .8 SD: .6	Mean: 4.3 SD: .5	Mean: 4.4 SD: .7

<b>170.315(a)(8) Medication Allergy List</b>	Mean: 1	Mean: 44 SD: 13	Mean: .2 SD: .4	Mean: 0 SD: 0	Mean: 4.4 SD: .5	Mean: 4.4 SD: .7
<b>170.315(a)(9) Clinical Decision Support</b>	Mean: 1	Mean: 109 SD: 49	Mean: 1 SD: .9	Mean: .1 SD: .3	Mean:4.4 SD: .5	Mean: 4.4 SD: .8
<b>170.315(a)(14) Implantable Device List</b>	Mean: 1	Mean: 67 SD: 56	Mean: .3 SD: .7	Mean: .6 SD: 1.3	Mean: 4.3 SD: .7	Mean: 4.5 SD: .6
<b>170.315(b)(2) Clinical Information Reconciliation and Incorporation</b>	Mean: 1	Mean: 82 SD: 48	Mean: .4 SD: .7	Mean: .2 SD: .4	Mean: 4.4 SD: .4	Mean: 4.4 SD: .5

# Introduction

The EHR tested for this study was Elation EMR Version 3.0. ElationEMR is used by providers of various medical specialties and their staff in an ambulatory setting to maintain patient charts, and perform various other clinical and practice-management functions such as ordering prescriptions, labs and other tests, downloading and reconciling medication fill information, scheduling patients, documenting billing information, and receiving faxes electronically.

The purpose of this study was to test the usability of the features required for 2015 ONC EHR Certification Requirement §170.315.g.3 Safety-Enhanced Design with healthcare professionals who had no prior training or experience with ElationEMR. Elation Health strives to offer an EHR that requires little to no training to be able to use proficiently, thus an ancillary goal of the study was to evaluate how intuitive the system is to new users. Measures of effectiveness, efficiency, and user satisfaction were captured during testing, and can be found in the section below on [Usability Metrics](#).

## User-centered design process

User-centered design has been a pillar of the Elation Health philosophy since the company's inception. The genesis for ElationEMR came when co-founders Conan and Kyna Fong worked alongside their father, a seasoned solo-practitioner of Family Medicine, to help him transition his medical practice from paper charts to digital records. Surveying the landscape of EHR technology available to their father, Conan and Kyna quickly realized that a user-centered design philosophy was glaringly absent from nearly all of the EHRs that they evaluated. As they put it, the EHR industry had forgotten the main feature of a medical practice – the physician.

Elation Health's founding mission is to keep the focus of the EHR's design and development process on the healthcare provider. In each phase of the Elation Health design process, end users representing each of the various roles and responsibilities within the practice - providers, administrative staff, medical assistants - are consulted. Product development at Elation is also highly iterative; throughout development and post-release, user feedback is actively collected and integrated into the refinement of a given feature. In doing so, Elation Health's design process reflects the principles of the International Organization for Standardization (ISO) standard 9241-210: Human-centered design for interactive systems:

1. The design is based upon an explicit understanding of users, tasks and environments.
2. Users are involved throughout design and development.
3. The design is driven and refined by user-centered evaluation.
4. The process is iterative.

5. The design addresses the whole user experience.
6. The design team includes multidisciplinary skills and perspectives.

Elation Health's design process is broken into several phases, listed and explained below:

### 1. **Research** (Shadowing, Surveys, Interviews, Quantitative Methods)

Before developing a new feature, Elation Health uses a variety of research methods to better understand our users and their needs. We combine quantitative and qualitative research methods. This research includes collecting and analyzing usage data from the EHR and performing contextual inquiry by regularly shadowing physicians and staff as they interact with ElationEMR in the clinical environment. To this end, as part of the hiring process at Elation Health, each new team member participates in a physician shadowing session; regardless of their function within the company, in order to sensitize them to our user-centered design philosophy.

### 2. **Planning & Specifying**

Using the data collected in the initial research phase and standard design principles, Elation Health's design team creates patterns, sketches, mockups, wireframes, and slide decks that outline the vision and requirements of the new feature. We then share this output (*i.e.* the mockups, slide decks, sketches, etc.) with a core group of physician advisors and end users for feedback.

### 3. **Prototyping**

Next, we develop a lightweight and flexible prototype to demonstrate and test the feature's core user experience. When developing the prototype, we tend to eschew complex elements of graphic design, and focus solely on layout, information architecture, and interactions, in order to create a functional facsimile or the final feature. Once complete, we share the prototype with the same group of advisors and end users for feedback.

### 4. **Finalization & Testing**

After completing prototyping, the development of the feature is finalized: code is prepared for production, and front-end design and copy go through final edits. Once code-complete, our Quality Assurance (QA) team thoroughly tests the feature, then regression tests the entire EHR to uncover any unanticipated effects that the new feature may have on other areas of the software.

### 5. **(Optional) Soft release, Review & Iteration**

Depending on the scope of the new feature, we may choose to conduct a "soft" release, in which we roll out the new feature to a small, hand-selected group of users. These users evaluate and provide feedback on the feature as they test it in their respective clinical environments and help us further refine the feature before releasing it to all users.

## 6. Release & Gather Feedback

When ready, we release the new feature to the Elation Health user community, and announce the change through an in-app banner or pop-up, and when deemed necessary (e.g. for a sufficiently large feature) we present and record a webinar to help train users. Post release, we closely monitor usage logs and user feedback, which any user can easily submit from within the EHR.

## 7. Iterate

Again, through a blend of quantitative and qualitative research methods (i.e., app usage data and user feedback), we plan, build, and release enhancements and refinements to the feature. In the lifecycle of a feature, we typically iterate and then revisit the feature again periodically, depending on the volume, frequency, and nature of feedback about the feature.

# Method

## Participants

The study consisted of 10 healthcare providers and staff members at medical offices and clinics. Participants were recruited through a snowball sampling process and participated on a voluntary basis. They included both people who had never used ElationEMR as well as current ElationEMR users. In addition, participants had no direct connection to the development of ElationEMR. (More information on the usability recruitment process is documented in [Appendix 1](#).) Participants were asked to complete twelve tasks, each comprising of several subtasks. Participants new to ElationEMR were given the opportunity to have a brief, 5-minute orientation to the chart.

The following is a table of participants by characteristics, including healthcare experience, experience with EHRs, and needs for assistive technology. Participant names are replaced with Participant IDs to ensure anonymity. Recruited participants had a mix of backgrounds and demographic characteristics conforming to that of a Elation Health typical user. 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 Demographic Data

ID	Specialty	Role	Gender	Age	Education	Years in Healthcare	Years using EMRs	Computer literacy score*	Assistive Tech Needs
1	RN	RN	Female	30-39	Bachelor's Degree	5.5	5	5	None
2	MSN	Nurse Midwife	Female	20-29	Master's Degree	2.5	1	7	None
3	RN	ICU Nurse	Female	20-29	Master's Degree	5	5	5	None
4	RN	Nurse	Male	30-39	Bachelor's Degree	5.5	7	6	None
5	PA student	PA	Female	20-29	Master's Degree	6	6	7	None
6	Surgery	MD	Female	30-39	Doctorate Degree	10	10	8	None
7	MD Internal Medicine	MD	Male	50-59	Doctorate Degree	10+	10+	6	None
8	ND Naturopath	ND	Female	30-39	Bachelor's Degree	8	5	9	None
9	Med Student	Med Student	Female	30-39	Doctorate Degree (in progress)	3	1.5	7	None
10	RN	RN	Female	20-29	Bachelor's Degree	2	2	8.5	None

\*For the computer literacy score, participants were asked to rate themselves on a scale of 1 (least computer literate) to 10 (most computer literate).

## Study Design

The goal of this test was to evaluate the effectiveness, efficiency, and satisfaction of use of features required for 2015 ONC EHR Certification Requirement §170.315.g.3 Safety-Enhanced Design. Overall, the objective of this test was to uncover areas where the application performed well – that is, effectively, efficiently, and with satisfaction – and areas where the application failed to meet the needs of the participants. The data from this test may serve as a baseline for future tests with an updated version of the same EHR and/or comparison with other EHRs provided the same tasks are used. In short, this testing serves as both a means to record or benchmark current usability, but also to identify areas where improvements must be made. The list of features tested can be found in the [Tasks section](#) below.

Participants used ElationEMR v3.0, and were tested individually, in the location of their choice, proctored via screen-share and teleconference. Participants were given a brief 5-minute overview of the software.

During the course of the test, the system was evaluated for effectiveness, efficiency, and satisfaction as defined by measures collected and analyzed for each participant:

- Number of tasks successfully completed
- Total time to complete the tasks
- Number and types of errors
- Path deviations
- Participant’s verbalizations (comments)
- Task ratings: Ease and efficiency
- Participant’s feedback on overall satisfaction with the system

## Tasks

Tasks for the study were constructed to test each participant’s ability to perform the actions specified by the ONC under the Safety-Enhanced Design criterion. Each task and their constituent subtasks are listed in the table below. For each subtask, sample test data (i.e., sample medications, allergies, orders, etc.) were provided to the participant (see [Appendix 5](#)). Optimal user paths for each subtask are provided in [Appendix 6](#). Each subtask was timed and evaluated separately. Data from the subtasks were then aggregated for their related task.

A risk level of high, moderate, or low was assigned to each task and subtask and recorded in the table below. Tasks and subtasks that, if performed incorrectly, had the potential to result in patient harm (e.g., anything affecting allergies, medications, or Elation’s alert and notification system) were deemed high risk, while tasks and subtasks that had little to no chance of resulting in patient harm were deemed low risk. High-risk items were prioritized in terms of evaluation during the usability test as well as how we ranked product changes to the features associated with those tasks.

Task	Risk
<b>Task 1: Medication Orders (§170.315.a.1)</b>	<b>High</b>
1A. Record a medication	High
1B. Change medication	High
1C. Display changed medication order	Moderate
<b>Task 2: Laboratory Orders (§170.315.a.2)</b>	<b>Moderate</b>
2A. Write a lab order	Moderate
2B. Change a lab order	Moderate
2C. View the details of changed lab order	Moderate

<b>Task 3: Diagnostic Imaging (§170.315.a.3)</b>	<b>Moderate</b>
3A. Write an imaging order	Moderate
3B. Change an imaging order	Moderate
3C. View the details of a changed imaging order	Moderate
<b>Task 4: Drug Interaction Checks (§170.315.a.4)</b>	<b>High</b>
4A. Check for drug-drug interactions while creating a prescription	High
4B. Check for drug-allergy interactions while creating a prescription	High
4C. Change the settings so that you are only alerted for major drug-drug interactions	High
<b>Task 5: Demographics (§170.315.a.5)</b>	<b>Moderate</b>
5A. Record a patient's preferred language, date of birth, birth sex, race, ethnicity, sexual orientation, or gender identity	Moderate
5B. Change the patient's preferred language, date of birth, birth sex, race, ethnicity, sexual orientation, or gender identity	Moderate
5C. Display the patient's changed preferred language, date of birth, birth sex, race, ethnicity, sexual orientation, or gender identity	Moderate
<b>Task 6: Problem List (§170.315.a.6)</b>	<b>High</b>
6A. Record a problem to the problem list	High
6B. Change a problem on the problem list	High
6C. Display the active problem list	High
6D. Display the historical problem list	Moderate
<b>Task 7: Medication List (§170.315.a.7)</b>	<b>High</b>
7A. Record a medication to the medication list	High
7B. Change a medication on medication list	High
7C. Display active medication list	High
7D. Display historical medication list	Moderate
<b>Task 8: Medication Allergies List (§170.315.a.8)</b>	<b>High</b>
8A. Record a medication allergy	High
8B. Change a medication allergy	High

8C. Display the active medication allergy list	High
8D. Display the historical medication allergy list	High
<b>Task 9: Clinical Decision Support (§170.315.a.9)</b>	<b>Moderate</b>
9A. Enable CQMs in Settings so that CDS interventions display based on data in the Problem list, Medication list, Medication Allergy List, Demographics, Laboratory Tests, Vital Signs, and combinations of the above)	Moderate
9B. Trigger the CDS interventions based on the applicable data elements	Low
9C. View resource information using the Infobutton standard for data elements in the problem list, medication list, and demographics	Low
9D. 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 CCDA	Low
9E. Access the following attributes for one of the triggered CDS interventions/resources: bibliographic citation, developer, funding source, release/revision date	Low
<b>Task 10: Implantable Device List (§170.315.a.14)</b>	<b>Moderate</b>
10A. Document a patient's Implantable device	Moderate
10B. Change the status of a UDI	Moderate
10C. Check the details of an entry in the patient's implantable device list	Moderate
<b>Task 11: Clinical information reconciliation and incorporation (§170.314.b.2)</b>	<b>Moderate</b>
11A. 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	Moderate
11B. Generate a new CCDA with reconciled information.	Moderate
<b>Task 12: Electronic Prescribing (§170.315.b.3)</b>	<b>High</b>
12A. Create a new prescription	High
12B. Change a prescription (dosage or duration)	High
12C. Cancel a prescription	Moderate
12D. Refill a prescription	Moderate
12E. Receive a fill status notification	Moderate
12F. Request and receive medication history information	Moderate

## Procedure

Prior to each session, one patient chart was populated with sample information, for use by the participant in the study. A data collection spreadsheet would also be prepared for the current participant in order to collect test data.

Prior to each scheduled session, an email was sent to the participant with a link to the Participant Instructions ([Appendix 4](#)), hosted as a read-only Google document. Instructions for the participant to join the screen share and teleconference session were also sent. After the participant joined the screen share, the session agenda and instructions for the test were reviewed, a basic demographic survey was conducted. The participant was then given a brief orientation and overview of the patient chart. The participant was monitored as he or she worked through each task.

Task times were recorded with a stopwatch and notes on task success, path deviations, number and type of errors, and participant comments were noted during administration of the test. At the end of each task, post-task rating data was also collected. After each session, the video recording of the participant was stored and served as a resource for review.

For each task, the participants were given written instructions in a read-only Google document, and were free to reference these instructions continuously as they worked through the task. Task timing began once the participant announced that he or she had begun the task or when the administrator observed that the participant had started the task. The task time was stopped once the participant indicated they had successfully completed the task or when the administrator observed that the necessary outcome had been achieved. Scoring is discussed below in the section on [Usability Metrics](#).

Following the session, participants were asked for feedback on their overall satisfaction with the software and thanked for their time.

## Test Location

The usability study was conducted remotely via a screen share and teleconference session hosted by Zoom - the test administrator joined from Elation Health's headquarters in San Francisco, California, while participants joined from their respective work or home offices across the United States. Participants were instructed to ensure that their office environment was quiet, their computers were correctly set up, and that they would be uninterrupted throughout the course of the testing.

## Test Environment

As ElationEMR is a web-based EHR typically accessed from both work and home offices by physicians, to recreate a realistic setting, participants were asked to interact with the EHR using

their own computers from their work or home. Prior to the test, participants joined a remote screen share and teleconference session. Through this session, the test administrator was able to moderate the session and both view and record the participant's computer screen and spoken commentary.

## **Test Forms and Tools**

During the usability test, various documents and instruments were used, including an Administrator's Guide ([Appendix 3](#)) and a data collection spreadsheet for the administrator. During the test, the administrator led the session while a note taker input test data (e.g. task success, task time, errors, deviations) in the spreadsheet while observing the participant via screen capture software and following along with the Participant Instructions.

Video and audio of the participant's performance on the usability test was captured and recorded digitally with the screen capture and teleconference service Zoom.

## **Participant Instructions**

At the beginning of each session, the administrator reviewed the agenda with the participant. After explaining the goal and purpose of the study, the administrator asked a series of survey questions to capture the participant's background, including: specialty, role in their medical practice, age, education, years in healthcare, years using EHRs, a self-assessment of their computer literacy on a scale from 1 (Not proficient with computers at all) to 10 (Extremely proficient with computers), and a list of any assistive tech needs used by the individual.

After recording the answers to the survey questions, the test administrator led the participant through a brief 5-minute orientation to the patient chart if the participant was a non ElationEMR user. The administrator then reviewed the rules and instructions for the test, explaining that the participant should speak out loud as they complete the task. Participants were also encouraged to ask any questions, but notified that answers may not be given as to not bias their task actions or opinions of the technology.

When the participant was ready to commence, they signed into the EHR testing environment and worked through each task, referencing the participant instructions ([see Appendix 4](#)) as needed. The note taker recorded task success, task time, errors, deviations from the optimal path, efficiency ratings, ease of use ratings, and any commentary from the participant.

After each set of tasks, the participant was asked to rate the ease of use for the tasks and the task efficiency on a scale from 1 (Very difficult/inefficient) to 5 (Very easy/efficient). After all tasks were completed, the participant was asked to comment on their satisfaction with the system, in the context of the tasks they just performed, as well as provide any other general feedback or commentary. Responses were recorded by the test administrator and note taker.

See the full administrator’s guide in [Appendix 3](#).

## Usability Metrics

The table below describes how the tasks were scored, how errors were evaluated, and how the time-on-task data was analyzed.

Measure	Rationale and Scoring
<b>Effectiveness:</b> Task Success and Failure	A subtask was counted as a success and assigned a value of “1” if the participant achieved the correct outcome. A subtask was counted as a failure (i.e. not a success) and assigned a value of “0” if the participant abandoned the task or did not achieve the correct result within a reasonable timeframe as determined at the discretion of the test administrator. The total task success rate was calculated as an average of the subtask success rate.
<b>Effectiveness:</b> Task Errors	Errors were recorded each time a participant needed any correction by the test administrator in order to continue the given subtask.
<b>Efficiency:</b> Task Standard Deviations	Deviations were counted each time the participant performed an action that strayed from the optimal path to complete the task. Deviations included, for example, choosing an incorrect menu item or navigating to the incorrect area of the medical record.
<b>Efficiency:</b> Task Time	Each task was timed from when the participant began attempting the subtask to when the administrator determined success or failure as defined above. All task times (both success and failure) were included in the average task time analysis.
<b>Satisfaction:</b> Task Rating	After a set of tasks, participants were asked to rate both the ease of those tasks and the efficiency of those tasks on a scale of 1 (Very Difficult/Inefficient) to 5 (Very Easy/Efficient). These data were averaged across participants. Participants were also asked to provide qualitative feedback on their overall experience with the system after the test was completed. Comments were noted by the test administrator.

## Results

### Data Analysis and Reporting

The results of the usability test were calculated following the methods specified in the [Usability Metrics](#) section above.

#### Task 1: Medication Orders (§170.315.a.1)

<i>Participant ID</i>	Average Task Success (Y/N)*	Total Task Time (sec)*	Total Deviations (#)*	Total Errors (#)	Average Task ease 1-5 (5 = very easy)	Average Task efficiency 1-5 (5 = very efficient)
1	1.0	154	2	0	4.0	4.0
2	0.7	71	0	1	5.0	5.0
3	1.0	164	0	0	4.0	3.5
4	1.0	99	2	0	5.0	5.0
5	1.0	89	1	0	4.0	5.0
6	1.0	176	0	0	4.0	5.0
7	1.0	165	1	0	4.8	4.6
8	1.0	88	0	0	4.0	3.5
9	1.0	86	0	0	4.3	4.3
10	1.0	141	0	0	3.0	4.0
	<b>Mean: 1</b>	<b>Mean: 123 SD: 40</b>	<b>Mean: .6 SD: .8</b>	<b>Mean: .1 SD: .3</b>	<b>Mean: 4.2 SD: .6</b>	<b>Mean: 4.4 SD: .6</b>

**Task 2: Laboratory Orders (§170.315.a.2)**

<i>Participant ID</i>	Average Task Success (Y/N)*	Total Task Time (sec)*	Total Deviations (#)*	Total Errors (#)	Average Task ease 1-5 (5 = very easy)	Average Task efficiency 1-5 (5 = very efficient)
1	1.0	201	2	0	4.0	4.0
2	1.0	139	0	0	5.0	5.0
3	0.7	272	2	1	4.0	3.5
4	1.0	135	0	0	5.0	5.0
5	1.0	139	1	0	4.0	5.0
6	1.0	187	4	0	4.0	5.0
7	1.0	124	0	0	4.8	4.6
8	1.0	121	0	0	4.0	3.5
9	1.0	152	2	1	4.3	4.3
10	1.0	112	0	0	3.0	4.0
	<b>Mean: 1</b>	<b>Mean: 158 SD: 49</b>	<b>Mean: 1.1 SD: 1.4</b>	<b>Mean: .2 SD: .4</b>	<b>Mean: 4.2 SD: .6</b>	<b>Mean: 4.4 SD: .6</b>

**Task 3: Diagnostic Imaging (§170.315.a.3)**

<i>Participant ID</i>	Average Task Success (Y/N)*	Total Task Time (sec)*	Total Deviations (#)*	Total Errors (#)	Average Task ease 1-5 (5 = very easy)	Average Task efficiency 1-5 (5 = very efficient)
1	1.0	45	0	0	4.0	4.0
2	1.0	59	0	0	5.0	5.0
3	1.0	75	0	0	4.0	3.5
4	1.0	76	0	0	5.0	5.0
5	1.0	112	1	0	4.0	5.0
6	1.0	100	0	0	4.0	5.0
7	1.0	202	0	0	4.8	4.6
8	1.0	112	0	0	4.0	3.5
9	1.0	41	0	0	4.3	4.3
10	1.0	83	0	0	3.0	4.0
	<b>Mean: 1</b>	<b>Mean: 91 SD: 47</b>	<b>Mean: .1 SD: .3</b>	<b>Mean: 0 SD: 0</b>	<b>Mean: 4.2 SD: .6</b>	<b>Mean: 4.4 SD: .6</b>

**Task 4: Drug Interaction Checks (§170.315.a.4)**

<i>Participant ID</i>	Average Task Success (Y/N)*	Total Task Time (sec)*	Total Deviations (#)*	Total Errors (#)	Average Task ease 1-5 (5 = very easy)	Average Task efficiency 1-5 (5 = very efficient)
1	1.0	62	0	1	4.0	4.0
2	1.0	57	0	0	5.0	5.0
3	1.0	59	0	0	4.0	3.5
4	1.0	75	0	0	5.0	5.0
5	1.0	51	0	0	4.0	5.0
6	1.0	33	1	0	4.0	5.0
7	1.0	62	0	0	4.8	4.6
8	1.0	42	0	0	4.0	3.5
9	1.0	50	0	0	5.0	5.0
10	1.0	78	0	0	3.0	4.0

	<b>Mean: 1</b>	<b>Mean: 57 SD: 14</b>	<b>Mean: .1 SD: .3</b>	<b>Mean: .1 SD: .3</b>	<b>Mean: 4.3 SD: .7</b>	<b>Mean: 4.5 SD: .6</b>
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**Task 5: Demographics (§170.315.a.5)**

<i>Participant ID</i>	Average Task Success (Y/N)*	Total Task Time (sec)*	Total Deviations (#)*	Total Errors (#)	Average Task ease 1-5 (5 = very easy)	Average Task efficiency 1-5 (5 = very efficient)
1	1.0	78	0	0	4.0	4.0
2	1.0	31	0	0	5.0	5.0
3	1.0	25	0	0	4.0	3.5
4	1.0	27	0	0	5.0	5.0
5	1.0	17	0	0	4.0	5.0
6	1.0	57	0	0	4.0	5.0
7	1.0	33	0	0	4.8	4.6
8	1.0	21	0	0	4.0	3.5
9	1.0	30	1	0	5.0	5.0
10	1.0	36	0	0	3.0	4.0
	<b>Mean: 1</b>	<b>Mean: 36 SD: 18</b>	<b>Mean: .1 SD: .3</b>	<b>Mean: 0 SD: 0</b>	<b>Mean: 4.3 SD: .7</b>	<b>Mean: 4.5 SD: .6</b>

**Task 6: Problem List (§170.315.a.6)**

<i>Participant ID</i>	Average Task Success (Y/N)*	Total Task Time (sec)*	Total Deviations (#)*	Total Errors (#)	Average Task ease 1-5 (5 = very easy)	Average Task efficiency 1-5 (5 = very efficient)
1	1.0	44	1	0	4.0	3.5
2	1.0	33	0	0	5.0	5.0
3	1.0	75	1	0	4.0	3.8
4	0.8	141	4	2	4.5	5.0
5	1.0	43	1	0	4.5	5.0
6	1.0	52	1	0	4.5	5.0
7	1.0	85	0	1	4.7	4.6
8	1.0	116	1	0	4.0	3.3
9	1.0	65	1	1	5.0	5.0
10	1.0	55	0	0	3.5	4.0

	<b>Mean: 1</b>	<b>Mean: 71 SD: 35</b>	<b>Mean: 1 SD: 1.2</b>	<b>Mean: .4 SD: .7</b>	<b>Mean: 4.4 SD: .5</b>	<b>Mean: 4.4 SD: .7</b>
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**Task 7: Medication List (§170.315.a.7)**

<i>Participant ID</i>	<b>Average Task Success (Y/N)*</b>	<b>Total Task Time (sec)*</b>	<b>Total Deviations (#)*</b>	<b>Total Errors (#)</b>	<b>Average Task ease 1-5 (5 = very easy)</b>	<b>Average Task efficiency 1-5 (5 = very efficient)</b>
1	0.3	304	1	1	4.0	3.7
2	0.7	115	0	1	5.0	5.0
3	0.7	125	0	1	4.0	3.7
4	0.7	86	1	0	4.7	5.0
5	0.7	94	2	1	4.3	5.0
6	0.7	190	2	2	4.3	5.0
7	0.7	62	2	1	4.7	4.6
8	1.0	84	1	0	4.0	3.3
9	1.0	77	0	1	5.0	5.0
10	1.0	75	0	0	3.3	4.0
	<b>Mean: .7</b>	<b>Mean: 121 SD: 74</b>	<b>Mean: .9 SD: .9</b>	<b>Mean: .8 SD: .6</b>	<b>Mean: 4.3 SD: .5</b>	<b>Mean: 4.4 SD: .7</b>

**Task 8: Medication Allergies List (§170.315.a.8)**

<i>Participant ID</i>	<b>Average Task Success (Y/N)*</b>	<b>Total Task Time (sec)*</b>	<b>Total Deviations (#)*</b>	<b>Total Errors (#)</b>	<b>Average Task ease 1-5 (5 = very easy)</b>	<b>Average Task efficiency 1-5 (5 = very efficient)</b>
1	1.0	67	0	0	4.0	3.5
2	1.0	41	0	0	5.0	5.0
3	1.0	56	0	0	4.0	3.8
4	1.0	45	1	0	4.5	5.0
5	1.0	40	0	0	4.5	5.0
6	1.0	37	0	0	4.5	5.0
7	1.0	62	1	0	4.7	4.6
8	1.0	24	0	0	4.0	3.3
9	1.0	40	0	0	5.0	5.0
10	1.0	32	0	0	3.5	4.0

	<b>Mean: 1</b>	<b>Mean: 44 SD: 13</b>	<b>Mean: .2 SD: .4</b>	<b>Mean: 0 SD: 0</b>	<b>Mean: 4.4 SD: .5</b>	<b>Mean: 4.4 SD: .7</b>
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**Task 9: Clinical decision support (§170.315.a.9)**

<i>Participant ID</i>	Average Task Success (Y/N)*	Total Task Time (sec)*	Total Deviations (#)*	Total Errors (#)	Average Task ease 1-5 (5 = very easy)	Average Task efficiency 1-5 (5 = very efficient)
1	1.0	168	1	0	4.0	3.2
2	1.0	50	0	0	5.0	5.0
3	1.0	79	0	0	4.0	3.9
4	1.0	119	3	0	4.2	5.0
5	1.0	92	1	0	4.8	5.0
6	1.0	165	1	0	4.8	5.0
7	1.0	39	0	0	4.6	4.5
8	1.0	168	2	1	4.0	3.1
9	1.0	77	1	0	5.0	5.0
10	1.0	136	1	0	3.8	4.0
	<b>Mean: 1</b>	<b>Mean: 109 SD: 49</b>	<b>Mean: 1 SD: .9</b>	<b>Mean: .1 SD: .3</b>	<b>Mean:4.4 SD: .5</b>	<b>Mean: 4.4 SD: .8</b>

**Task 10: Implantable Device List (§170.315.a.14)**

<i>Participant ID</i>	Average Task Success (Y/N)*	Total Task Time (sec)*	Total Deviations (#)*	Total Errors (#)	Average Task ease 1-5 (5 = very easy)	Average Task efficiency 1-5 (5 = very efficient)
1	1.0	193	0	1	4.0	4.0
2	1.0	64	0	0	5.0	5.0
3	1.0	136	0	4	4.0	3.5
4	1.0	32	0	0	5.0	5.0
5	1.0	36	0	0	4.0	5.0
6	0.7	80	2	1	4.0	5.0
7	1.0	40	0	0	4.8	4.6
8	1.0	34	0	0	4.0	3.5
9	1.0	33	1	0	5.0	5.0

10	1.0	25	0	0	3.0	4.0
	<b>Mean: 1</b>	<b>Mean: 67 SD: 56</b>	<b>Mean: .3 SD: .7</b>	<b>Mean: .6 SD: 1.3</b>	<b>Mean: 4.3 SD: .7</b>	<b>Mean: 4.5 SD: .6</b>

**Task 11: Clinical information reconciliation and incorporation (§170.314.b.2)**

<i>Participant ID</i>	Average Task Success (Y/N)*	Total Task Time (sec)*	Total Deviations (#)*	Total Errors (#)	Average Task ease 1-5 (5 = very easy)	Average Task efficiency 1-5 (5 = very efficient)
1	1.0	53	0	0	4.0	3.5
2	1.0	54	0	0	5.0	5.0
3	1.0	79	0	0	4.0	4.3
4	1.0	44	0	0	4.0	4.5
5	1.0	65	0	0	4.5	4.5
6	1.0	132	1	0	4.5	5.0
7	1.0	97	2	1	4.7	4.6
8	1.0	70	0	0	4.5	3.8
9	1.0	35	0	0	5.0	5.0
10	1.0	192	1	1	4.0	4.0
	<b>Mean: 1</b>	<b>Mean: 82 SD: 48</b>	<b>Mean: .4 SD: .7</b>	<b>Mean: .2 SD: .4</b>	<b>Mean: 4.4 SD: .4</b>	<b>Mean: 4.4 SD: .5</b>

**Task 12: Electronic Prescribing (§170.315.b.3)**

<i>Participant ID</i>	Average Task Success (Y/N)*	Total Task Time (sec)*	Total Deviations (#)*	Total Errors (#)	Average Task ease 1-5 (5 = very easy)	Average Task efficiency 1-5 (5 = very efficient)
1	1.0	206	0	0	4.0	3.8
2	1.0	189	1	0	5.0	5.0
3	0.8	376	4	1	4.0	4.4
4	0.8	370	2	2	4.0	4.2
5	0.8	286	3	2	4.2	4.2
6	0.8	476	3	1	4.2	5.0
7	1.0	110	0	0	4.8	4.6
8	1.0	344	4	1	4.8	4.3
9	1.0	197	4	4	4.5	4.3

10	1.0	143	0	0	4.0	4.0
	<b>Mean: .9</b>	<b>Mean: 270 SD: 119</b>	<b>Mean: 2.1 SD: 1.7</b>	<b>Mean: 1.1 SD: 1.3</b>	<b>Mean: 4.3 SD: .4</b>	<b>Mean: 4.4 SD: .4</b>

## Discussion of the Findings

### Effectiveness

Participants were universally successful in completing the tasks with very low error rates, indicating that that ElationEMR is highly effective for users to carry out the functions required for §170.314.g.3 Safety-Enhanced Design.

The lack of any task failures from the participants with no prior experience in ElationEMR strongly indicates that the system is highly intuitive for new users.

In terms of effectiveness, our lowest-performing task was subtask 7B (Change a medication on medication list) under Task 7 (Medication List), which still met a 70% success rate. We attribute these results to our strict definition of success, in which we expected users to “document” the discontinuation of a medication rather than “order” its discontinuation. We understand this to reflect nuanced charting preferences among our providers that we hope to explore and clarify in future research and iteration.

### Efficiency

Based on the results for average task time and deviations, we found participants to be very efficient in completing the tasks presented. Task 2B (Change a lab order) and Task 12E (Receive a fill status notification) were outliers that exposed important usability findings discussed in [Major Findings and Areas for Improvement](#) below. Participants also perceived ElationEMR to be very efficient for performing all of the tasks included in the study; the overall mean efficiency rating (looking at all user efficiency ratings for all tasks) is 4.4.

Overall, we found that, given that the majority of our participants were non-Elation users, efficiency was maintained at a high level both in observation and in self-declared ratings from the participants themselves.

### Satisfaction

Overall, participants were extremely satisfied with ElationEMR and the features tested during the study. The mean ease rating and efficiency rating of all tasks across all participants were 4.3 and 4.4, respectively. In the post-test interviews conducted, 10 out of 10 participants commented that ElationEMR was “easy to use” and “intuitive.” Several of the participants compared ElationEMR to the EHR that they currently use, noting that ElationEMR is a more

efficient and more intuitive system, allowing the participant to have important patient information easily accessible.

## Major Findings and Areas for Improvement

One of our most consistent findings was the speed at which users understood the system. After a five-minute training, all participants new to ElationEMR were able to successfully complete most of the tasks presented. Qualitatively, participants also expressed overwhelming appreciation for the overall layout and design of ElationEMR. Specifically, participants appreciated the ability to keep multiple workflows open at once and easily switch from task to task. Participants also noted that the iconography and color in the patient chart was clear and helpful.

For specific tasks, we found that participants expressed particular comfort with Task 6 (Problem List), Task 7 (Medication List), and Task 8 (Medication Allergies List). These tasks featured similar user interaction patterns that participants were quickly able to learn and replicate after trying them out once. Participants also expressed comfort with most of the subtasks in Task 12 (Electronic Prescribing) due to a straightforward flow. Many participants expressed surprised at how simple it was to import a continuity-of-care file into a patient's chart, and how the data was incorporated directly into the relevant areas of the chart.

Participants found a couple navigation flows challenging. In Task 10 (Implantable Device List), participants offered constructive feedback on where the Implantable Device List could be more readily discovered. For subtask 12E (Receive a fill status notification) under Task 12 (Electronic Prescribing), participants provided insight on where they would expect to find the relevant information.

The study also identified a few usability issues that we hope to address in future iterations. In subtask 2A (Write a lab order) under Task 2 (Laboratory Orders), participants found it difficult to find how to enter a post-date for a lab order. For subtask 2B (Change a lab order), participants struggled to figure out how to delete a previously ordered lab order due to the placement of the "remove" button in a dropdown menu. For subtask 9C (View resource information using the Infobutton standard ...) under Task 9 (Clinical Decision Support), we found that participants did not readily understand the distinction between automatically sourced information and handouts that the practice had previously uploaded. We hope to address these usability issues as we continue to improve the user experience for ElationEMR.

# Appendix 1: Recruitment Procedure

## Snowball sampling

To recruit participants, we employed a snowball sampling method with the following template.

Dear \_\_\_\_\_,

I'm a part of Elation Health's product team and I was informed that you are willing to participate in a usability session with us next week! For clarification, we are scheduling an hour and a half for the session. We are compensating our usability interviewees \_\_\_\_ amount. Would you be able to let me know your availability between \_\_\_\_\_.

## Confirmation email

Once participants confirmed a session appointment, we provided the following information before the session.

Dear \_\_\_\_\_,

Thank you for agreeing to participate in a usability testing session with Elation Health! We are excited to learn more from this session with you. For context, this usability session is designed to see how you perform certain tasks within Elation's EHR system as a part of our certification process. We will be observing how you interact with the technology and be asking for your feedback as we go along.

Your usability testing session will be:

Date / Time

Please use this zoom link to join the call at the time specified above.

If you don't have a current zoom account, you will need to create one before the session begins by clicking on the link above.

**In another email you should be receiving a consent form. Please sign this electronically before the session.**

We will provide you with an additional email containing more instructions on how to engage in the user testing session before the call.

Once again, thank you so much for your time and willingness to participate in this research!

We look forward to speaking with you soon,  
Elation Health Team

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

Consent Form: Remote Usability Test (Adult)

Please read and sign this form.

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 Elation Health, 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 Elation Health and is being disclosed solely for the purposes of the Participant's participation in today's usability study. By signing this form the Participant will not disclose this confidential information obtained today to anyone else or any other organizations.

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During this usability test I agree to participate in an online session using my computer and telephone. During the session I will be interviewed about the site, asked to find information or complete tasks using the site and asked to complete a verbal survey about the experience.

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

I understand that participation is voluntary and I agree to immediately raise any concerns I might have.

---

Please sign below to indicate that you have read and understand the information on this form and that any questions you might have about the session have been answered.

Date:\_\_\_\_\_

Please print your name: \_\_\_\_\_

Please sign your name: \_\_\_\_\_

Thank you!

We appreciate your participation.

# Appendix 3: Administrator's Guide

## 1. Review the session agenda

## 2. Explain the goals and expectations for the session.

- By watching users interact with our software, we can learn what makes sense and what doesn't and improve the experience.
- The patient chart(s) that you will be interacting with during the study are fictitious and only contain sample data.
- Please do not share in any form actual patient data during this session.

## 3. Survey

1. Specialty
2. Role
3. Age
4. Education
5. Years in Healthcare
6. Years using EMRs
7. Self-rating on a scale of 1-10 of computer literacy/tech proficiency
8. Assistive Tech Needs

## 4. Orientation to the patient chart: 5 min.

- Key areas of ElationEMR:
  - Practice Home
  - Clinical Profile
  - Action Bar
  - Chronological Record
  - Settings

## 5. Participant pre-test instructions

You will be presented with a series of tasks to complete in the EMR:

- Try to complete each part of each workflow as if you were doing it at work. If this is something you wouldn't normally do, please let us know and then try the workflow out anyway.
- Feel free to ask questions and speak aloud as you go. We might not answer your questions until later because we don't want to influence the workflow.
- After completing a task, feel free to let us know by saying "I'm done."

## 6. Conduct and record the tests

- Participant instructions here: [REDACTED]
- Record the test-taker data here: [REDACTED]

## 7. Post-test survey

- How satisfied were you with the ability to complete the tasks using Elation?

- Any comments or feedback?

## Appendix 4: Participant Instructions

### Please note

- The patient chart(s) that you will be interacting with during the study are fictitious and only contain sample data.
- Please do not share in any form actual patient data during this session.

### Login instructions:

Go to: [REDACTED]

Username: [REDACTED]

Password: [REDACTED]

### Test instructions:

You will be presented with a series of tasks to complete in the EMR:

- Try to complete each part of each workflow as if you were doing it at work. If this is something you wouldn't normally do, please let us know and then try the workflow out anyway.
- Feel free to ask questions and speak aloud as you go. We might not answer your questions until later because we don't want to influence the workflow.
- After completing a task, feel free to let us know by saying "I'm done."

## Appendix 5: Task Details

Listed here are the details of the tasks each participant was asked to complete. The instructions here correspond to the respective subtask as labeled. To provide a more realistic context, we embedded these tasks in a separate, clinically-relevant script.

### Task 1: Medications

#### **1A. Write the following prescription, then SIGN it (do not ePrescribe).**

**Med:** Sulfacetamide Sodium 10 % Liquid

**Sig:** 1 application topically to affected area weekly

**Qty:** 1

**units:** bottle

**Rf:** 0

#### **1B. Delete the original prescription, then create and SIGN the following prescription (do not ePrescribe):**

**Med:** Azithromycin 500 mg Tab

**Sig:** 1 tablet orally daily for 3 days

**Qty:** 3

**units:** tablet

**Rf:** 0

#### **1C. Inspect the details of the prescription you just wrote.**

## Task 2: Lab orders

### **2A. Write the following lab order, then sign it.**

**Lab:** Labcorp

**Tests:** Hemoglobin A1C  
TSH

**Diagnosis:** Hypertension (I10)

**Pt Cond:** Fasting - 12 hours

**Do test on:** 12/14/2018

### **2B. Delete the original order & create the following lab order:**

**Lab:** Labcorp

**Tests:** Complete Metabolic Panel

**ICD-9:** Hypertension (I10)

**Pt Cond:** Fasting - 8 hours

**Do test on:** 12/14/2018

### **2C. Inspect the details of the lab order you just wrote.**

### Task 3: Imaging orders

**3A. Write the following imaging order, then sign it.**

**Test:** Chest X-Ray

**Reason:** Pneumonia

**Center:** ..Other

**3B. Delete the original order & create the following imaging order:**

**Test:** Chest X-Ray, PA and Lateral Views

**Reason:** Pneumonia

**Center:** ..Other

**3C. Inspect the details of the imaging order you just wrote.**

## Task 4: Drug-drug, drug-allergy interactions

**4A. Start the following prescription and let the test proctor know when you see any drug-drug interactions**

Med: Warfarin Sodium 2.5 mg Tab

**4B. Start the following prescription and let the test proctor know when you see any drug-allergy interactions**

Med: Sulfacetamide Sodium 10 % Liquid

**4C. Adjust the Drug Decision Support Preferences in Settings so that you're only notified for Major drug-drug interactions.**

## Task 5: Demographics

**5A, 5B: Edit the previous patient's demographic information to include:**

**Date of Birth:** 5/1/1960

**Preferred Language:** Spanish

**5C: View the demographics of the patient.**

## Task 6: Problem List

**6A: Add the following problem to the patient's problem list:**

**Dx:** Hypertension

**Dx Date:** 12/3/18

**Status:** Active

**6B: Edit the previously added problem to reflect a change**

**Status:** Controlled

**6C: View the active problem list.**

**6D: View the historical problem list.**

## Task 7: Medication List

### **7A. Document the following medications that the patient is on:**

**Med:** Simvastatin 20 mg Tab

**Sig:** 1 tablet orally daily in the evening

**Date started:** 10/01/2018

**By:** John Smith, MD

### **7B. Document that the Simvastatin was discontinued:**

Select the Simvastatin that you just added and document that it was discontinued.

**Discontinued on:** 11/01/2018

**Discontinued by:** John Smith, MD

**Reason:** (none)

### **7C. View the Medication History for the patient.**

## Task 8: Medication Allergies

### **8A. Add the following medication allergies:**

**Allergy:** Aspirin

**Reaction:** Hives

### **8B. Change a medication allergy.**

For the following medication allergy: Aspirin = Hives, change **Hives** to **Hives and Itchy Skin** and save it.

### **8C. View the active medication allergy list.**

### **8D. View the historical medication allergy list.**

## Task 9: Clinical Decision Support

**9A. Turn on clinical reminders in the settings.**

**9B. Start a visit note and locate the Clinical Reminders.**

**9C. Find handouts and resources for patients based on their problems, medication list, and demographics.**

**9D. Import a CCDA and view the clinical reminders in a visit note.**

**9E. Inspect the details of any reminder in the list.**

## Task 10: Implantable Device List

### **10A. Add an implantable device to the patient's chart using the following:**

**UDI:**

+B066000325011NS1/\$\$420020216LOT123456789012345/SXYZ456789012345678/16D20130202C1

**Location:** heart

**Implant date:** 11/30/18

**Status:** Active

### **10B: Edit the UDI Status of the previously entered implantable device.**

**Status:** Inactive

### **10C: View the implantable device description, identifiers, and attributes**

## Task 11: Clinical information reconciliation

**11A. Upload and reconcile a CCDA's medications, allergies, and problems into the patient chart.**

**11B. Create a CCDA from this patient's chart.**

## Task 12: Electronic Prescribing

**12A. Write the following prescription, then ePrescribe it:**

**Med:** Lasix 20 mg Tab

**Sig:** 1 tablet orally daily

**Qty:** 30

**units:** tablet

**Rf:** 3

*ePrescribe to this pharmacy:*

**NYC Pharmacy 10.6MU**

88 Park Street

Brooklyn, NY 11201

Phone: 718-515-7181

Fax: 718-515-7182

**12B. Write a new order to increase Lasix strength to 40 mg.**

**12D. Write a new order to refill Lasix.**

**12C. Cancel the previous refill order of Lasix.**

**12E. Check the fill status of the Lasix refill order.**

**12F. Retrieve the previous medication history for this patient from the pharmacy database.**

## Appendix 6: Optimal Task Paths

Note: The following task paths were optimized for quickest time to task completion as well as the least risk for harmful user errors.

### **Task 1: Medications**

#### 1A: Record a medication

*Write the following prescription, then SIGN it (do not ePrescribe).*

1. In Menu bar, click "Rx" > "Prescription Form."
2. Complete form using information provided.
3. Click "Sign & Close."

#### 1B: Change medication

*Delete the original prescription, then create and SIGN the following prescription (do not ePrescribe):*

1. Hover cursor on prescription order in Chronological Record.
2. Click "Actions" > "Remove".
3. Repeats Steps 1-3 from Part A using information provided.

#### 1C: Display changed medication order

*Inspect the details of the prescription you just wrote.*

1. Click on the medication name in the prescription order in Chronological Record.

### **Task 2: Laboratory Orders**

#### 2A: Write a lab order.

*Write the following lab order, then sign it.*

1. In Menu bar, click "Orders" > "Lab Order."
2. Complete form using information provided.
3. Click "Sign & Close."

#### 2B: Change a lab order.

*Delete the original order & create the following lab order:*

1. Hover cursor on lab order in Chronological Record.
2. Click "Actions" > "Remove".
3. Repeats Steps 1-3 from Part A using information provided.

#### 2C: View the details of changed lab order.

*Inspect the details of the lab order you just wrote.*

1. Click on the order name in the lab order in Chronological Record.

### **Task 3: Diagnostic Imaging**

#### **3A: Write an imaging order**

*Write the following imaging order, then sign it.*

1. In Menu bar, click “Orders” > “Imaging Order.”
2. Complete form using information provided.
3. Click “Sign & Close.”

#### **3B: Change an imaging order**

*Delete the original order & create the following imaging order:*

1. Hover cursor on imaging order in Chronological Record.
2. Click “Actions” > “Remove”.
3. Repeats Steps 1-3 from Part A using information provided.

#### **3C: View details of changed imaging order**

*Inspect the details of the imaging order you just wrote.*

1. Click on the order name in the imaging order in Chronological Record.

### **Task 4: Drug Interaction Checks**

#### **4A: Check for drug-drug interactions while creating a prescription**

*Start the following prescription and let the test proctor know when you see any drug-drug interactions.*

1. In Menu bar, click “Rx” > “Prescription Form.”
2. Enter the medication name provided.
3. Point out the alert banner that appears informing the user of the drug-drug interaction.

#### **4B: Check for drug-allergy interactions while creating a prescription**

*Start the following prescription and let the test proctor know when you see any drug-allergy interactions*

1. In Menu bar, click “Rx” > “Prescription Form.”
2. Enter the medication name provided.
3. Point out the alert banner that appears informing the user of the drug-allergy interaction.

#### **4C: Change the settings so that you are only alerted for major drug-drug interactions**

*Adjust the Drug Decision Support Preferences in Settings so that you’re only notified for Major drug-drug interactions.*

1. Hover cursor over your username in the top-right corner of the screen.
2. Click the “Settings” link in the menu that appears.
3. Click the “App Preferences” tab in the left side navigation.
4. Scroll to “Drug Decision Support Preferences” and change the selection to “Major alerts only.” for Drug-to-Drug preferences.

## **Task 5: Demographics**

5A: Record a patient's preferred language, date of birth, birth sex, race, ethnicity, sexual orientation, or gender identity

*Create a new chart and enter in the following patient information.*

1. From Home screen, click on the "new chart" tab
2. Enter the demographic details provided
3. Select "Create and Open Chart"

5B: Change the patient's preferred language, date of birth, birth sex, race, ethnicity, sexual orientation, or gender identity

*Edit the previous patient's demographic information to include:*

1. Click the name from the top left corner of the patient chart
2. Change the details of the demographics with the demographic details provided
3. Select "Save and Close"

5C: Display the patient's changed preferred language, date of birth, birth sex, race, ethnicity, sexual orientation, or gender identity

*View the demographics of the patient.*

1. Click the name in the top left corner of the patient chart.
2. Select "Save & Close" or "Discard Changes".

## **Task 6: Problem List**

6A: Record a problem to the problem list

*Add the following problem to the patient's problem list:*

1. Click on the "Add problem" tab under the section "Problem List" on the left side of the chart.
2. Enter in the details of the problem provided.
3. Select "Save"

6B: Change a problem on the problem list

*Edit the previously added problem to reflect a change*

1. Click on an existing problem in the problem list
2. Edit the title of the problem
3. Enter in the details of the problem provided
4. Select "Save"

6C: Display the active problem list

*View the active problem list.*

1. View the problem list on the left hand side of the patient chart

6D: Display the historical problem list

*View the historical problem list.*

1. Click on the actions tab to the right of the "Problem List" header
2. Select "View Hx"

## **Task 7: Medication List**

### 7A: Record a medication to medication list

*Document the following medications that the patient is on:*

1. In Menu bar, click "Rx" > "Doc Med Pt is On"
2. Fill out the form using the information provided for the first medication.
3. Click "Save & Close"
4. Save.

### 7B: Change a medication on medication list

*Document that Lorazepam was discontinued.*

1. Hover cursor over the medication entry for Lorazepam in the Chronological Record.
2. Click "Actions" > "Document Discontinue."
3. Fill out the form using the information provided.
4. Save.

### 7C, 7D: Display historical medication list + active medication list

*View the Medication History for the patient.*

1. In Menu bar, click "Meds Hx."
2. Click "Medication History"

## **Task 8: Medication Allergies**

### 8A: Record a medication allergy

*Add the following medication allergies:*

1. In the Allergies section of the Clinical Profile, click "Add Allergy"
2. Fill out the form using the information provided for the first allergy.
3. Click "Save & Add Another."
4. Fill out the form using the information provided for the second allergy.
5. Save.

### 8B: Change a medication allergy

*Change a medication allergy.*

1. Click the "Aspirin" allergy name in the list.
2. Change the drug name in the form using the information provided.
3. Save.

### 8C: Display the active medication allergy list

*View the active medication allergy list.*

1. In the left side of the chart (Clinical Profile) scroll to the Allergies section (at the top).

#### 8D: Display the historical medication allergy list

*View the historical medication allergy list.*

1. Click on “Actions” tab from the “Allergies” section of the clinical profile.
2. Select “View Hx”

### **Task 9: Clinical Decision Support**

#### 9A: Enable CQMs in Settings so that CDS interventions display based on data in the Problem list, Medication list, Medication Allergy List, Demographics, Laboratory Tests, Vital Signs, and combinations of the above)

*Turn on clinical reminders in the settings.*

1. Click on Settings in top right
2. Click on Preferences under User Settings
3. Locate Clinical Reinders (MIPS)
4. Toggle on “Engable Clinical Reminder Service (CRS)”

#### 9B: Trigger the CDS interventions based on the applicable data elements

*Start a visit note and locate the Clinical Reminders.*

1. Click on Visit Note tab
2. Start a “Complete H&P Note”
3. View the clinical reminders at the top of the note

#### 9C: View resource information using the Infobutton standard for data elements in the problem list, medication list, and demographics

*View resources for patients based on their problems, medication list, and demographics.*

1. Go to Handouts tab
2. View a resource based on Active Problems / Medications / Demographics

#### 9D: 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 CCDA

*Import a CCDA and view the clinical reminders in a visit note.*

1. Drag and drop the provided xml file.
2. Click on generated “Patient Summary”
3. Click “Sign off and Import All”
4. Start a “Complete H&P Note”
5. View the clinical reminders at the top of the note

#### 9E: Access the following attributes for one of the triggered CDS interventions/resources: bibliographic citation, developer, funding source, release/revision date

*Inspect the details of any reminder in the list.*

1. Click on a clinical reminder (“Hemoglobin A1c is undocumented or uncontrolled”)
2. View the information provided

## **Task 10: Implantable Device List**

### 10A: Document a patient's Implantable device

*Add an implantable device to the patient's chart.*

1. Click on the "More" tab in top right
2. Click on "Implantable Device List"
3. Click "Add implantable Device"
4. Enter in the implantable device details provided
5. Click "Save & Retrieve Device Details"

### 10B: Change the status of a UDI

*Edit the UDI Status of the previously entered implantable device.*

1. Click on the "More" tab in top right
2. Click on "Implantable Device List"
3. Click on the implantable device just created.
4. Change the device to "inactive"
5. Click "Save & Retrieve Device Details"

### 10C: Check the details of an entry in the patient's implantable device list

*View the implantable device description, identifiers, and attributes*

1. Click on the "More" tab in top right
2. Click on "Implantable Device List"
3. Select device
4. View the details

## **Task 11: Clinical information reconciliation**

### 11A: Incorporate a CCD A and conduct reconciliation of the medications, medication allergies, and problems in the CCD A with the information currently in the patient's record

*Upload and reconcile a CCD A's medications, medication allergies, and problems into the patient chart.*

1. Drag and drop the xml file into the patient chart.
2. Click on the "Patient Summary" in the Chronological Record.
3. Compare the Allergies, Problems, and Medications sections between the open Patient Summary document and the Clinical Profile in the chart.
4. Click "Import Allergies" inside the Patient Summary to pull over the missing allergies.
5. Click "Import Problems" inside the Patient Summary to pull over the missing problems.
6. Click "Import Medications" inside the Patient Summary to pull over the missing medications.

### 11B: Generate a new CCD A with reconciled information

1. Click on the “More” tab in the top right.
2. Select “Data Exchange”.
3. Select “Export Complete Record (C-CDA)”.

## **Task 12: ePrescribing**

### 12A: Create a new prescription

*Write the following prescription, then ePrescribe it*

1. In Menu bar, click “Rx” > “Prescription Form.”
2. Complete form using information provided.
3. Click “ePrescribe.”
4. Enter the name of the pharmacy provided in the form that appears.
5. Click “Select Pharmacy.”
6. Click “ePrescribe Only.”

### 12B: Change a prescription (dosage or duration)

*Write a new order to increase Lasix prescription strength to 40 mg. [2 weeks later]*

1. Locate the prescription from the chronological record.
2. Click on the “Actions” menu to the right.
3. Click on “Change Dose”.
4. Enter in details provided for the dose change.
5. Click ePrescribe.
6. Click ePrescribe only.

### 12C: Cancel prescription

*Cancel the previous refill order. [Sent to wrong pharmacy]*

1. Click Actions in order in chronological record.
2. Cancel eRx Order.
3. Cancel this eRx.

### 12D: Refill prescription

*Write a new order to refill Lasix.*

1. Click Actions in order in chronological record.
2. Click “Refill”.
3. Click “ePrescribe”.
4. Click “ePrescribe only”.

### 12E: Receive fill status notification

*Check the fill status of the refill order.*

1. Point out that status is under the prescription in the chronological record.

### 12F: Request and receive medication history information

*Retrieve the previous medication history for this patient from the pharmacy database.*

1. "Download Fills" from Meds Hx.