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

Pulse v 15.2

Date of Usability Test 12/3/18
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2nd Usability Test 6/1/2020 – 6/30/2020
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§170.315(g) (3) Safety-enhanced design

The application of user-centered design (UCD) during development and summative testing is limited to only those twelve 2015 Edition certification criteria specified in this certification criterion and only for which certification is sought, namely [80 FR 62670]:

§ 170.315 (a)(1) Computerized provider order entry (CPOE) – medications

§ 170.315 (a)(2) Computerized provider order entry (CPOE) – laboratory

§ 170.315 (a)(3) Computerized provider order entry (CPOE) – diagnostic imaging

§ 170.315 (a)(4) Drug-drug, drug-allergy interaction checks for CPOE

§ 170.315 (a)(5) Demographics XXX

§ 170.315 (a)(6) Problem list XXX

§ 170.315 (a)(7) Medication list

§ 170.315 (a)(8) Medication allergy list

§ 170.315 (a)(9) Clinical decision support (CDS) XXX

§ 170.315 (a)(14) Implantable device list XXX

§ 170.315 (b)(2) Clinical information reconciliation and incorporation XXX

§ 170.315 (b)(3) Electronic prescribing

Clinical Decision Support (§ 170.315 (a)(9) Clinical decision support (CDS)

A usability test of PULSE version 15.2 for **Clinical Decision Support (§ 170.315 (a)(9) Clinical decision support (CDS))** was conducted on December 3, 2018 via WebEx at several local facilities of Community Health Services. This test was completed by 10 healthcare providers of varying backgrounds and experience. The purpose of the test was to validate the usability of the user interface and provide evidence of usability Clinical Decision Support (CDS) alerts.

This study collected performance data on normal functionality typically conducted on an eHR for CDS in a clinical environment. The following types of data were collected for each participant:

The following ACTIONS will be tested using information entered:

CDS Rule- Hearing

- User (Physician) Signs into MAP using appropriate user name and sign-in
- User selects a Newborn patient
- An “Alert Window’ Appears
- Select Hyperlink
- Close Link
- Select ‘X’ in upper right corner of Intervention section.
- click on My Patients icon to return to full patient list

CDS Rule VTE 1:

- User (Physician) Signs into MAP using appropriate user name and sign-in
- User selects a Patient-meeting Criteria.
- An "Alert Window' Appears
- Select Hyperlink
- Close Link
- Select 'X' in upper right corner of Intervention section.
- click on My Patients icon to return to full patient list

CDS Rule VTE 2:

- User (Physician) Signs into MAP using appropriate user name and sign-in
- User selects a Patient-meeting Criteria.
- An "Alert Window' Appears
- Select Hyperlink
- Close Link
- Select 'X' in upper right corner of Intervention section.
- click on My Patients icon to return to full patient list

CDS Rule AMI 1:

- User (Physician) Signs into MAP using appropriate user name and sign-in
- User selects a Patient-meeting Criteria.
- An "Alert Window' Appears
- Select Hyperlink
- Close Link
- Select 'X' in upper right corner of Intervention section.
- click on My Patients icon to return to full patient list

CDS Rule CHF:

- User (Physician) Signs into MAP using appropriate user name and sign-in
- User selects Patient-meeting Criteria.
- An "Alert Window' Appears
- Select Hyperlink
- Close Link
- Select 'X' in upper right corner of Intervention section.
- click on My Patients icon to return to full patient list

Problem List (§170.315 (a)(6) Problem list)

The PULSE application will have the appropriate data entered in order to verify the end-user experience of the CDS Rules. This is what will be used to obtain appropriate user sign-off. After performing all the steps in this test script, the user will be able to document that the specified actions are working as designed and displayed expected outcomes. The user will document any exceptions to the expected

outcomes and any suggestions they have. Results of those tests were transcribed into this report on December 5-7, 2018.

The following types of data were collected for each participant:

• Number of tasks successfully completed within the allotted time without assistance

• Time to complete the tasks

• Number and types of errors, if any

• Path deviations

• Participant's verbalizations

• Participant's satisfaction ratings of the system

The results from the Usability Scale scored the subjective satisfaction with CDS functionality to be: PASSED.

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

- Comments
- Suggestions

In addition, a usability test was executed for the **Problem List** (**§170.315 (a)(6) Problem list)** Functionality of Pulse

The purpose of this test is to verify the functionality of the Problem List in Pulse v 15.2 and its usability in PULSE. The Test is designed to be executed following a specific set up in the Pulse. The following ACTIONS will be tested using information entered:

- Access Problem List
- Look up Problem
- Record Problem

The PULSE application will have the appropriate data entered in order to verify the end-user experience of the Problem list. This is what will be used to obtain appropriate user sign-off. After performing all the steps in this test script, the user will be able to document that the specified actions are working as designed and displayed expected outcomes. The user will document any exceptions to the expected outcomes and any suggestions they have. Results of those tests were transcribed into this report on December 5-7, 2018.

This study collected performance data on normal functionality typically conducted on an eHR for Problem List in a clinical environment. The following types of data were collected for each participant:

• Number of tasks successfully completed within the allotted time without assistance

• Time to complete the tasks

• Number and types of errors, if any

• Path deviations

• Participant's verbalizations

• Participant's satisfaction ratings of the system

The results from the Usability Scale scored the subjective satisfaction with Problem List functionality to be: PASSED.

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

- Comments
- Suggestions

Demographics (§ 170.315 (a)(5) Demographics)

In addition, a usability test was executed for the **Demographics** Functionality of Pulse **(§ 170.315 (a)(5) Demographics)**

The purpose of this test is to verify the functionality of the Demographics in Pulse v 15.2 and its usability in PULSE. The Test is designed to be executed following a specific set up in the Pulse. The following ACTIONS will be tested using information entered:

- Date of Birth
- Race
- Ethnicity
- Preferred language
- Sex
- Sexual Orientation
- Gender Identity
- Preliminary Cause of Death
- Date of Death

The PULSE application will have the appropriate data entered in order to verify the end-user experience of the Demographics. This is what will be used to obtain appropriate user sign-off. After performing all the steps in this test script, the user will be able to document that the specified actions are working as designed and displayed expected outcomes. The user will document any exceptions to the expected outcomes and any suggestions they have. Results of those tests were transcribed into this report on December 5-7, 2018.

This study collected performance data on normal functionality typically conducted on an EHR for Demographics in a clinical environment. The following types of data were collected for each participant:

• Number of tasks successfully completed within the allotted time without assistance

• Time to complete the tasks

• Number and types of errors, if any

• Path deviations

• Participant's verbalizations

• Participant's satisfaction ratings of the system

The results from the Usability Scale scored the subjective satisfaction with Demographics functionality to be: PASSED.

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

- Comments
- Suggestions

Implantable Devices (§170.315 (a)(14) Implantable device list)

In addition, a usability test was executed for the Implantable Devices Functionality of Pulse

The purpose of this test is to verify the functionality of the **Implantable Devices (§170.315 (a)(14) Implantable device list)** in Pulse v 15.2 and its usability in PULSE. The Test is designed to be executed following a specific set up in the Pulse. The following ACTIONS will be tested using information entered:

- Access Implantable Device Screen
- Add Implantable Device
- Enter UDI
- Accept returned Device Description

The PULSE application will have the appropriate data entered in order to verify the end-user experience of the Implantable Devices. This is what will be used to obtain appropriate user sign-off. After performing all the steps in this test script, the user will be able to document that the specified actions are working as designed and displayed expected outcomes. The user will document any exceptions to the expected outcomes and any suggestions they have.

This study collected performance data on normal functionality typically conducted on an eHR for Implantable Devices in a clinical environment. The following types of data were collected for each participant:

• Number of tasks successfully completed within the allotted time without assistance

• Time to complete the tasks

• Number and types of errors, if any

• Path deviations

• Participant's verbalizations

• Participant's satisfaction ratings of the system

The results from the Usability Scale scored the subjective satisfaction with Implantable Devices functionality to be: PASSED.

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

- Comments

- Suggestions

Clinical information reconciliation and incorporation (§ 170.315 (b)(2) Clinical information reconciliation and incorporation)

In addition, a usability test was executed for the Clinical Information reconciliation and incorporation of Pulse.

A new set of usability testing was conducted for only b2 criteria for matching, reconciliation and incorporation. The testing occurred between June 1st thru June 30th and transcribed between August 10th thru 28th.

The purpose of this test is to verify the functionality of the Clinical information reconciliation and incorporation (§ 170.315 (b)(2) Clinical information reconciliation and incorporation) in Pulse v 15.2 and its usability in PULSE. The Test is designed to be executed following a specific set up in the Pulse. The following ACTIONS will be tested using information entered:

- PM - Patient matching - The user will complete match received external document to current EHR patient record
- PL - Reconcile and incorporate Problems - The user will complete the reconciliation and incorporation of Problems
- ALL - Reconcile and incorporate Allergies - The user will complete the reconciliation and incorporation of Allergies
- Med - Reconcile and incorporate Medication - The user will complete the reconciliation and incorporation of Medications

The PULSE application will have the appropriate data entered in order to verify the end-user experience for the clinical reconciliation and incorporation. This is what will be used to obtain appropriate user sign-off. After performing all the steps in this test script, the user will be able to document that the specified actions are working as designed and displayed expected outcomes. The user will document any exceptions to the expected outcomes and any suggestions they have.

This study collected performance data on normal functionality typically conducted on an eHR for the clinical reconciliation and incorporation in a clinical environment. The following types of data were collected for each participant:

• Number of tasks successfully completed within the allotted time without assistance

• Time to complete the tasks

• Number and types of errors, if any

• Path deviations

• Participant's verbalizations

• Participant's satisfaction ratings of the system

The results from the Usability Scale scored the subjective satisfaction with Implantable Devices functionality to be: PASSED.

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

- Comments
- Suggestions

Attached documents:

- Master Usability Test Scripts Workbook 2015 EHR Certification
  Includes:
  - Usability Test Script for Demographics
  - Usability Test Script for Problem List
  - Usability Test Script for Implantable Devices
  - Usability Test Script for CDS Rules
  - **Usability Test Script for Clinical reconciliation and Incorporation**
  - Pulse and CDS User Instructions
  - System Usability Scale Questions
- Master Usability for Calculations Spreadsheet with Results
- Spreadsheet with User info

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1 EXECUTIVE SUMMARY

An initial usability test of Pulse v 15.2 was conducted on December 3, 2018 via Webex by Community Health Services. The purpose of this test was to test and validate the usability of the current user interface and provide evidence of usability in the EHR under Test (EHRUT).

A new usability test of Pulse v15.2 was conducted on in June 2020 via WebEx by Community Health Services for the new functionality. The purpose of this test was to test and validate the usability of the current user interface and provide evidence of usability in the EHR under Test (EHRUT).

During the initial usability test, 10 healthcare providers matching the target demographic criteria served as participants and used the EHRUT in simulated, but representative tasks.

This study collected performance data on 51 tasks typically conducted

on an EHR in these categories:

- CDS Rules (Clinical Decision Support (§ 170.315 (a)(9) Clinical decision support (CDS))
- Problem List (§ 170.315 (a)(6) Problem list)
- Demographics (§ 170.315 (a)(5) Demographics)
- Implantable Devices (§170.315 (a)(14) Implantable device list)

A new usability testing was conduction for the new function. During the usability test 19 healthcare providers matching the target demographic criteria served as participants and used the EHRUT in simulated, but representative tasks.

This study collected performance data on 4 tasks typically conducted on an EHR for Clinical Information Reconciliation and Incorporation.

- Clinical information reconciliation and incorporation (§ 170.315 (b)(2) Clinical information reconciliation and incorporation)

During the hosted group usability test, the participants were greeted by the proctor and asked to review the instructions for the testing. They were instructed that they could withdraw at any time. Participants had varying amounts of prior experience with the EHR. The proctor introduced the test, and instructed participants to complete a series of tasks (given one at a time) using the EHRUT. During the testing, the participants timed each step of the actions of the testing and user performance data electronically. The proctor did not give the participant assistance in how to complete the task. The following types of data were collected for each participant:

- Number of tasks successfully completed within the allotted time without assistance
- Time to complete the tasks
- Number and types of errors, if any
- Path deviations
- 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 questionnaire. Various recommended metrics, in accordance with the examples set forth in the NIST Guide to the Processes Approach for Improving the Usability of Electronic Health Records, were used to evaluate the usability of the EHRUT. Following is a summary of the performance and rating data collected on the EHRUT.

The results from the System Usability Scale scored the subjective satisfaction with the system based on performance with these tasks to be: Passed (See the Master Usability Testing Workbook with results and calculations for specific numbers).

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

*Major findings, p*assed all tasks in each category.

No Major Issues or failures.

Suggestions/Areas for improvement

Demographics:

On registration screen must update race and save again as primary.

Implantable Devices:

Enter UDI Number: It would be great to have a way to scan this number in, instead of having staff type it.

STATUS and AREA verbiage: Would like to be able to make the STATUS and AREA verbiage in blue. This way the staff is aware it is a REQUIRED field.

Problem List:

Look up Problem: Would it be possible to be able to CLICK on the correct option rather than type in the desired number (ex - 001)

Clinical reconciliation and incorporation:

Please use a textual caption in addition the color change to indicate the problems that are not incorporated.

The button for incorporating problems meds and allergies is confusing. The allergy button should say "Add to Allergy List" instead of "Submit Reconciliation". The latter makes no sense to a provider.

The header is confusing here. Rather than saying "Reconciled Problems" say "Accept and add to Pulse Problem List" with the ability to cancel and fix if necessary.

The popup list should not say "reconciled allergies" but should say "Confirm New Allergies" instead of "Reconciled Allergies"

Do not need to include hospital meds as this is not same as admission med rec.

I suggest changing the button to incorporate into home med list rather than the term reconciliation.

Need textual description to designate unincorporated meds in addition to color change

2 INTRODUCTION

The EHRUT(s) tested for this study was Pulse v 15.2 designed to present medical information to healthcare providers in Acute Inpatient setting at CHS facilities, the EHRUT consists of electronic health records in the Inpatient setting. The usability testing attempted to represent realistic exercises and conditions. The purpose of this study was to test and validate the usability of the current user interface and provide evidence of usability in the EHR under Test (EHRUT). To this end, measures of effectiveness, efficiency and user satisfaction, such as the below items, were captured during the usability testing.

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

3 METHOD

3.1 PARTICIPANTS

A total of 29 participants were tested on the EHRUT(s). Participants in the test were Clinical healthcare providers and actual users; nurses, physicians, Health Information Management and IT engineers. Participants were recruited by CHS Corporate office. Recruited participants had a mix of backgrounds and demographic characteristics conforming to the recruitment screener. Attached is a spreadsheet of participants by characteristics, including demographics, professional experience, computing experience and user needs for assistive technology. Each task was completed by 10 participants.

Participant names were replaced with Participant IDs so that an individual's data cannot be tied back to individual Identities.

Participants were scheduled for 4 sessions with 5 minutes in between each session for debrief by the Proctor, and to reset systems to proper test and to review the next section instructions. A spreadsheet was used to keep track of the participants and included each participant's demographic characteristics as provided by the recruiter of participants.

3.2 STUDY DESIGN

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

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

Number of tasks successfully completed within the allotted time without assistance

Time to complete the tasks

Number and types of errors

Path deviations

Participant's verbalizations (comments)

Participant's satisfaction ratings of the system

3.3 TASKS

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

CDS Rule- Hearing

- User (Physician) Signs into MAP using appropriate user name and sign-in
- User selects a Newborn patient
- An "Alert Window' Appears
- Select Hyperlink
- Close Link
- Select 'X' in upper right corner of Intervention section.
- click on My Patients icon to return to full patient list

CDS Rule VTE 1:

- User (Physician) Signs into MAP using appropriate user name and sign-in
- User selects a Patient-meeting Criteria.
- An "Alert Window' Appears
- Select Hyperlink
- Close Link
- Select 'X' in upper right corner of Intervention section.
- click on My Patients icon to return to full patient list

CDS Rule VTE 2:

- User (Physician) Signs into MAP using appropriate user name and sign-in
- User selects a Patient-meeting Criteria.
- An "Alert Window' Appears
- Select Hyperlink
- Close Link
- Select 'X' in upper right corner of Intervention section.
- click on My Patients icon to return to full patient list

CDS Rule AMI 1:

- User (Physician) Signs into MAP using appropriate user name and sign-in
- User selects a Patient-meeting Criteria.
- An "Alert Window' Appears
- Select Hyperlink
- Close Link
- Select 'X' in upper right corner of Intervention section.
- click on My Patients icon to return to full patient list

CDS Rule CHF:

- User (Physician) Signs into MAP using appropriate user name and sign-in
- User selects a Patient-meeting Criteria.
- An "Alert Window' Appears
- Select Hyperlink
- Close Link
- Select 'X' in upper right corner of Intervention section.

- click on My Patients icon to return to full patient list

Problem List:

- Access Problem List
- Look up Problem
- Record Problem

Demographics:

- Date of Birth
- Race
- Ethnicity
- Preferred language
- Sex
- Sexual Orientation
- Gender Identity
- Preliminary Cause of Death
- Date of Death

Implantable Devices:

- Access Implantable Device Screen
- Add Implantable Device
- Enter UDI
- Accept returned Device Description

Clinical reconciliation and incorporation:

- PM - Patient matching - The user will complete match received external document to current EHR patient record
- PL - Reconcile and incorporate Problems - The user will complete the reconciliation and incorporation of Problems
- ALL - Reconcile and incorporate Allergies - The user will complete the reconciliation and incorporation of Allergies
- Med - Reconcile and incorporate Medication - The user will complete the reconciliation and incorporation of Medications

Tasks were selected based on their frequency of use, criticality of function, and those that may be most troublesome for users. Tasks should always be constructed in light of the study objectives.

3.4 PROCEDURES

Upon starting of the WebEx for testing, participants were greeted; their identity was verified and matched with a name on the participant schedule. Participants were then assigned a participant ID. To ensure that the test ran smoothly, two staff members participated in this test, the usability proctor and an assistant. The usability testing staff conducting the test was experienced usability practitioners with varied number of years of experience, educational backgrounds, and qualifications of the test proctors.

The proctor moderated the session including administering instructions and tasks. The participants monitored their task times, gave post-task rating data, path deviations, number and type of errors and noted their comments and suggestions.

A second person served as an assistant to assist the moderator to administer the test. Participants were instructed to perform the tasks (see specific instructions below): 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 task, the participants were given a written copy of the task. Task timing began once the administrator finished reading the question.

The task time was stopped once the participant indicated they had successfully completed the task.

Following the session, the proctor gave the participant the post-test questionnaire (e.g., the System Usability Scale, see Appendix 5.2) 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.

Participants were thanked for their time and compensated.

3.5 TEST LOCATION

The test facility was in the various participant facility locations via WebEx on the user's facility computer. Only the participants, proctors and observers were on the WebEx. Observers did not perform any tasks and were able to see the participants screen on the WebEx. To ensure that the environment was comfortable for users, the proctor asked that the participants and observers keep noise levels to a minimum unless they had questions.

3.6 TEST ENVIRONMENT

The EHRUT would be typically be used in a healthcare office or facility. In this instance, the testing was conducted in the Pulse v 15.2 Model Hospital Environment in various inpatient facilities.

For testing, the participant used a personal computer with MOCHA terminal emulation running AS400. The participants used a mouse and keyboard when interacting with the EHRUT. The [EHRUT] used various screen sizes, resolutions and color settings per their preference. The application was set up by the CHS Corporate IT office. The application itself was running on a AS400 platform using a test database on a [LAN / WAN] connection. Technically, the system performance (i.e., response time) was representative to what actual users would experience in a field implementation.

3.7 TEST FORMS AND TOOLS

During the usability test, various documents and instruments were used, including:

Usability Test Workbook (separate one for each participant by User type) that included:

- Testing Instructions
- Test Scripts for each Category
- Post-test Questionnaire

Examples of these documents can be found in Appendices 5.2

The test workbooks once completed were sent back to the proctor via email and then calculated.

3.8 PARTICIPANT INSTRUCTIONS

(See attached workbook in Appendices 5.2 for participant instructions)

3.9 USABILITY METRICS

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

The goals of the test were to assess:

1. Effectiveness of [EHRUT] by measuring participant success, rates and errors

2. Efficiency of [EHRUT] by measuring the average task time and path deviations

3. Satisfaction with [EHRUT] by measuring ease of use ratings

4.0 RESULTS

4.1 DATA SCORING

Measures Rationale and Scoring Effectiveness: Task Success A task was counted as a "Success" if the participant was able to achieve the correct outcome on a per task basis. 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. Average task times were calculated by taking each participant's time for each task in seconds and dividing it by the total number of times the task was performed.

Effectiveness: Task Failures If the participant abandoned the task or could not complete the task, it was counted as a failure. The total number of errors was calculated for each task and then divided by the total number of times that task was attempted and noted in percentages.

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. This path was compared to the optimal path. If there was a deviation, it was noted as a major or minor deviation. The number of deviations was added and then divided by the number of times the task was performed.

Efficiency: Task Time each task was timed from when the administrator said "Begin" until the participant said, "Done." Only task times for tasks that were successfully completed were included in the average task time analysis. Average time per task was calculated for each task.

Satisfaction: Task Rating Participant's subjective impression of the ease of use of the application was measured by administering both a simple post-task question as well as a post-session questionnaire. After each task, the participant was asked to rate "Overall, this task was:" on a scale of 1 (Very Difficult)

to 5 (Very Easy). These data are averaged across participants. 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 [EHRUT] 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."

4.2 RESULTS DATA ANALYSIS AND REPORTING

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

The usability testing results for the EHRUT are detailed in Appendices 5.3. The results should be seen in light of the objectives and goals outlined in Section Study Design. The data should yield actionable results that, if corrected, yield material, positive impact on user performance. Furthermore, the data should be presented in forms such as the tables so that the tasks can be easily identified, and their performance results examined and compared.

The results from the SUS (System Usability Scale) scored the subjective satisfaction with the system based on performance with these tasks to be: average and above average, per the ratings from the users. Broadly interpreted, scores under 60 represent systems with poor usability; scores over 80 would be considered above average.

4.3 DISCUSSION OF THE FINDINGS

EFFECTIVENESS based on the success, failure and path deviation data the effectiveness was shown to be effective with 100% passing of all tasks. Participants were complimentary of the functionality and the ease of use. Participants were satisfied with the outcomes of the scripts and were encouraged to know that education on use would be minimal.

EFFICIENCY based on the observations of the task time and deviation data, the product was shown to be completed within a reasonable time with no major deviations. Application ran quickly, and Alerts are not intrusive to the work flow

SATISFACTION: Based on the task ratings and SUS results data the product was average to above average per the ratings from the users and found to be easy to use. Participants provided good feedback and very complimentary of the application.

MAJOR FINDINGS: No Major issues or failures

AREAS FOR IMPROVEMENT: Users had the following areas for improvement:
<u>Demographics:</u>
On registration screen must update race and save again as primary.
<u>Implantable Devices:</u>
Enter UDI Number: It would be great to have a way to scan this number in, instead of having staff type it.
STATUS and AREA verbiage: Would like to be able to make the STATUS and AREA verbiage in blue. This way the staff is aware it is a REQUIRED field.
<u>Problem List:</u>

Look up Problem: Would it be possible to be able to CLICK on the correct option rather than type in the desired number (ex - 001)

Clinical reconciliation and incorporation

Please use a textual caption in addition the color change to indicate the problems that are not incorporated.

The button for incorporating problems meds and allergies is confusing. The allergy button should say "Add to Allergy List" instead of "Submit Reconciliation". The latter makes no sense to a provider.

The header is confusing here. Rather than saying "Reconciled Problems" say "Accept and add to Pulse Problem List" with the ability to cancel and fix if necessary.

The popup list should not say "reconciled allergies" but should say "Confirm New Allergies" instead of "Reconciled Allergies"

I suggest changing the button to incorporate into home med list rather than the term reconciliation.

Need textual description to designate unincorporated meds in addition to color change

5.0 APPENDICES

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

5.1 Participant demographics

5.2 Usability Test Workbook (separate one for each participant by User ID) that included:

- Testing Instructions
- Test Scripts for each Category
- System Usability Scale Questionnaire

5.3 Master Calculated Results Spreadsheet