Usability Test Report – Woundtech EMR

Version: Woundtech EMR v2.0

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UCD Process Used: NISTIR 7741: Schumacher, Robert M., and Svetlana Z. Lowry. (NISTIR 7741) NIST, Guide to the Processes Approach for Improving the Usability of Electronic Health Records. NIST, 29 Nov. 2010. Web.
https://nvlpubs.nist.gov/nistpubs/Legacy/IR/nistir7741.pdf

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Table of Contents

1. Executive Summary **3**
2. Introduction **4**
3. Methodology **5**
3.1 Participants **5**
3.2 Study Design **7**
3.3 Tasks **8**
3.4 Procedure **9**
3.5 Test Location & Environment **11**
3.6 Participant Instructions **12**
3.7 Usability Metrics **13**
3.8 Data Scoring **14**
4. Results **16**
4.1 Data Analysis & Reporting **16**
4.2 Discussions & Findings **20**
5. Appendices **24**
5.1 Appendix 1: Informed Consent **24**
5.2 Appendix 2: Sample of Moderator's Guide **24**
5.3 Appendix 3: Task Test Scenarios **25**
5.4 Appendix 4: Pre-test Questionnaire **31**
5.5 Appendix 5: System Usability Scale & Post Test Questionnaire **35**

1. Executive Summary

This report presents the findings from the usability testing of Woundtech EMR v2.0. Conducted in accordance with the NISTIR 7742 Customized Common Industry Format Template for Electronic Health Record Usability Testing (EHRUT). The study employed a user-centered design process as outlined in NISTIR 7741.

A summative usability study of Woundtech EMR v2.0 was conducted between February 16, 2026 and April 22, 2026. The purpose of this study was to evaluate the usability of the system's user interface and workflows and to provide objective evidence of usability in support of ONC §170.315(g)(3) Safety Enhanced Design (SED) requirements.

The study was conducted remotely using simulated but representative clinical scenarios. A total of 13 participants, representative of the intended end-user population, completed the study across four certification criteria:

- **§170.315(a)(1)** – Computerized Provider Order Entry (CPOE) – Medications
- **§170.315(a)(5)** – Demographics
- **§170.315(a)(14)** – Implantable Device List
- **§170.315(b)(11)** – Decision Support Interventions

Participants completed 22 tasks aligned to real-world clinical workflows within the Woundtech EMR.

Tasks Evaluated

CPOE – Medications

1. Enter a new medication order for a patient
2. Cancel or discontinue a patient's medication order
3. Review list of active and inactive medications
4. Create a drug allergy alert for a patient

Patient Demographics

5. Search for a patient record, navigate, and view patient demographics details
6. Edit or update the patient's ethnicity type
7. Edit or update the patient's preferred language
8. Save changes and verify updated demographics persist correctly
9. View demographics summary in a patient summary report

Implantable Devices

10. Navigate to a patient record and access Implantable Devices menu option
11. Search and view patient's existing implantable device information
12. Add a new implantable device to a patient record
13. Update and save the existing implantable device status

Decision Support Interventions

14. Navigate to the Decision Support Intervention Dashboard view
15. View an existing evidence based DSI details
16. Edit the Security Level of an existing DSI

17. Add additional evidence based DSI criteria
18. Update the evidence based DSI Action/Recommendations
19. Preview and save changes to the evidence based DSI
20. Navigate to a patient record, treatment section, and view the evidence based DSI
21. View the clinical-based guideline detail for the evidence based DSI
22. Take an action on the intervention

Each usability session was conducted as a one-hour, one-on-one, moderated session. Participants were provided with an overview of the study, completed an informed consent process, and were informed they could withdraw at any time. All participants had prior experience with electronic health record systems and were representative of the Woundtech EMR user base.
During the sessions, participants were asked to complete tasks sequentially while interacting with the system. The facilitator observed and recorded performance data in real time. Sessions were conducted remotely, and participant screen activity and audio were recorded for subsequent analysis.

Data Collection
The following usability metrics were collected for each task:

- Task success rate (completion without assistance)
- Time to complete tasks
- Number and type of errors
- Path deviations from optimal workflow
- Participant rating of tasking using Likert Scale
- Participant verbal feedback and observations

All participant data was **de-identified**, ensuring no linkage between individuals and the collected data.

2. Introduction

Woundtech EMR is a proprietary electronic medical record system designed to support clinical workflows for wound care management across ambulatory and home-based care settings. The system enables healthcare providers to document patient encounters, manage clinical data, coordinate care, and support treatment decisions.

The usability testing conducted in this study was designed to reflect realistic clinical scenarios and workflows representative of the Woundtech EMR user environment. Testing focused on routine, day-to-day tasks performed by end users, including patient documentation, medication management, implantable device tracking, and clinical decision support interactions, to ensure alignment with real-world usage conditions.

3. Methodology

Summative usability testing was conducted using representative end users performing realistic clinical tasks.

3.1 Participants

A total of 13 participants were included in the usability testing of Woundtech EMR v2.0. Participants represented healthcare providers and administrative users involved in the day-to-day documentation, coordination, and management of patient clinical data within Woundtech's care delivery model. Roles included Nurse Practitioners, Clinical Team Leads, Patient Care Navigators, Patient Case Managers, and Clinical Leadership.

Participants were recruited internally based on predefined end-user characteristics aligned with the intended user population of Woundtech EMR. All participants were representative of actual system users and had prior experience with electronic medical record systems. None of the participants were involved in the design or development of the Woundtech EMR system.

Participants were provided with the same level of orientation and training that a typical end user would receive. For the purposes of the study, key user characteristics were identified and translated into a recruitment screener to ensure appropriate representation across roles, experience levels, and technical proficiency.

The participant group reflected a diverse range of clinical and operational experience, including:

- Professional experience ranging from approximately 11 years to 42 years (132 to 504 months)
- Computer experience ranging from approximately 11 years to 34 years (132 to 408 months)
- Product (EMR) experience ranging from approximately 7 years to 30 years (84 to 360 months)

All participant data was de-identified, and participant IDs were used to ensure anonymity. No personally identifiable information is included in this report.

All 13 scheduled participants completed the study, with no no-shows or drop-offs.

Participants were scheduled for 60-minute individual usability sessions, with time allocated between sessions for facilitator debriefing and data review. Scheduling was coordinated using Microsoft Outlook, and all usability testing sessions were conducted remotely using Microsoft Teams, where participant screen activity and audio were recorded for analysis.

Participant Demographics and Experience

Table 1. Participant Demographics

Participant ID	Job Title	Age Range	Education Level	Professional Experience (Months)	Computer Experience (Months)	Product Experience (Months)	Gender	Assistive Tech Required
p1	Patient Care Navigator	20–29	Associate's degree	132	132	132	F	No
p2	Patient Care Navigator	30–39	High School Diploma	132	180	132	F	No
p3	Patient Care Navigator	30–39	Technical College Degree	156	156	108	F	No
p4	Executive Director, Clinical Integration & Education	50–59	Master's Degree	408	408	360	F	No
p5	Clinical Team Lead	30–39	Master's Degree	216	240	180	F	No
p6	Executive Director, Clinical Integration & Education	50–59	Master's Degree	252	252	240	F	No
p7	Nurse Practitioner	40–49	Master's Degree	240	300	84	F	No
p8	Clinical Team Lead	50–59	Doctorate	300	396	300	F	No
p9	Nurse Practitioner	30–39	Bachelor's Degree	300	300	120	F	No
p10	Patient Care Navigator	40–49	Bachelor's Degree	192	240	192	F	No
p11	Patient Case Manager	60–69	Bachelor's Degree	504	360	240	F	No
p12	Clinical Team Lead	40–49	Master's Degree	300	300	300	F	No
p13	Physician Assistant	40–49	Master's Degree	96	300	96	F	No

3.2 Study Design

The primary objective of this usability study was to evaluate the effectiveness, efficiency, and user satisfaction of Woundtech EMR and to identify areas where the system performs well, as well as areas requiring improvement.

The study aimed to assess how effectively end users are able to complete representative clinical tasks, how efficiently those tasks are performed, and how satisfied users are with the overall interaction experience.

This evaluation also serves as a baseline for future usability assessments, enabling comparison across subsequent versions of Woundtech EMR and supporting continuous improvement efforts.

During the usability study, participants interacted exclusively with Woundtech EMR. Each participant completed the testing using their own equipment and in a location of their choosing, creating an environment that closely reflects real-world usage conditions. This approach was intentionally designed to ensure that findings are grounded in practical, day-to-day workflows and user behaviors.

The study evaluated usability based on established NISTIR principles, focusing on three core dimensions:

- Effectiveness – the accuracy and completeness with which users achieve specified goals
- Efficiency – the resources expended (e.g., time, steps) in achieving those goals
- Satisfaction – users' comfort and acceptability of use

To support these evaluations, the following measures were collected and analyzed for each participant:

- Number of tasks successfully completed within the allotted time without assistance
- Time required to complete each task
- Number and type of errors encountered
- Path deviations from the optimal workflow
- Participant verbalizations and qualitative feedback
- Participant satisfaction ratings (Likert scale)

These measures provide a comprehensive view of system usability and enable both quantitative and qualitative analysis of user interaction with Woundtech EMR. Additional details regarding the definition and calculation of these measures are provided in the methodology section of this report.

3.3 Tasks

The tasks included in this usability study were designed to reflect realistic, end-to-end clinical workflows that users routinely perform within Woundtech EMR. Tasks were carefully selected to ensure coverage of both high-frequency user activities and safety-critical functions, enabling a comprehensive evaluation of system usability across key certification criteria.

Task selection was guided by the study objectives and informed by:

- Frequency of use in daily clinical and operational workflows
- Criticality to patient safety and clinical decision-making
- Potential for user error or workflow breakdown

A risk-based assessment was conducted to prioritize tasks, considering both the likelihood of occurrence and the potential impact of errors on patient safety and care outcomes. Tasks with higher risk profiles and greater clinical significance were emphasized to ensure alignment with ONC Safety Enhanced Design (SED) expectations.

Each participant was assigned the same standardized set of tasks, as outlined in Table 2, to ensure consistency across test sessions and enable reliable comparison of performance metrics. Tasks were presented sequentially and were timed and observed during execution.

Participants were provided with written instructions for each task and were encouraged to ask clarifying questions before and after task execution. No assistance was provided during task completion unless necessary to prevent prolonged task failure, in accordance with standard usability testing practices.

The tasks were designed to simulate real-world conditions, ensuring that user interactions with Woundtech EMR accurately reflect practical usage scenarios and workflows.

Table 2. Task Testing Scenarios

Task ID	Criterion	Task Description
a1.1	§170.315(a)(1) – CPOE	Enter a new medication order for a patient
a1.2	§170.315(a)(1) – CPOE	Cancel or discontinue a patient's medication order
a1.3	§170.315(a)(1) – CPOE	Review list of active and inactive medications
a1.4	§170.315(a)(1) – CPOE	Create a drug allergy alert for a patient
a5.1	§170.315(a)(5) – Patient Demographics	Search for a patient record, navigate, and view patient demographics details
a5.2	§170.315(a)(5) – Patient Demographics	Edit or update the patient's ethnicity type

Task ID	Criterion	Task Description
a5.3	§170.315(a)(5) – Patient Demographics	Edit or update the patient's preferred language
a5.4	§170.315(a)(5) – Patient Demographics	Save changes and verify updated demographics persist correctly
a5.5	§170.315(a)(5) – Patient Demographics	View demographics summary in a patient summary report
a14.1	§170.315(a)(14) – Implantable Devices	Navigate to a patient record and access Implantable Devices menu option
a14.2	§170.315(a)(14) – Implantable Devices	Search and view patient's existing implantable device information
a14.3	§170.315(a)(14) – Implantable Devices	Add a new implantable device to a patient record
a14.4	§170.315(a)(14) – Implantable Devices	Update and save the existing implantable device status
b11.1	§170.315(b)(11) – Decision Support Interventions	Navigate to the Decision Support Intervention Dashboard view
b11.2	§170.315(b)(11) – Decision Support Interventions	View an existing evidence based DSI details
b11.3	§170.315(b)(11) – Decision Support Interventions	Edit the Security Level of an existing DSI
b11.4	§170.315(b)(11) – Decision Support Interventions	Add additional evidence based DSI criteria
b11.5	§170.315(b)(11) – Decision Support Interventions	Update the evidence based DSI Action/Recommendations
b11.6	§170.315(b)(11) – Decision Support Interventions	Preview and save changes to the evidence based DSI
b11.7	§170.315(b)(11) – Decision Support Interventions	Navigate to a patient record, treatment section, and view the evidence based DSI
b11.8	§170.315(b)(11) – Decision Support Interventions	View the clinical-based guideline detail for the evidence based DSI
b11.9	§170.315(b)(11) – Decision Support Interventions	Take an action on the intervention

3.4 Procedure

Upon initiation of each usability testing session, participants joined a scheduled video conference session and were greeted by the study administrator. Participant identity was confirmed and matched to the study schedule, and each participant was assigned a unique participant ID to ensure anonymity. Participants were then asked to review and electronically sign the Informed Consent and Non-Disclosure Agreement before beginning the session (see Appendix 1).

The Moderator conducting the sessions had prior experience with Woundtech EMR, including domain familiarity and product knowledge, ensuring consistency in task administration and participant guidance.

Participants were instructed to complete each task as efficiently and accurately as possible, minimizing errors and deviations. Tasks were designed to reflect realistic clinical workflows and were presented with sufficient context to align with typical system usage.

For each task:

- Participants were provided with written instructions
- Task timing began once the participant initiated the task
- Task timing ended when the participant indicated completion or was unable to proceed further
- Participants completed tasks without assistance; however, the Moderator was permitted to provide non-directive clarification (e.g., restating instructions) but did not guide how to perform tasks

The following data points were captured during task execution:

- Task success (completed without assistance)
- Time on task
- Number and type of errors
- Path deviations from the optimal workflow
- Participant verbalizations and observations
- Participant Task Satisfaction (Likert scale)

After completing each task or task group, participants were asked to provide a task satisfaction rating using a 5-point Likert scale (1 = very difficult, 5 = very easy).

At the conclusion of the session, participants were also asked to provide qualitative feedback regarding areas for improvement and overall experience with the system and comparison to previous EHR applications they may have used.

Usability feedback and the System Usability Scale (SUS) details can be found in Appendix 5.

All sessions were conducted remotely using screen-sharing technology, and participant screen activity and audio were recorded for subsequent analysis. Participants completed testing using their own equipment and in their preferred environment, ensuring that testing conditions closely reflected real-world usage.

All participant data was de-identified and kept confidential. Demographic information, task performance data, and qualitative feedback were recorded in a structured dataset for analysis. At the conclusion of each session, participants were thanked for their time, recordings were stopped, and the session was formally closed.

3.5 Test Location & Environment

Usability testing for Woundtech EMR was conducted remotely, with participants completing sessions from locations of their choosing. These locations were representative of the environments in which participants typically perform their day-to-day responsibilities, ensuring that testing conditions closely reflected real-world usage scenarios.

All sessions were conducted using Microsoft Teams, which was used for video conferencing, screen sharing, and session recording. Participant screen activity and audio were recorded to support detailed post-session analysis and ensure accuracy in data capture.

Participants accessed the Woundtech EMR Production environment using their standard system access and typical hardware configurations, including their normal work computers, tablets or laptops, keyboard, and mouse.

The system was accessed via standard web browsers (e.g., Google Chrome or Microsoft Edge). Screen display settings were maintained at standard resolution (no greater than 100% magnification) to ensure consistent system visibility across sessions.

To ensure data privacy and compliance with HIPAA requirements, participants were provided with designated test patient records for the completion of usability tasks. These test records were used for all applicable scenarios to prevent exposure of protected health information (PHI).

For select scenarios where interaction with non-test data was required for demonstration purposes, participants were instructed to navigate using a “think-aloud” approach and stop prior to any action that would modify real patient data. No real patient data was altered during the course of testing.

Participants were informed that all session recordings would be securely stored and used solely for usability analysis by authorized personnel. No participant requested or required alternative testing methods such as remote desktop control; however, this option was available if needed.

During the usability study, the following materials and instruments were utilized:

- Informed Consent Form
- Non-Disclosure Agreement (NDA)
- Moderator’s Guide
- Task Scripts and Instructions
- Post-Test Questionnaire and System Usability Scale (SUS)

These materials are provided in the Appendices of this report. The Moderator’s Guide was designed to ensure consistency in session facilitation and to support accurate capture of all required usability metrics.

3.6 Participant Instructions

Prior to each usability testing session, participants were provided with a Safety Enhanced Design(SED) Testing Packet, which included the participant's guide, study overview, tasks overview, and required documentation (e.g., Informed Consent and Non-Disclosure Agreement). Participants were instructed to review and complete all required forms before beginning the session.

At the start of each session, the Moderator read a standardized orientation script to ensure consistency across all participants. The script outlined the purpose of the study, session expectations, and instructions for task completion. Audio and video were recorded for each session to support usability analysis.

Participants were informed that the session would consist of task-based testing across four functional areas of Woundtech EMR, including:

- Patient Demographics
- Implantable Devices
- Decision Support Interventions
- Medication Ordering (via integrated e-prescribing functionality)

Participants were advised that the session would last approximately one hour and that tasks would range in complexity from simple to more advanced clinical workflows.

Moderator Instructions to Participants

The Moderator provided the following standardized instructions:

- Participants were asked to share their screen so that interactions with Woundtech EMR could be recorded for analysis
- Recordings were described as confidential and used solely for usability evaluation purposes
- Participants were instructed to use the “think-aloud” method, verbalizing their thoughts, actions, and observations while completing tasks
- Participants were encouraged to provide honest and transparent feedback, including areas of confusion or difficulty

Participants were instructed to:

- Complete each task as quickly and accurately as possible without assistance
- Indicate completion of each task by stating “Done”
- Notify the Moderator if they were unable to complete a task or became stuck, at which point the session would proceed to the next task

The Moderator clarified that:

- The session was not an evaluation of the participant’s performance, but rather an evaluation of the system’s usability
- Participants could ask questions, though responses during task execution would be limited to avoid influencing results
- Participants could stop the session at any time, at which point recording would cease

Task Execution Instructions
For each task:

- The Moderator read the task instructions aloud to the participant
- The Moderator indicated the start of the task by stating “Start”
- Participants performed the task while verbalizing their actions and thought process
- Upon completion, participants indicated completion by stating “Done”

After each task, participants were asked to rate task difficulty using a 5-point Likert scale:

- 1 – Very Difficult
- 2 – Difficult
- 3 – Neutral
- 4 – Easy
- 5 – Very Easy

Data Privacy and Testing Conditions
Participants were informed that:

- All tasks would be conducted using test patient records, ensuring that no protected health information (PHI) was exposed
- All recordings and collected data would be handled by HIPAA-compliant personnel and systems
- Data collected would be used solely for usability analysis and product improvement

Participants were also informed that demographic information would be collected at the beginning of the session to support grouping and analysis of usability results.

Session Initiation
Following verification of completed consent forms and demographic data collection, participants were asked if they had any questions before beginning. Once confirmed, the Moderator initiated the session and proceeded with task execution.

3.7 Usability Metrics

In accordance with the NIST Guide to the Processes Approach for Improving the Usability of Electronic Health Records (NISTIR 7742), electronic health record systems should support workflows that enable users to interact with the system effectively, efficiently, and with an acceptable level of satisfaction.

To evaluate the usability of Woundtech EMR, a comprehensive set of quantitative and qualitative metrics was collected during usability testing. These metrics were designed to assess system performance across the three core usability dimensions defined by NISTIR:

- Effectiveness – the accuracy and completeness with which users achieve specified goals
- Efficiency – the resources expended (e.g., time, steps) to complete tasks
- User Satisfaction – users’ perceptions of ease of use and overall experience

3.8 Data Scoring

The data scoring methodology for this study was developed in alignment with NISTIR 7742 to evaluate usability across the dimensions of effectiveness, efficiency, and user satisfaction.

Task performance was measured using quantitative metrics, including task success rates, errors, task completion time, and path deviations from optimal workflows.

User satisfaction was measured through post-task Likert-scale ratings and a post-test System Usability Scale (SUS) questionnaire. In addition, qualitative feedback from participant verbalizations was captured to identify usability challenges and opportunities for improvement.

Table 3. Rational & Scoring Details

Measure Category	Measure	Rationale and Scoring Methodology
Effectiveness	Task Success	A task was counted as a "success" if the participant achieved the correct outcome without assistance within the allotted task time. The total number of successful completions was divided by the total number of attempts and reported as a percentage. Observed task time divided by optimal task time was used to assess efficiency relative to expected performance. Optimal task time was established based on expert performance under realistic conditions and adjusted by a factor of 1.25 to account for non-expert users.
Effectiveness	Task Failure	A task was counted as a "failure" if the participant abandoned the task, performed it incorrectly, or did not complete it within the allotted time. No task time was recorded for failed tasks. Failure rates were calculated as the number of failed attempts divided by total attempts.
Effectiveness	Errors	Errors were recorded when a participant completed a task but performed one or more steps incorrectly. The total number of errors per task was calculated and divided by the number of participants. Error types were also categorized qualitatively to identify common usability issues and areas of risk.
Efficiency	Task Time	Task time was measured from when the Moderator indicated the start of the task ("Start") until the participant indicated completion ("Done") or ceased task activity. Only completed tasks were included in the time analysis. Average task time was calculated per task, along with standard deviation and standard error to assess variability.
Efficiency	Task Time Deviation	Task time deviation was calculated by comparing the observed task time to the predefined optimal task time. Optimal times

Measure Category	Measure	Rationale and Scoring Methodology
	(Optimal)	were derived from expert user performance and adjusted using a multiplier (e.g., 1.25) to allow for variability among typical users. This ratio was aggregated across participants and tasks to evaluate efficiency.
Efficiency	Path Deviations	Participant navigation paths were recorded and compared to predefined optimal workflows. A path deviation occurred when a participant navigated to an incorrect screen, selected an incorrect option, or performed unnecessary steps. Path deviation was calculated as the ratio of observed steps to optimal steps.
Satisfaction	Task Rating (Ease of Use)	After each task, participants rated task difficulty using a 5-point Likert scale (1 = Very Difficult, 5 = Very Easy). Ratings were averaged across participants. This data is averaged across all participants.
Satisfaction	Post-Test Questionnaire & SUS	Overall system usability was assessed using post-test questionnaires and the System Usability Scale (SUS). These measures evaluated user confidence, satisfaction, and perceived usability of Woundtech EMR. Results were aggregated across participants to provide an overall usability score.
Qualitative	Participant Verbalizations	Participant comments and think-aloud feedback were recorded during task execution. These qualitative insights were used to identify usability challenges, workflow inefficiencies, and areas for improvement not captured through quantitative metrics.

4. Results

The usability testing results for Woundtech EMR were analyzed and calculated in accordance with the methodology defined in the Usability Metrics section. These results should be interpreted in the context of the study objectives and design outlined earlier in this report, with a focus on evaluating system performance across effectiveness, efficiency, and user satisfaction.

The findings provide both quantitative and qualitative insights into user interaction with Woundtech EMR and are intended to identify strengths as well as areas requiring improvement. The data collected is designed to yield actionable outcomes, such that addressing identified usability challenges is expected to result in meaningful improvements in user performance, workflow efficiency, and overall system usability.

4.1 Data Analysis & Reporting

The results of the usability evaluation for the Woundtech EMR are summarized below and should be interpreted in the context of the study objectives and goals described in the Study Design section. The findings are intended to identify areas of strength as well as opportunities for improvement, to enhance overall user performance, efficiency, and satisfaction.

Table 4. Results of Each Tasks / Measure

CPOE – Medications – 170.315(a)(1)

Task Description	N	Task Success	Path Deviations	Task Time (Secs)	Task Time Dev (Secs)	Task Errors	Task Rating (5=Easy)
	#	Mean (SD)	Observed/Optimal	Mean (SD)	Observed/Optimal	Mean (SD)	Mean (SD)
Enter a new medication order for a patient	10	100 (0)	2/0	78 (67)	38/0	0.1 (3.2)	4.4 (0.80)
Cancel or discontinue a patient's medication order	10	100 (0)	2/0	39 (21)	18/0	0 (0)	4.7 (0.60)
Review list of active & inactive medications	10	100 (0)	0/0	14 (7)	3/0	0 (0)	5.0 (0.00)
Create drug allergy alert for a patient	10	100 (0)	1/0	34 (15)	13/0	0 (0)	5.0 (0.00)

Patient Demographics – 170.315(a)(5)

Task Description	N	Task Success	Path Deviations	Task Time (Secs)	Task Time Dev (Secs)	Task Errors	Task Rating (5=Easy)
	#	Mean (SD)	Observed/Optimal	Mean (SD)	Observed/Optimal	Mean (SD)	Mean (SD)
Search for a patient record, navigate and view the patient demographics detail	10	100 (0)	0/0	22 (15)	12/0	0.1 (3.2)	4.9 (0.30)
Edit or update the patient's ethnicity type	10	90 (30)	0/0	16 (11)	9/0	0.2 (4.5)	4.7 (0.60)
Edit or update the patient's preferred language	10	100 (0)	3/0	20 (11)	10/0	0.3 (5.5)	4.4 (0.80)
Save changes and verify updated demographics persist correctly	10	100 (0)	1/0	10 (6)	3/0	0/0	4.9 (0.30)
View demographics summary in a patient summary report	10	100 (0)	2/0	21 (13)	15/0	0.1 (3.2)	4.9 (0.30)

Implantable Devices – 170.315(a)(14)

Task Description	N	Task Success	Path Deviations	Task Time (Secs)	Task Time Dev (Secs)	Task Errors	Task Rating (5=Easy)
	#	Mean (SD)	Observed/Optimal	Mean (SD)	Observed/Optimal	Mean (SD)	Mean (SD)
Navigate to a patient record and access Implantable Devices menu option	10	100 (0)	1/0	9 (4)	1/0	0 (0)	5.0 (0.00)
Search and view patient's existing implantable device information	10	80 (40)	5/0	32 (25)	20/0	0.3 (5.5)	4.1 (0.80)
Add a new implantable device to a patient record	10	90 (30)	5/0	41 (17)	14/0	0.1 (3.2)	4.2 (0.90)
Update and save the existing implantable device status	10	100 (0)	2/0	22 (11)	7/0	0 (0)	4.9 (0.30)

Decision Support Interventions – 170.315(b)(11)

Task Description	N	Task Success	Path Deviations	Task Time (Secs)	Task Time Dev (Secs)	Task Errors	Task Rating (5=Easy)
	#	Mean (SD)	Observed/Optimal	Mean (SD)	Observed/Optimal	Mean (SD)	Mean (SD)
Navigate to the Decision Support Intervention Dashboard View	10	100 (0)	0/0	6 (3)	2/0	0 (0)	5.0 (0.00)
View an existing evidence based DSI details	10	100 (0)	0/0	9 (5)	2/0	0 (0)	5.0 (0.00)
Edit the Security Level of an existing DSI	10	100 (0)	0/0	15 (6)	7/0	0 (0)	5.0 (0.00)
Add additional evidence based DSI criteria	10	100 (0)	1/0	18 (11)	10/0	0 (0)	5.0 (0.00)
Update the evidence based DSI Action/Recommendations	10	90 (30)	2/0	31 (26)	26/0	0.1 (3.2)	4.7 (0.50)
Preview and save changes to the evidence based DSI	10	100 (0)	1/0	14 (6)	7/0	0 (0)	4.9 (0.30)
Navigate to a patient record, treatment section, and view the evidence based DSI	10	70 (45.8)	9/0	51 (47)	31/0	0.3 (5.5)	3.6 (1.30)
View the clinical-based guideline detail for the evidence based DSI	10	100 (0)	0/0	13 (4)	3/0	0 (0)	5.0 (0.00)
Take an action on the intervention	10	100 (0)	0/0	5 (2)	0/0	0 (0)	5.0 (0.00)

4.2 Discussion of the Findings

4.2.1 Summary of Findings

The summative usability evaluation of Woundtech EMR demonstrates that users are able to effectively, efficiently, and satisfactorily complete representative clinical and administrative tasks across the evaluated ONC criteria.

Participants achieved high task success rates (90–100%) across most tasks, with low error rates and strong satisfaction scores (4.4–5.0), indicating a generally intuitive and usable system.

CPOE – Medications (170.315(a)(1)

Participants demonstrated consistently high performance (100% success) across all medication-related tasks. Minimal path deviations and low error rates indicate that workflows for entering, reviewing, and managing medications are well-structured and intuitive. Slight variability in task time for medication entry suggests differences in user familiarity but did not impact overall usability. Satisfaction ratings (4.4–5.0) reflect strong user confidence in medication workflows.

Patient Demographics (170.315(a)(5)

Patient Demographics tasks showed high usability with strong success rates (90–100%) and high satisfaction (4.4–4.9). Minor usability challenges were observed in:

- Ethnicity field location, where users initially expected alignment with Preferred Language
- Preferred language updates, which showed slight increases in path deviations

These findings suggest opportunities to improve field grouping and discoverability, though overall task completion remained efficient and accurate.

Implantable Devices (170.315(a)(14)

While core navigation tasks performed well, reduced success rates (80–90%) and increased path deviations (5 observed) were noted in:

- Searching/viewing device information
- Adding new devices

Participants expressed uncertainty around search functionality effectiveness, particularly whether search would filter large device lists. These findings indicate moderate usability friction in search and data retrieval workflows, though overall satisfaction remained positive (4.1–4.9).

Decision Support Interventions (170.315(b)(11)

Administrative and configuration tasks demonstrated excellent usability (100% success, minimal deviations), confirming that structured workflows are clear and efficient.

However, a notable drop in performance occurred in patient-facing workflows:
While administrative configuration tasks demonstrated high usability and efficiency, participants experienced increased difficulty navigating to and interacting with DSI content within the patient

treatment workflow. This resulted in lower task success rates, increased path deviations, and higher error rates for patient-facing tasks, indicating opportunities to improve discoverability and integration of DSI within clinical workflows.
Specifically:

- Task success dropped to 70%
- Path deviations increased significantly (9 observed)
- Satisfaction decreased (3.6 mean)

Observed path deviations were primarily driven by participants exploring multiple navigation paths:

- Observed path deviations were primarily driven by participants exploring multiple navigation paths to locate DSI content within the patient record.
- Errors were not system-related but tied to navigation:
- Errors observed were primarily related to navigation and task initiation rather than system failures or incorrect functionality.
- High performance in administrative tasks is attributable to workflow clarity:
- Participants demonstrated strong performance in configuration tasks, likely due to clearer workflow structure and controlled interaction paths**.**

4.2.2 Major Takeaways

Overall task performance indicates:

- High task success rates (generally 90–100%)
- Low observed error rates
- High user satisfaction scores (generally ≥ 4.4 on a 5-point scale)

Performance was strongest in structured workflows (e.g., CPOE and administrative configuration tasks), where users followed predictable paths with minimal deviation.
Reduced performance was observed in navigation-dependent workflows, specifically:

- Implantable Device search and entry
- Decision Support Intervention (DSI) navigation within patient records

These findings indicate that Woundtech EMR supports accurate task completion, with observed usability challenges primarily related to navigation and feature discoverability, rather than system functionality.

4.2.3 Effectiveness

Effectiveness was assessed using task success rates, task failures, and observed errors.
Across all evaluated criteria, participants demonstrated high effectiveness, with most tasks achieving success rates between 90% and 100%. Tasks associated with CPOE (170.315(a)(1)) and administrative DSI workflows (170.315(b)(11)) achieved 100% task success, indicating that users were able to reliably complete these tasks as intended.
Lower success rates were observed in:

- Implantable Device workflows (80–90%)

- DSI navigation within patient workflows (70%)

Observed failures were primarily attributable to:

- Difficulty locating functionality
- Variability in navigation paths

Errors were infrequent and non-critical, and were generally associated with:

- Initial navigation steps
- Task initiation
- Feature location

No errors resulted in incorrect system outcomes. These findings support that Woundtech EMR enables accurate and safe task completion when used as intended.

4.2.4 Efficiency

Efficiency was evaluated using task completion time, task time deviation, and path deviations. Participants were generally able to complete tasks within expected time ranges, with low variability observed across most workflows. Efficiency was highest in:

- CPOE workflows, which demonstrated consistent task times and minimal path deviations
- Administrative DSI workflows, which followed clearly defined interaction paths

Reduced efficiency was observed in:

- Implantable Device workflows, where increased path deviations (up to 5 observed) were noted
- DSI navigation within patient workflows, where:
    - Path deviations increased (up to 9 observed)
    - Task completion times were longer and more variable

Observed inefficiencies were primarily due to:

- Exploration of multiple navigation paths
- Uncertainty in search behavior
- Additional steps required to access embedded functionality

Despite these findings, tasks were generally completed successfully, indicating localized inefficiencies rather than systemic usability issues.

4.2.5 Satisfaction

Satisfaction was assessed using post-task Likert scale ratings and post-test usability feedback, including System Usability Scale (SUS) responses.

Participants reported high overall satisfaction with Woundtech EMR, with most task ratings ranging from 4.4 to 5.0, indicating that tasks were perceived as easy to complete.

Lower satisfaction ratings were observed in:

- Implantable Device workflows (mean 4.1–4.2)
- DSI navigation within patient workflows (mean 3.6)

These ratings are consistent with observed findings related to:

- Navigation complexity
- Feature discoverability
- Workflow integration

Qualitative feedback indicates that:

- Users perceive the system as intuitive and comparable to or easier than other EMRs
- System usability improves with familiarity
- Initial interaction may require additional effort to locate specific features

4.2.6 Areas for Improvement

Based on the findings, the following usability improvements are recommended:

1. Improve Feature Discoverability
    - Enhance grouping and visibility of related demographic fields
    - Improve visibility of alerts and DSI content within patient workflows
2. Optimize Search Functionality
    - Improve responsiveness and reduce reliance on manual search actions (e.g., “Apply”)
    - Introduce predictive or auto-search capabilities
    - Ensure clear and consistent filtering behavior
3. Enhance DSI Integration
    - Improve placement and accessibility of DSI content within patient records
    - Reduce navigation steps required to access DSI
    - Consider embedding DSI directly into clinical workflows
4. Reduce Navigation Complexity
    - Streamline multi-step workflows
    - Improve consistency in navigation patterns
    - Minimize unnecessary user actions
5. Expand Data Flexibility
    - Add additional selectable values where applicable (e.g., language options)
    - Improve configurability of structured fields
6. Address Minor Usability Enhancements
    - Improve access to commonly used features
    - Enhance clarity of less frequently used workflows

5. Appendices

5.1 Appendix 1: Informed Consent

The following Informed Consent was used to receive participants' permission to participate in the usability study.

Informed Consent
I acknowledge and agree that your participation in this study is voluntary, and you may withdraw consent or discontinue participation at any time. You acknowledge and agree that you will be video and voice-recorded for the duration of the study. WOUNDTECH reviews and utilizes these recordings and your feedback for research and product improvement purposes only.

I understand that by participating, I grant WOUNDTECH a perpetual, royalty-free, exclusive license to use my feedback and recordings for research and product improvement purposes. I relinquish any rights to the recordings and feedback and understand the recordings and feedback are solely owned by WOUNDTECH and may be copied and used by WOUNDTECH without further notification to you.

I acknowledge and agree that the data collected from this study may be de-identified and shared outside of WOUNDTECH.

I agree to immediately raise any concerns or areas of discomfort, or your decision to withdraw from the study, with the study administrator.

☐ YES, I have read the above statement and agree to be a participant.

☐ NO, I choose not to participate in this study.

Signature: _____ Date: _____

5.2 Appendix 2: Sample of Moderator's Guide

Thank you for participating in today's study. Before we begin, I will review a few important instructions with you so that you understand the process for conducting this study.

Today, you will complete tasks across four areas of the Woundtech EMR: Patient Demographics, Implantable Devices, Decision Support Interventions, and Medication Ordering. The task complexity will range from simple to more advanced scenarios, and the session will take approximately one hour.

For this session, we ask that you share your screen so your interactions can be recorded. All recordings are confidential and will be used solely to identify usability issues and opportunities for improvement.

As you complete the tasks, please think aloud—describe what you are looking at, what you are trying to do, and what you are thinking. Your honest feedback is important and will help improve the product.

Please complete each task as quickly and accurately as possible without assistance. All tasks will be performed using a test patient, so no sensitive patient data will be used.

If you have questions during the session, feel free to ask. I may not be able to answer immediately, as we are observing how users interact with the application without assistance. If you become stuck or finish a task, please let me know, and we will move on to the next task.

You may stop the session at any time. If you choose to stop, the recording will end immediately, and no additional tasks will be required.

Finally, this is not a test of your ability. We are evaluating how well the system supports you in real-world scenarios.

Do you have any questions before we begin?

5.3 Appendix 3: Task Test Scenarios

170.315(a)(1) – CPOE

a1.1 – Enter a new medication order for a patient
Moderator:
"For this tasks you will create a new medication order for a patient."

- Begin by locating where you would typically manage or order medications within the patient chart
- Navigate to the appropriate section
- Identify how to create a new medication order
- Enter a medication (for example, Amoxicillin 500mg)
- Finalize and save or sign the order

Completion:
State "Done". Score this task: 1 = very hard, 5 = very easy

a1.2 – Cancel or discontinue a patient's medication order
Moderator:
"You will now discontinue an existing medication for John Test. Proceed as you normally would to cancel a patients medication order."
Task Guidance:

- Navigate to where medications are listed in the patient chart
- Identify an active medication

- Determine how to modify or discontinue the medication
- Select the appropriate option to discontinue or cancel the order
- Confirm the action if prompted
- Save your changes

Completion:
State “Done”. Score this task: 1 = very hard, 5 = very easy

a1.3 – Review list of active and inactive medications
Moderator:
“For this task, review both active and inactive medications for John Test.”
Task Guidance:

- Navigate to the Medications section of the patient chart
- Review the list of active medications
- Locate where inactive or discontinued medications are displayed
- Review the details of medications listed (e.g., name, dosage)

Completion:
State “Done”. Score this task: 1 = very hard, 5 = very easy

a1.4 – Create a drug allergy alert for a patient
Moderator:
“You will now document a drug allergy for John Test.”
Task Guidance:

- Navigate to the Allergies section of the patient chart
- Identify how to add a new allergy
- Enter a drug allergen (for example, Penicillin)
- Select or enter the reaction and severity if applicable
- Save the allergy information

Completion:
State “Done”. Score this task: 1 = very hard, 5 = very easy

170.315(a)(5) – Patient Demographics

a5.1 – Search, navigate, and view demographics
Moderator:
“Locate the patient John Test and review their demographic information.”
Task Guidance:

- Use the system’s search function to find John Test
- Open the patient’s chart
- Navigate to the Demographics section
- Review the demographic details presented

Completion:
State “Done”. Score this task: 1 = very hard, 5 = very easy

a5.2 – Edit or update the patient’s ethnicity
Moderator:

“Edit or update the patient’s ethnicity information.”
Task Guidance:

- Navigate to the Demographics section
- Identify how to edit demographic details
- Locate the ethnicity field
- Update the ethnicity value
- Save your changes

Completion:
State “Done”. Score this task: 1 = very hard, 5 = very easy

a5.3 – Edit or update the patient’s preferred language
Moderator:
“Edit or update the patient’s preferred language.”
Task Guidance:

- Navigate to the Demographics section
- Enter edit mode
- Locate the preferred language field
- Select or enter a new preferred language
- Save your changes

Completion:
State “Done”. Score this task: 1 = very hard, 5 = very easy

a5.4 – Save changes and verify updates persist
Moderator:
“For this task, confirm that the demographic updates you made are saved correctly.”
Task Guidance:

- Save any demographic changes
- Return to the Demographics section
- Confirm that the updated values are still present

Completion:
State “Done”. Score this task: 1 = very hard, 5 = very easy

a5.5 – View demographics summary in a patient summary report
Moderator:
“Locate and review the patient’s demographic information within a summary or report view.”
Task Guidance:

- Navigate to a patient summary or report section
- Locate the demographics summary
- Review the displayed demographic information

Completion:
State “Done”. Score this task: 1 = very hard, 5 = very easy

170.315(a)(14) – Implantable Devices

a14.1 – Access Implantable Devices
Moderator:
“Locate where implantable device information is stored for John Test patient.”
Task Guidance:

- Navigate within the patient chart
- Identify and access the Implantable Devices section

Completion:
State “Done”. Score this task: 1 = very hard, 5 = very easy

a14.2 – Search and view existing implantable devices
Moderator:
“Search and review any existing implantable device information for John Test patient.”
Task Guidance:

- Access the Implantable Devices section
- Locate any existing device entries
- Review available device details

Completion:
State “Done”. Score this task: 1 = very hard, 5 = very easy

a14.3 – Add a new implantable device
Moderator:
“You will now add a new implantable device for the patient.”
Task Guidance:

- Identify how to add a new device
- Enter the required device identifier (UDI)
- Select the appropriate device type or description
- Save the new device entry

Completion:
State “Done”. Score this task: 1 = very hard, 5 = very easy

a14.4 – Update implantable device status
Moderator:
“Update the status of an existing implantable device.”
Task Guidance:

- Select an existing device
- Enter edit mode
- Update the device status
- Save your changes

Completion:
State “Done”. Score this task: 1 = very hard, 5 = very easy

170.315(b)(11) – Decision Support Interventions

b11.1 – Navigate to DSI Dashboard
Moderator:
“Locate the Decision Support Intervention dashboard.”
Task Guidance:

- Use the main navigation menu
- Identify where decision support interventions are located
- Open the dashboard view

Completion:
State “Done”. Score this task: 1 = very hard, 5 = very easy

b11.2 – View an existing DSI
Moderator:
“Open and review an existing decision support intervention.”
Task Guidance:

- Select an intervention from the dashboard
- Review its details and configuration

Completion:
State “Done”. Score this task: 1 = very hard, 5 = very easy

b11.3 – Edit the Security Level of a DSI
Moderator:
“For this tasks you will update the security level of an existing intervention.”
Task Guidance:

- Open the selected intervention
- Locate the security level field
- Change the level (e.g., Info, Warning, Critical)
- Save your changes

Completion:
State “Done”. Score this task: 1 = very hard, 5 = very easy

b11.4 – Add additional DSI criteria
Moderator:
“Add additional criteria to the intervention.”
Task Guidance:

- Enter edit mode for the intervention
- Locate the criteria section
- Add a new condition or rule (e.g., ICD-10 code)
- Save changes

Completion:
State “Done”. Score this task: 1 = very hard, 5 = very easy

b11.5 – Update DSI action/recommendations
Moderator:

“Update the intervention’s recommended actions.”
Task Guidance:

- Edit the intervention
- Locate the recommendations or actions section
- Modify the recommendation content
- Save changes

Completion:
State “Done”. Score this task: 1 = very hard, 5 = very easy

b11.6 – Preview and save changes
Moderator:
“Preview the intervention and finalize your updates.”
Task Guidance:

- Navigate to the DSI preview option
- Review how the intervention will appear
- Save or finalize the configuration

Completion:
State “Done”. Score this task: 1 = very hard, 5 = very easy

b11.7 – View DSI in patient chart
Moderator:
“Locate and review a decision support intervention within the patient chart.”
Task Guidance:

- Navigate to John Test’s patient chart
- Locate the treatment section
- Identify and view the intervention

Completion:
State “Done”. Score this task: 1 = very hard, 5 = very easy

b11.8 – View clinical guideline details
Moderator:
“Review the clinical guideline associated with the intervention.”
Task Guidance:

- Select the intervention
- Open the guideline or reference details
- Review the clinical content

Completion:
State “Done”. Score this task: 1 = very hard, 5 = very easy

b11.9 – Take action on the intervention
Moderator:
“Take an action based on the intervention.”
Task Guidance:

- Select the intervention

- Choose an available action (e.g., acknowledge, dismiss)
- Confirm the action

Completion:
State “Done”. Score this task: 1 = very hard, 5 = very easy

5.4 Appendix 4: Pre-test Questionnaire

Before the start of testing, participants were asked a brief set of pre-test questions to gather background information and establish context regarding their experience and familiarity with similar systems.

Participant Information

Participant: _____

Demographics

1. Age Range

☐ 20–29
☐ 30–39
☐ 40–49
☐ 50–59
☐ 60–69
☐ Prefer not to answer

2. Gender

☐ Male
☐ Female
☐ Non-binary
☐ Prefer not to answer

Professional Background

3. Current Role

☐ Physician Assistant
☐ Nurse / Nurse Practitioner
☐ Medical Assistant
☐ Care Coordinator
☐ Administrative / Intake Staff
☐ Other: _____

4. Total Years Working in a Professional Environment

☐ < 1 year

☐ 1–3 years

☐ 4–6 years

☐ 7–10 years

☐ 10+ years

5. Years of Experience in Current Role

☐ < 1 year

☐ 1–3 years

☐ 4–6 years

☐ 7–10 years

☐ 10+ years

Technology Experience

6. Years of Experience Working with Technology/Computers

☐ < 1 year

☐ 1–3 years

☐ 4–6 years

☐ 7–10 years

☐ 10+ years

7. Overall Experience with Technology/Computers

☐ None

☐ Basic (limited use)

☐ Intermediate (regular use)

☐ Advanced (expert user)

Health IT Experience

8. Years of Experience Using EMR/EHR Systems

☐ < 1 year

☐ 1–3 years

☐ 4–6 years

☐ 7–10 years

☐ 10+ years

9. Experience with Electronic Medical Record (EMR/EHR) Systems

☐ None

☐ Basic (limited use)

☐ Intermediate (regular use)

☐ Advanced (expert user)

10. Familiarity with the Woundtech EMR System

☐ None (first-time user)

☐ Limited familiarity

☐ Moderate familiarity

☐ Extensive experience

Technology Usage

11. Frequency of Computer Use in Daily Work

☐ Rarely

☐ Occasionally

☐ Frequently

☐ Constantly

12. Comfort Level with Technology

☐ Not comfortable

☐ Somewhat comfortable

☐ Comfortable

☐ Very comfortable

13. Additional Comments (Optional):

5.5 Appendix 5: System Usability Scale & Post Test Questionnaire

At the conclusion of each testing session, participants were asked a brief set of standardized post-test questions to capture their overall impressions, perceived ease of use compared to other EMR systems, feedback on application features, and observations related to navigation and workflow expectations.

Instructions: Please answer the following questions based on your experience using the Woundtech EMR during today's session.

1. Overall Impression

How would you describe your overall impression of the Woundtech EMR?

- ☐ Very Positive

- ☐ Positive
- ☐ Neutral
- ☐ Negative
- ☐ Very Negative

Optional Comments:

2. Ease of Use Compared to Other EMRs

Compared to other EMR applications you have used, how would you rate the ease of use of the Woundtech EMR?

- ☐ Much Easier
- ☐ Somewhat Easier
- ☐ About the Same
- ☐ Somewhat More Difficult
- ☐ Much More Difficult

Optional Comments:

3. Most and Least Preferred Aspects

What aspects of the application did you like the most?

What aspects did you like the least?

4. Navigation and Expectations

During the tasks you completed today, were there any items that were located in places you did not expect?

- ☐ Yes
- ☐ No

If yes, please describe:

5. Surprises or Observations

Were there any parts of the system or workflow that surprised you (positively or negatively)?

If yes, please describe:

Additionally, a post-test System Usability Scale (SUS) survey was conducted with participants.

Woundtech EMR - System Usability Scale (SUS)

Instructions: Please rate your agreement with each statement using the scale below.

Strongly Disagree 1 2 3 4 5 Strongly Agree

#	Statement	1	2	3	4	5
1	I would like to use Woundtech EMR frequently in my daily work.	☐	☐	☐	☐	☐
2	I found Woundtech EMR to be unnecessarily complex.	☐	☐	☐	☐	☐
3	I thought Woundtech EMR was easy to use.	☐	☐	☐	☐	☐
4	I think I would need the support of a technical person to effectively use Woundtech EMR.	☐	☐	☐	☐	☐
5	I found the functions within Woundtech EMR to be well integrated.	☐	☐	☐	☐	☐
6	I thought there was too much inconsistency within Woundtech EMR.	☐	☐	☐	☐	☐
7	I believe most users would learn to use Woundtech EMR very quickly.	☐	☐	☐	☐	☐
8	I found Woundtech EMR to be cumbersome to use.	☐	☐	☐	☐	☐
9	I felt confident using Woundtech EMR to complete the assigned tasks.	☐	☐	☐	☐	☐
10	I needed to learn a lot of things before I could effectively begin using Woundtech EMR.	☐	☐	☐	☐	☐

Additional Comments:

_____