HEALTHCARE INNOVATION TECHNOLOGY LAB (HITLAB)

User-centric optimization of Birthvue: A combined heuristic evaluation and usability testing approach

Jinu Mathew Valayil, PhD [1]; Vandana Yadav, MS[1]; Srishti Gupta,PhD[1]; Stan Kachnowski, PhD, MPA [1]
[1]Healthcare Innovation and Technology Lab (HITLAB)

ABSTRACT

Maternal morbidity and mortality rates in the United States are concerning, with approximately 700 maternal deaths and 60,000 maternal morbidities annually due to pregnancy complications. Staffing shortages in maternity departments worsen these issues, underscoring the urgent need for technological innovations in labor care. Birthvue, an AI-powered labor and delivery platform, addresses these challenges by providing customized information tailored to the needs of pregnant women and healthcare providers through dedicated interfaces. Birthvue empowers patients with real-time labor updates, while clinicians benefit from proactive interventions based on real-time patient data and labor score thresholds.

To enhance Birthvue's usability, HITLAB conducted a comprehensive evaluation process combining heuristic evaluation and usability testing. The heuristic evaluation involved two experts inspecting the platform against established usability heuristics, while the usability study involved interviewing three obstetrician-gynecologists on their perceptions of the platform's usability and fit within clinical settings.

The study revealed that heuristic evaluation effectively identifies usability problems early in the software development process, while usability testing uncovers real-world user challenges and fit issues. Insights gained from both methods were applied in an iterative redesign of Birthvue, significantly enhancing its usability and effectiveness. This study highlights the importance of combining inspection and testing methods to comprehensively address usability concerns and enhance the functionality of digital health platforms.

OBJECTIVES

- Evaluate Birthvue's interface usability based on Jakob Nielsen's ten established heuristics
- Identify usability issues and specific challenges arising from user interactions and evaluate the platform's alignment with the existing clinical workflows.
- Derive actionable insights to refine Birthvue's interfaces, with the aim of enhancing user experience.

STUDY METHODOLOGY

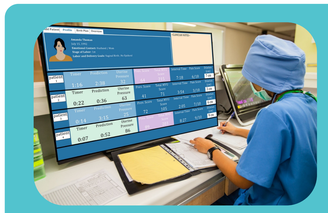
Heuristic Evaluation:

- Two independent researchers conducted independent evaluations focusing on the platform's usability from an OB-GYN's perspective.
- The evaluators analyzed the interface against Nielsen's heuristics, noting observed issues and their impact on usability.
- Problems were categorized based on severity, frequency, and criticality, and ranked accordingly.

Usability Testing:

- Three OB-GYNs selected for the study were introduced to the platform through a concise visual presentation outlining its purpose, features, interfaces, and projected impact on delivery outcomes.
- OB-GYNs were interviewed to gather their perceptions regarding the platform's usability and its integration within existing clinical settings.
- Structured interview questions were designed to uncover gaps in current clinical practices and gather recommendations for platform enhancement. Interview transcripts were analyzed to identify common themes and patterns.

Birthvue's Integration in Clinical Environments

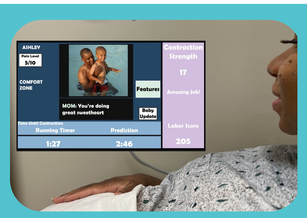


Clinician Interface

Data

Standard Maternal Monitors

Data



Patient Interface

Birthvue's Clinician Interface:

Birthvue's clinician interface gathers data from standard maternal monitors and its proprietary AI algorithms transforms raw data into actionable insights, enabling swift and prioritized care. With the ability to set customizable data thresholds, clinicians receive early updates, empowering proactive interventions rather than reactive responses.

By prioritizing patients requiring urgent attention, clinicians can optimize their time and improve patient outcomes significantly. The interface includes features for organized record-keeping and collaborative communication.

Birthvue's Patient Interface:

Birthvue's patient interface empowers expectant mothers by providing real-time updates and vital information, turning their childbirth journey into an informed and engaged experience. It offers comprehensive data, including contraction details and predictions, preparing mothers for birthing and facilitating active participation. Acting as a virtual doula, it offers relaxation techniques, coaching, and personalized guidance, ensuring continuous support throughout this critical period. The interface's empathetic design philosophy uses calming colors and non-pharmacological pain management aids, creating a serene atmosphere and significantly alleviating anxiety during childbirth.

RESULTS

Heuristic Evaluation Overview

- Cognitive walkthrough assessed the platform across four key areas, outlined below.

Heuristic Evaluation Rating

- An evaluation of the platform against Jakob Nielsen's ten usability heuristics identified problems that were prioritized based on their severity, importance, and prevalence.

Usability Study Results

Usability interviews uncovered user challenges, expectations, and the platform's perceived integration into existing workflows, highlighting shortcomings in current practices and suggestions for improvement.

Identified Categories(3) and Themes (8)

1.Current Practice

Current Tools and Technologies
- Standard monitors
- Clinical examination

Gaps in current practice
- Absence of Advanced Technologies
- Lack of Comprehensive Information Systems
- Limited Innovation in Women's Health

Crucial data for decision making
- Uterine pressure
- Contraction strength
- Dilation
- MVU scores
- The labor curve assessment

2. Usability

User Interface and Intuitiveness
- Optimism about patient-centric features
- Cognitive overload on Clinicians
- Overall layout deemed fine and intuitive

Adaptability
- Positive outlook on platform's comprehensive nature
- Importance of training sessions

Challenging Features
- Relevance and meaning of timers
- MVU score calculation lacks clarity

3. Feedback

Recommendations
- Need for a Comprehensive Platform
- Early Detection of Complications
- Integration with Existing Workflow
- Avoid Cognitive Overload
- AI-Driven Alerts and Decision Support

Concerns
- Seamless integration with various EMR systems
- Documentation Burden

- OBGYNs emphasized the need for innovative labor care solutions that empower clinicians with critical data and actionable insights.
- 70% of respondents expressed strong optimism about its potential to empower patients.
- OBGYNs stressed the need for EMR integration and value over standard monitors for the platform's success.

CONCLUSIONS

- **Urgent Demand for Innovation:** Maternal health challenges underscore the crucial need for innovative labor care solutions.
- **Integration and Value are Key:** Insights from OB-GYNs stress seamless integration in clinical settings and value over traditional monitors for platform success. Participant feedback emphasizes the value of empowering patients.
- **Methodological Importance:** This study highlights the critical role of multifaceted evaluation methods in addressing usability concerns and optimizing digital health platform functionality.

HITLAB Healthcare Innovation Technology

Birthvue

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HITLAB
3960 Broadway, Suite 501
New York, NY 10032
Phone: 2125430100
Email: research@hitlab.org