“What-if” Explanations in an AI-Driven Clinical Decision-Support Tool for Pulmonary Arterial Hypertension (PAH)

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Background

- Clinicians **use risk stratification tools** to determine appropriate treatment plans for patients with PAH
- PAH risk stratification tools offer clinicians a calculated risk score with **little guidance on subsequent decision-making**
- Clinicians think “what-if...?” and want to know **how a particular intervention will affect** a patient’s risk and prognosis
- There is currently **no way to visualize the potential change in risk** until after prescribing treatment takes effect

Goals

- Design **interactive “what-if” scenarios** to help guide clinicians through different patient outcomes by simulating potential changes in risk
- Help clinicians **visualize potential patient outcomes** of a decision before making that decision
- Identify how visualizing potential changes in risk can be **useful to clinicians as they consider treatment changes**

Methods

- Conducted semi-structured need-finding interviews and user studies with **28 PAH clinicians**
- Iteratively prototyped, progressing from static low-fidelity to interactive high-fidelity prototypes to a **deployed, web-based interactive dashboard**
- Thematic analysis of interview transcripts to inform dashboard design and clinician preferences

Results

- Identified why **clinicians favor visualizing potential changes in risk related outcomes**:
  - Educate patients, caregivers, and junior-level clinicians about PAH risk related survival
  - Actively engage patients in decision-making by demonstrating relevance of treatment changes
  - Navigate potential treatment plans
  - Understand the risk stratification model
- Developed an **interactive clinical decision-support tool for PAH risk assessment** using the PHORA (Pulmonary Hypertension Outcome Risk Assessment)[1] model

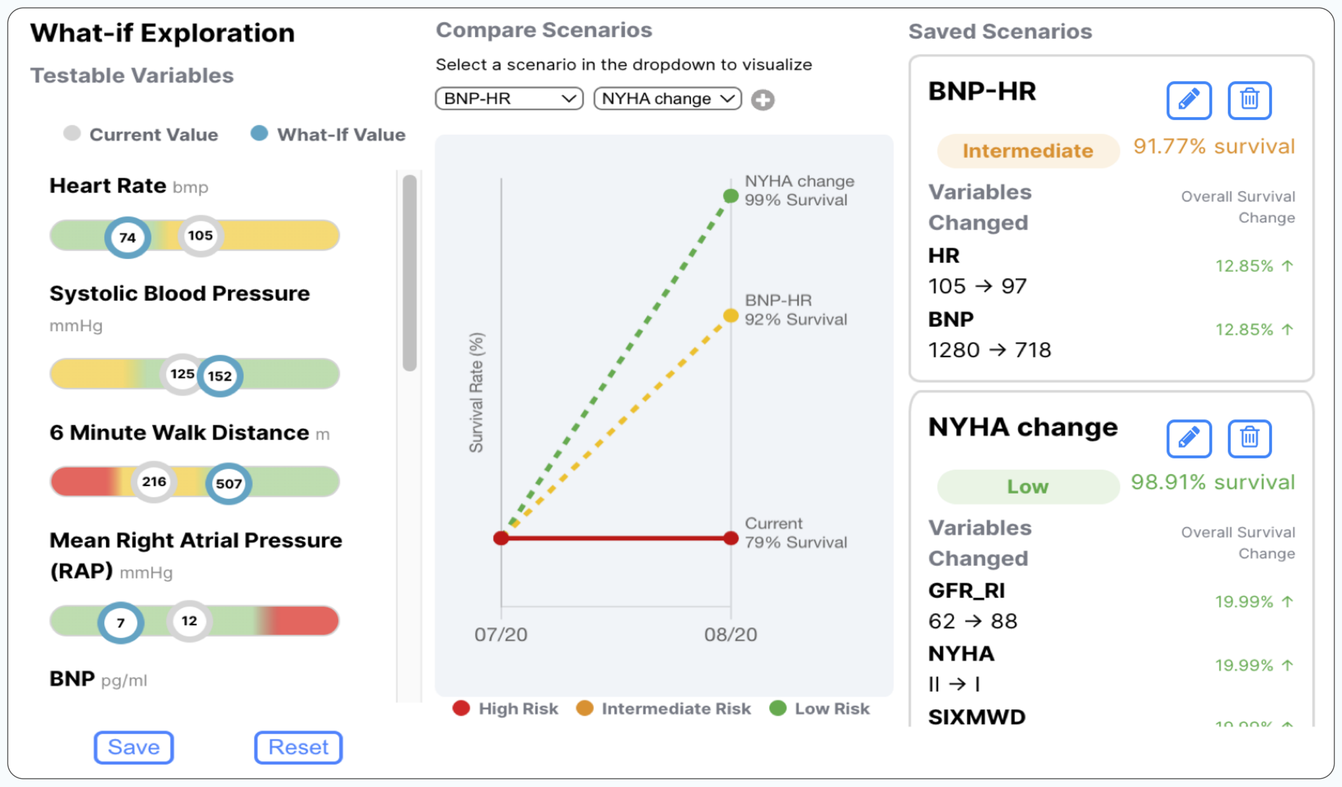

Figure 1: Designed interactive “what-if” scenarios feature to support clinicians’ primary intended uses (https://phora-user-study.web.app/).

Conclusion & Implications

Clinicians find value in tools that help them visualize the potential outcomes of treatment decisions. Such tools can aid in exploring treatment options, engaging patients in decision-making, and educating stakeholder about PAH.

We designed a tool that aims to **support clinicians’ essential needs** and **educate patient**s when navigating PAH risk assessment and treatment planning.

References & Acknowledgements

[1] Kanwar, M. K., Gomberg-Maitland, M., Hoeper, M., Pausch, C., Pittrow, D., Strange, G., ... & Benza, R. L. (2020). Risk stratification in pulmonary arterial hypertension using Bayesian analysis. European Respiratory Journal, 56(2).

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National Institutes of Health

Project Number: R01HL164906