

PHUSE APAC 2026

# Precision in Limb Salvage.

AI-powered decision making for  
diabetic foot syndrome.



# The Brutal Reality

**50%**

**5-Year Mortality**

Post-amputation. Worse than many  
cancers.

**THE CLINICAL NEED**

# The "Real World" Mess



## The Problem

Real World Data (RWD) is inherently messy.  
Unlike clinical trials, EHR data is fragmented  
and requires careful handling.

 **Class Imbalance:** Amputations are rare  
(Signal) vs. General Population (Noise).

 **Censoring:** Patients drop out, requiring  
robust time-to-event modeling.



DATA CHALLENGE

# The Three Critical Questions



## 1. Risk

Is it coming?

Binary classification. Identifying the "at-risk" cohort from the noise.



## 2. Type

How severe?

Distinguishing Toe (Salvageable) from Above-Knee (Severe).

▲ AKA carries ~50% mortality rate.



## 3. Time

When?

Survival analysis. "Risk" without a timeline is not actionable.

# Hybrid Architecture: A "Split-Brain" Approach



## STAGE 1

### The Gatekeeper

**Role:** Filters the noise.

Trained on imbalanced data to learn true real-world probability.

**0.824 AUC**

## STAGE 2

### The Specialist

**Role:** Determines severity.

Trained on synthetic data (SMOTE) to amplify the signal of rare events.

**95.7% Recall**

## METHODOLOGY

# Engineered Intelligence



## Glycemic Volatility vs. Average

We engineered 28 features to capture the trajectory of the patient.

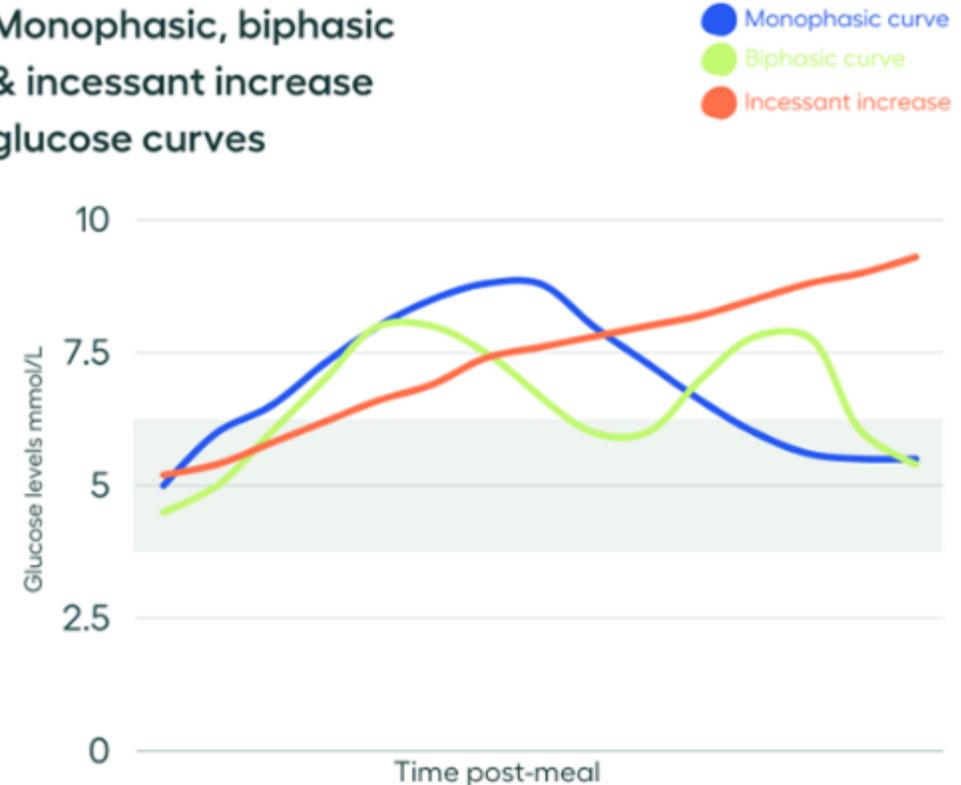
### The Medical Insight:

High average blood sugar (HbA1c) is common in all patients.

### The AI Discovery:

Our model found that **volatility** (wild swings) is the true predictor, often invisible to human review.

Monophasic, biphasic & incessant increase glucose curves



## FEATURE ENGINEERING

# Multimodal Intelligence

## The AI "Radiologist"

We don't just read the charts. We see the patient.

Our framework integrates **Computer Vision** to analyze radiographic images. The system automatically scans X-rays for

**Osteomyelitis** (bone infection) and soft

**Result:** Risk scores corroborated by visual tissue deterioration.

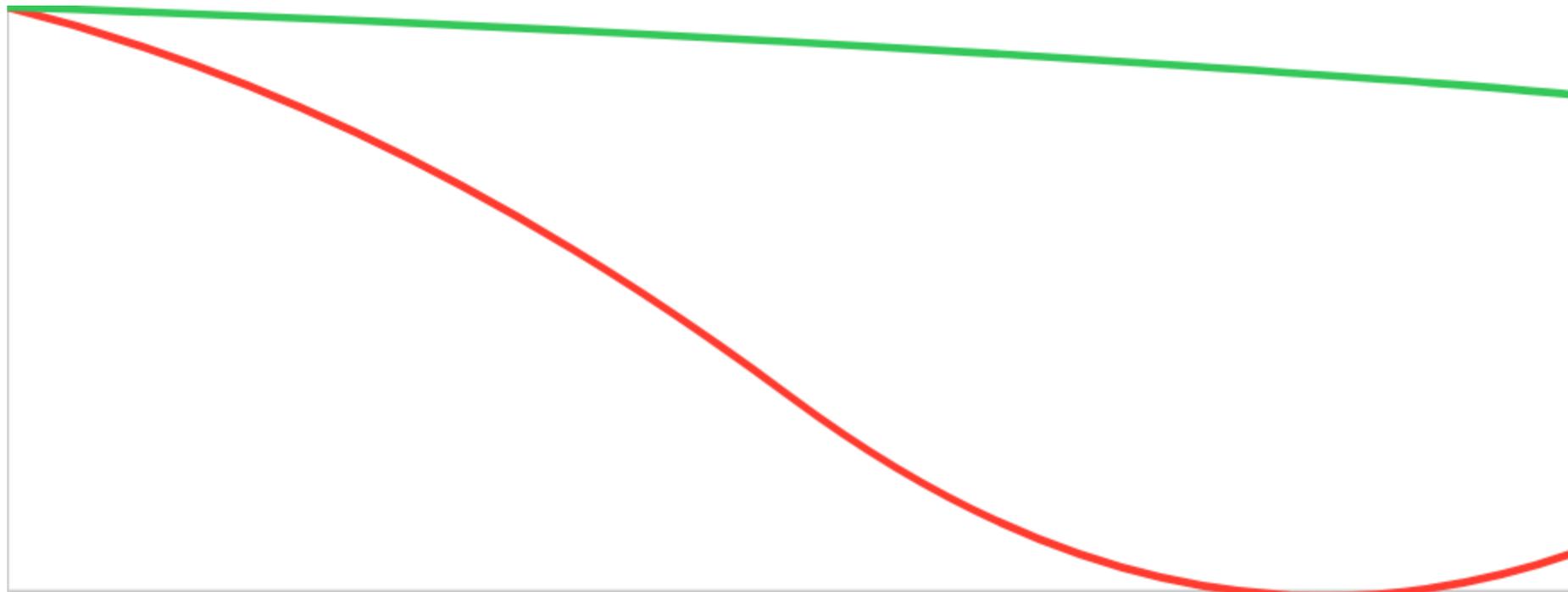


# The Time Dimension



## Survival Analysis (Cox Proportional Hazards)

Classification answers "What". Survival analysis answers "When".



**SURVIVAL  
ANALYSIS**

C-Index: 0.746

# The Explainability Layer



## The Bridge

Clinicians trust narratives, not just probabilities. We use GenAI (Claude 3.7) to act as a **Translator** between the ML Core and the Doctor.

This bridge ensures every score comes with a "Why".

What is the risk profile for Patient 402?

**High Risk (Score 0.92).**  
Driven by rapid nutritional decline (Albumin Slope -0.4) and extreme glycemic volatility. Immediate vascular consult recommended.

# Validation & Honesty



Tested on unseen future data (2023) to prevent look-ahead bias.

**0.824**

**AUC**  
Discrimination

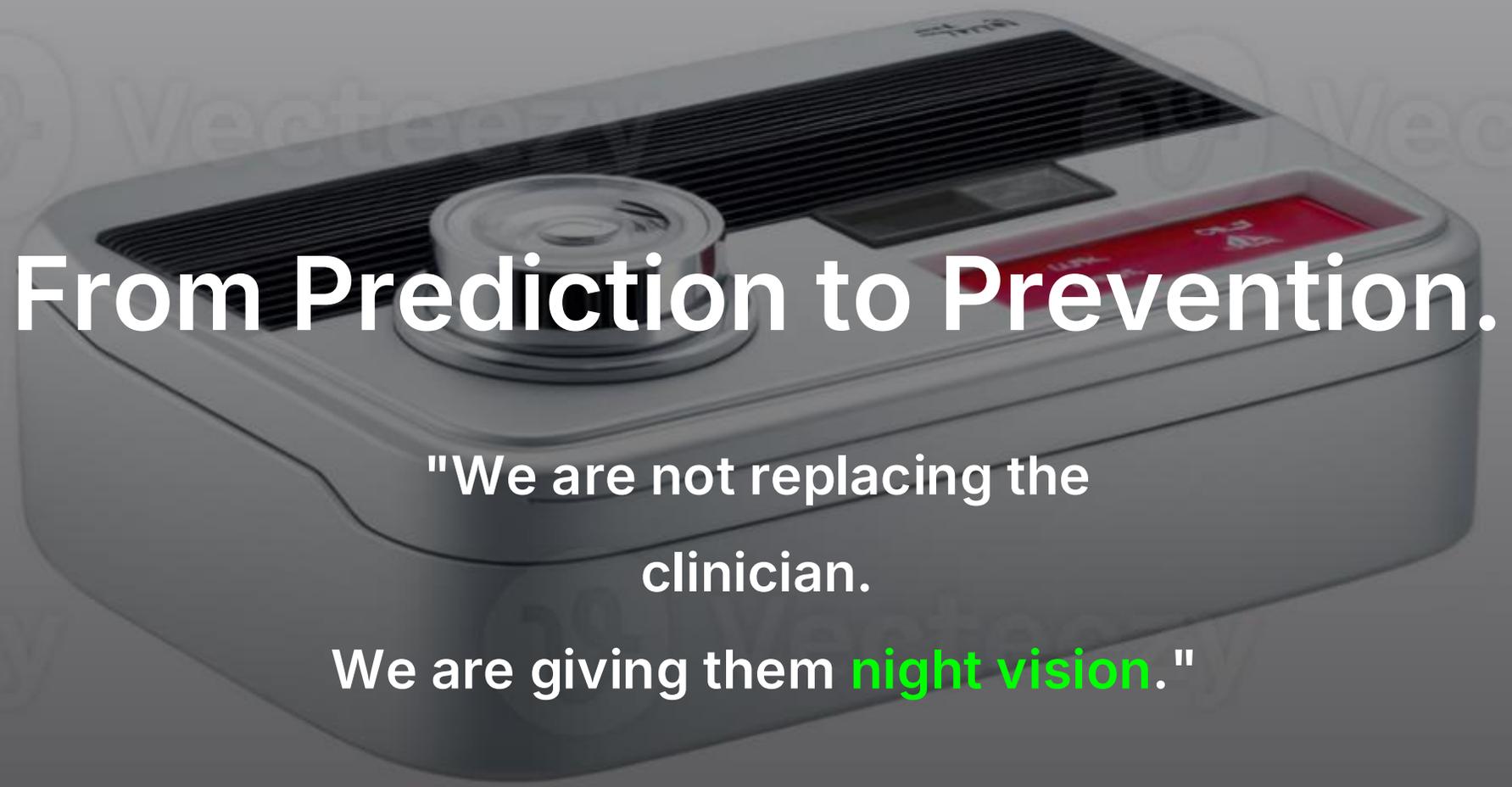
**0**

**Critical Misses**  
No Major Amputations missed

**95.7%**

**Recall**  
On Severe (AKA) Cases

## RESULTS

A dark grey, rectangular medical device, possibly a portable diagnostic tool. It features a prominent lens in the center, a red display screen on the right side, and a black grille on the top surface. The device is shown from a slightly elevated perspective.

# From Prediction to Prevention.

"We are not replacing the  
clinician.

We are giving them **night vision.**"



# Thank You

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