GRACE Explainability Report: mimic

Interpretability Report for Patient Instance: 7515

1. Patient Summary

Prediction: Died
Confidence: 56.12%

Key Feature Contributions according to LIME:

LIME values are between -1 and 1, where positive values support the prediction, and negative values oppose it.
Only contributions with absolute value > 0.01 are shown.

Ensemble Model:

- Sepsis and Organ Dysfunction: 0.0916
- Neurological and Cognitive Status: 0.0823
- Cardiovascular Function and Hemodynamics: 0.0812
- Renal Function and Electrolyte Balance: 0.0726
- Liver Function and Metabolic Status: 0.0391

Node Models (Contributions to Intermediate Nodes):

Node - Cardiovascular Function and Hemodynamics:

-- FoleymL_sum: -0.0428
-- HRbpm: 0.0206

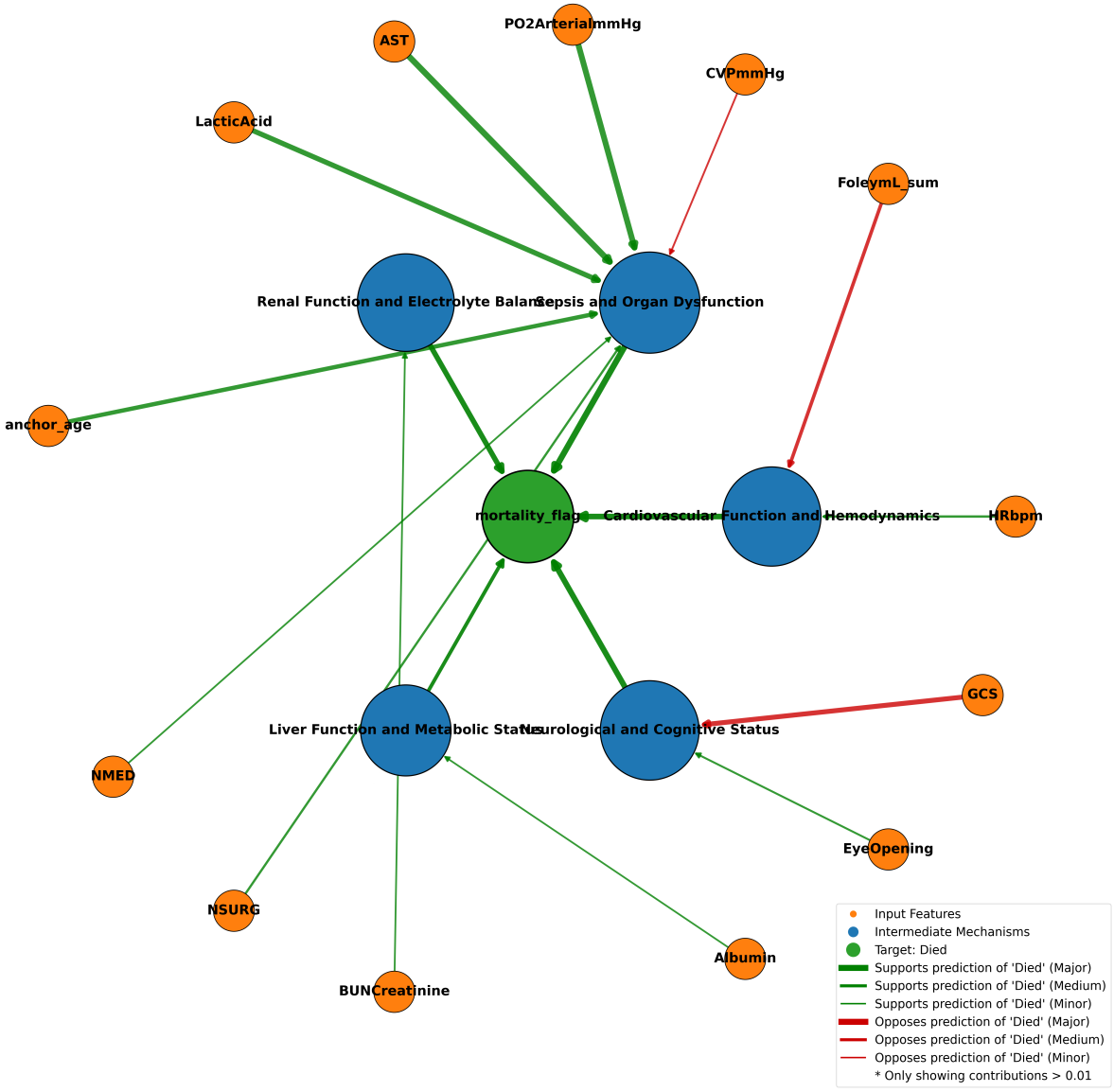
Node - Sepsis and Organ Dysfunction:

-- AST: 0.1091
-- PO2ArterialmmHg: 0.1030
-- LacticAcid: 0.0831
-- anchor_age: 0.0613
-- NSURG: 0.0185
-- CVPmmHg: -0.0119
-- NMED: 0.0105

Node - Neurological and Cognitive Status:

-- GCS: -0.0769
-- EyeOpening: 0.0134

LIME-Informed Knowledge Graph Visualization


PO2ArterialmmHg
AST
CVPmmHg
LacticAcid
FoleymL_sum
Renal Function and Electrolyte Balance
Sepsis and Organ Dysfunction
anchor_age
mortality_flag
Cardiovascular Function and Hemodynamics
HRbpm
GCS
Liver Function and Metabolic Status
Neurological and Cognitive Status
NMED
EyeOpening
NSURG
Albumin
BUNCreatinine
Input Features
Intermediate Mechanisms
Target: Died
Supports prediction of 'Died' (Major)
Supports prediction of 'Died' (Medium)
Supports prediction of 'Died' (Minor)
Opposes prediction of 'Died' (Major)
Opposes prediction of 'Died' (Medium)
Opposes prediction of 'Died' (Minor)
* Only showing contributions > 0.01

2. Contextual Explanation

This patient's predicted mortality risk is influenced by several critical clinical features reflecting severe physiological derangements common in critically ill ICU patients. Elevated AST (98.0 U/L) suggests significant liver injury or dysfunction, which can impair metabolic and detoxification processes, contributing to multi-organ failure. The high lactic acid level (8.1 mmol/L) indicates profound tissue hypoxia and anaerobic metabolism, often seen in sepsis or shock states, correlating with poor prognosis. The arterial PO2 of 79 mmHg is low, reflecting impaired oxygenation possibly due to respiratory failure or sepsis-related lung injury. Cardiovascular parameters show tachycardia (HR 112 bpm) and low diastolic blood pressure (NBPd 60 mmHg), indicating hemodynamic instability and potential circulatory shock. The central venous pressure (CVP) is elevated at 20 mmHg, which may reflect fluid overload or right heart dysfunction. Neurologically, the Glasgow Coma Scale (GCS) score of 3 and minimal eye opening (1) denote severe neurological impairment, often associated with poor outcomes. The patient's advanced age (83 years) and presence of hypertension further increase vulnerability. These features collectively contribute to the model's prediction of mortality by reflecting multi-organ dysfunction, sepsis, and critical hemodynamic compromise, consistent with known pathways leading to ICU mortality.

3. Personalized Insights and Considerations

Given the retrospective nature of the data, recommendations focus on general clinical and research implications. The prominent role of sepsis and organ dysfunction indicators (elevated AST, lactic acid, low PO2) underscores the importance of early identification and aggressive management of sepsis and multi-organ failure in ICU settings. Cardiovascular instability and neurological impairment highlight the need for vigilant hemodynamic monitoring and neuroprotective strategies. For individuals with similar profiles, discussions with healthcare providers might emphasize the importance of managing chronic conditions like hypertension, optimizing organ function, and recognizing early signs of infection or deterioration. Lifestyle factors such as maintaining cardiovascular health, avoiding infections, and regular medical follow-up are relevant. The interplay of elevated liver enzymes, lactic acidosis, impaired oxygenation, and neurological depression suggests a cascade of sepsis-induced organ dysfunction and shock, which are critical targets for intervention. Research focusing on integrated monitoring of these parameters could improve prognostication and guide therapeutic strategies in critically ill elderly patients.