AcuityPro

AI-Powered Acuity-Based Nurse Staffing and Optimization

Mr. Saji Mathew
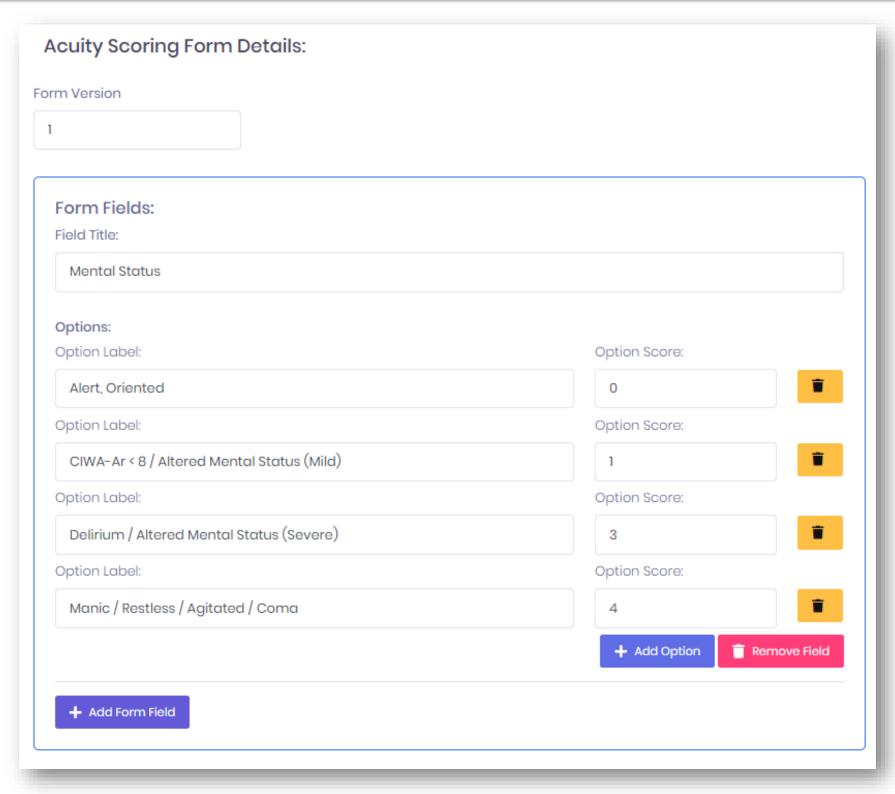
Chief Operating Officer
Baby Memorial Hospital, Kozhikode

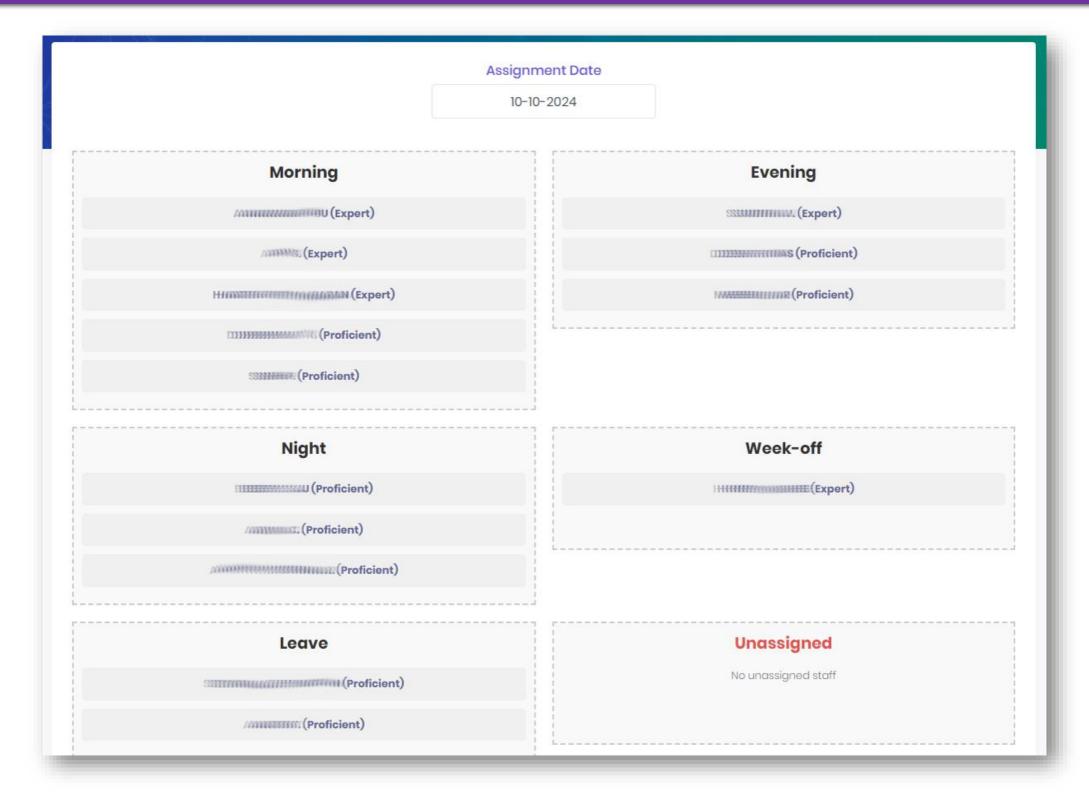**BMH**
more than care
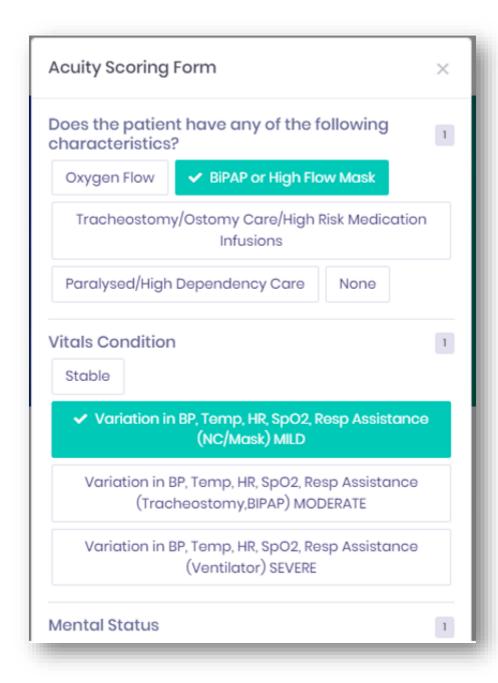Since 1987

Problem Statement

- **Challenges in nurse staffing**

  - Balancing nurse-patient ratios

  - Ensuring cost efficiency

- **Acuity based staffing**

  - NABH standard **COP-6** and Nursing Excellence standard **NCP-4**

- **Paper based systems**

  - Time consuming
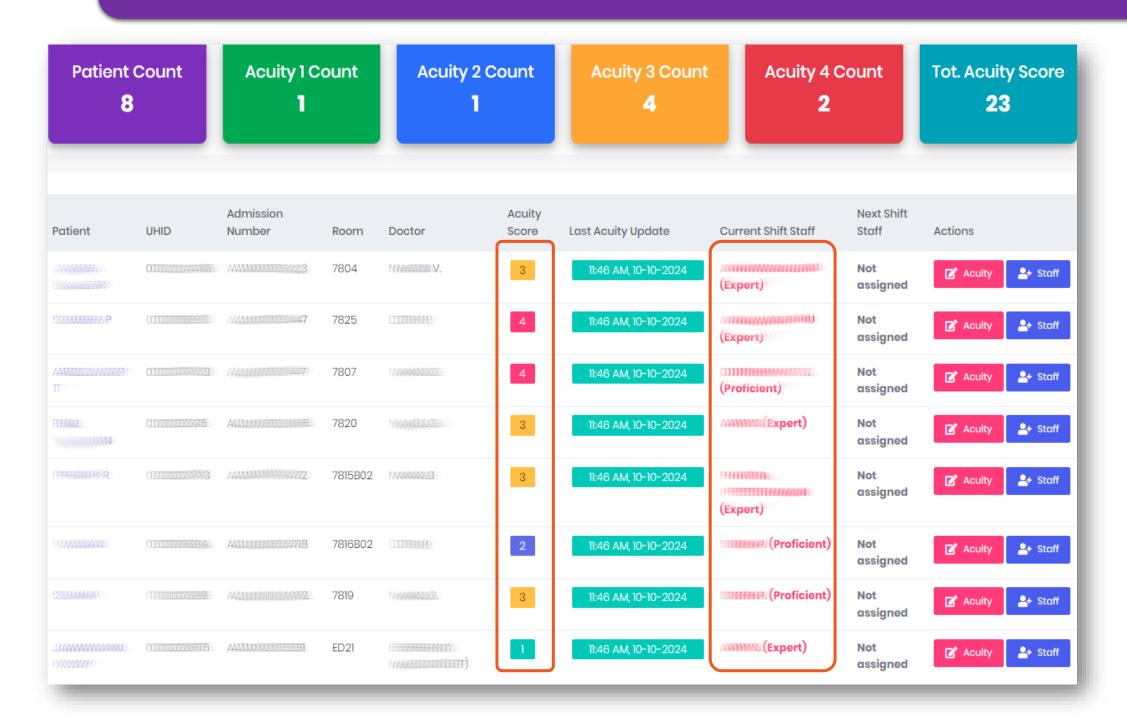
  - Poor management visibility

  - Imbalanced workloads

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Details of the Solution

Acuity Scoring Form Details:

Form Version

1

Form Fields:

Field Title:

Mental Status

Options:

Option Label:	Option Score:	
Alert, Oriented	0	🗑

Option Label:	Option Score:	
CIWA-Ar < 8 / Altered Mental Status (Mild)	1	🗑

Option Label:	Option Score:	
Delirium / Altered Mental Status (Severe)	3	🗑

Option Label:	Option Score:	
Manic / Restless / Agitated / Coma	4	🗑

+ Add Option   **🗑 Remove Field**

+ Add Form Field

Customizable acuity forms

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Details of the Solution

Drag and drop interface for duty assignment

Details of the Solution

Effortless data capture
Previous acuity data prepopulated

Details of the Solution

Ward Patient Acuity Dashboard

Patients **colour coded**

Staff **competency levels** mapped

Details of the Solution

Automatic staff assignment using **combinatorial optimization** and **constraint satisfaction**

Staff Auto-Assignment ×

Select Shift

Evening Shift (10-10-2024) ⌄

☑ Acuity scores are updated for all patients.

☑ Staff shift assignments have been completed.

👤✓ **Assign Staff**

Staff Assignment Logic:
- Patients are assigned based on their acuity scores and the competency of available staff.
- Each staff member is assigned to patients within their competency level. Staff with lower competency levels will not be assigned patients whose acuity scores exceed their competency threshold.
- If multiple staff members meet the competency requirement, the system prioritizes those who were recently assigned to the same patient in the past 2 days.
- If there are no recent assignments, staff members are chosen based on their current total acuity score. Staff with lower total acuity scores are preferred to balance the workload.
- In case of a tie in total acuity scores, staff with higher competency levels are prioritized to ensure fair distribution of work.
- If no qualified staff are available, fallback staff are assigned, following the same balancing logic.
- Auto assignment will not be executed if a staff is already assigned to the patient.
- Assignments can be manually edited later if needed.

Details of the Solution

Real-time Acuity Management Dashboard

Details of the Solution

AI-Powered Staffing Optimization Analysis

To optimize the staffing distribution across wards and reduce capacity utilization to below 100%, the following staff movements are recommended:

- **Ward B4:**
  - Move 1 Expert from C8E to B4 to increase max acuity capacity by 20.
  - Move 1 Proficient from NICU to B4 to increase max acuity capacity by 15.
- **Ward C6E:**
  - Move 1 Expert from PICU to C6E to increase max acuity capacity by 20.
- **Ward B7:**
  - Move 1 Proficient from NNICU to B7 to increase max acuity capacity by 15.
- **Ward C5E:**
  - Move 1 Proficient from C8W to C5E to increase max acuity capacity by 15.
- **Ward C5W:**
  - Move 1 Competent from C7E to C5W to increase max acuity capacity by 10.

These movements will help balance the staffing levels and ensure that each ward's acuity capacity meets or exceeds its total acuity level, thereby reducing the utilization percentage to below 100%.

AI-powered Staff Optimization Analysis

Benefits

Data-driven Decision Making

Balanced Workforce Distribution

Optimized Manpower Planning

Increased Nurse Satisfaction

Enhanced Staffing Accuracy

Operational Efficiency

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Cost-effectiveness

- Low cost incremental innovation by the **in house IT team**
- Minimal capital expenditure with **cloud technology**
- Use of **open-source optimization libraries** and low cost **generative AI APIs**

Scalability & Usefulness to Other Hospitals

- Easily **adaptable**
- **Standalone** tool or can be **integrated** with existing hospital systems.
- **Reduces costs** by eliminating inefficiencies
- **Cloud-based** infrastructure

Thank you!