

AcuityPro

AI-Powered Acuity-Based Nurse Staffing and Optimization

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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

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	
CIWA-Ar < 8 / Altered Mental Status (Mild)	1	
Delirium / Altered Mental Status (Severe)	3	
Manic / Restless / Agitated / Coma	4	

[+ Add Option](#) [Remove Field](#)

[+ Add Form Field](#)

Customizable acuity forms

Details of the Solution

Assignment Date
10-10-2024

Morning	Evening
XXXXXXXXXXXXU (Expert)	XXXXXXXXXXXX (Expert)
XXXXXX (Expert)	XXXXXXXXXXXXXS (Proficient)
XXXXXXXXXXXXXXXXXXXXN (Expert)	XXXXXXXXXXXX (Proficient)
XXXXXXXXXXXXXXXXXXXX (Proficient)	
XXXXXXXXXXXX (Proficient)	

Night	Week-off
XXXXXXXXXXXXU (Proficient)	XXXXXXXXXXXX (Expert)
XXXXXXXXXX (Proficient)	
XXXXXXXXXXXXXXXXXXXX (Proficient)	

Leave	Unassigned
XXXXXXXXXXXXXXXXXXXX (Proficient)	No unassigned staff
XXXXXXXXXX (Proficient)	

Drag and drop interface for duty assignment

Details of the Solution

Acuity Scoring Form

Does the patient have any of the following characteristics? 1

Oxygen Flow ☒ BiPAP or High Flow Mask

Tracheostomy/Ostomy Care/High Risk Medication Infusions

Paralysed/High Dependency Care None

Vitals Condition 1

Stable

☒ Variation in BP, Temp, HR, SpO2, Resp Assistance (NC/Mask) MILD

Variation in BP, Temp, HR, SpO2, Resp Assistance (Tracheostomy,BIPAP) MODERATE

Variation in BP, Temp, HR, SpO2, Resp Assistance (Ventilator) SEVERE

Mental Status 1

Effortless data capture
Previous acuity data prepopulated

Details of the Solution

[illegible]

Staff Name	Competency	Total Acuity Score
XXXXXXXXXXXXX	Expert	16
XXXXXXXXXXXXXXXXXXXX	Competent	10
XXXXXXXXXXXXX	Expert	12
XXXXXXXXXXXXX	Competent	10
XXXXXXXXXXXXXXXXXXXX	Advanced Beginner	7

Patients **colour coded**
Staff **competency levels** mapped

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

AI Powered Analysis

Search:

Ward	Total Staff	Advanced Beginner	Competent	Proficient	Expert	Total Patients	Total Acuity	Max Acuity Capacity	Capacity Utilization (%)
↑↓	↑↓	↑↓	↑↓	↑↓	↑↓	↑↓	↑↓	↑↓	↑↓
B7	4	3	1	0	0	16	45	31	145%
C5E	2	0	0	0	2	19	47	40	118%
C5W	3	1	0	0	2	18	49	47	104%
B6	2	1	0	0	1	9	26	27	96%
C6W	2	0	0	1	1	11	31	35	89%
B10	2	0	0	0	2	12	35	40	88%
B5	3	1	0	0	2	15	40	47	85%
B8	3	1	0	0	2	13	38	47	81%

Showing 1 to 10 of 59 entries

Previous

1

2

3

4

5

6

Next

11111196	SSSSSSSSSSPP	Expert	C4E
11111197	SSSSSSSSSSSSSVA	Competent	B8
11111198	/AAAAUUUUUUUJ	Expert	C4E
11222297	NNNNNNNT	Competent	B8
11222298	[IIIIIIIIWWWWWFFFN/	Expert	B8
12222297	VVVVVVVVVVUP	Competent	C4E
11222297	LLLLL8A	Competent	C6E
11222298	/AAAAUUUUUUZZ	Proficient	C4W
11222296	/VVVVVVVVVVVVVVSS	Advanced Beginner	B8
11111195	/AAAAUUUUUT	Expert	C4W

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%.

Benefits

**Data-driven
Decision
Making**

**Balanced
Workforce
Distribution**

**Optimized
Manpower
Planning**

**Increased
Nurse
Satisfaction**

**Enhanced
Staffing
Accuracy**

**Operational
Efficiency**

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!