Concept Note: Clinical Triage & Resource Allocation System

1. Project Title

Smart Triage & Resource Allocation System (STRA-System)

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2. Project Overview

The Smart Triage & Resource Allocation System is a **hospital-focused digital triage platform** designed **to help clinics and hospitals streamline patient flow**, **allocate medical staff efficiently**, and **optimise medicine and resource usage**.

Nurses will enter **initial patient data and vitals**, and the system will automatically classify urgency levels, recommend care pathways, and notify relevant departments. The system then uses this triage information to help hospital management understand:

- patient load in real time

- which departments need more support

- which doctors need to be assigned where

- stock levels and medicine usage

- patterns in disease trends

This improves efficiency, reduces congestion, and enhances decision-making.

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3. Problem Statement

Hospitals and clinics in Kenya face major workflow and resource challenges:

- Poor triage results in long waiting times

- Nurses often manually record vitals without a central system

- Doctors lack quick visibility on urgent cases

- Resources such as medicine, beds, and labs are not allocated based on real data

- No real-time dashboards for patient load

- Overworked departments struggle to predict staffing needs

- Hospitals lack analytics to manage peak times or outbreaks

A digital triage system is required to capture patient vitals, classify urgency, and give hospitals real-time insights for better resource allocation.

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4. Objective

Primary Objectives

1. Digitize the triage process to ensure accurate and fast patient prioritization.

2. Provide hospitals with **real-time dashboards** for resource allocation.

3. Help management allocate **doctors, nurses, rooms, labs, and beds** based on live demand.

4. Track medicine usage and stock based on triage patterns.

5. Improve patient flow from entry point → triage → consultation → treatment.

Secondary Objectives

- Improve data accuracy

- Provide early outbreak detection through patterns

- Reduce operational costs

- Improve staff scheduling

5. Target Users

Primary Users

- **Nurses** – who record vitals and patient intake data

- **Doctors** – who receive triage results and patient queues

- **Hospital Admin & Management** – for resource decisions

- **Pharmacy Department** – for medicine planning

Secondary Users

- Lab technicians

- Emergency department staff

- Ministry of Health reporting units

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6. Key Features & Functional Requirements

A. Triage Module (Core)

Nurses enter:

- Patient basic info

- Vitals (BP, pulse, temperature, oxygen saturation)

- Symptoms

- Existing conditions

- Pain scale

System outputs:

- **Urgency level** (Green, Yellow, Red)

- **Recommended department** (General, Pediatric, Emergency, etc.)

- **Estimated doctor wait-time**

● Automatic **queuing** into the correct department

B. Resource Allocation Dashboard

For management and department heads:

● Number of patients per department

● Capacity vs load (beds, rooms, equipment)

● Doctor availability

● Nurse availability

● Predictive demand based on current triage data

● Flags departments that are overwhelmed

C. Medicine & Consumable Tracking

● Track medicine usage based on triage patterns

● Predict which drugs will run out soon

● Pharmacy dashboard for stock allocation

● Daily and weekly insights on high-use medicines

D. Doctors' Portal

● View patient queues by urgency

● View detailed vitals and triage notes

● Send patients for labs, scans, or pharmacy

● Record diagnosis and treatment

● Reduce unnecessary delays

E. Hospital Insights & Analytics

- Daily patient load

- Most common symptoms

- Resource strain projections

- Time taken from triage → doctor → treatment

- Staff performance metrics

- Outbreak early warning alerts

F. Non-Functional Requirements

- Fast data entry (under 1 minute for vitals)

- High availability

- Role-based access control

- Secure patient data

- Offline mode support for clinics with unstable internet

- Automatic syncing when online

7. Technology Stack (Recommended)

Frontend

- React / [Next.js](TBD by Cyrus and Victor)

Backend

- Node.js (Express/NestJS)
- Python for analytics models

Database

- PostgreSQL (main DB)
- Redis (queues + real-time updates)

Integrations

- SMS alerts for high-risk cases
- Optional integration to EMR systems

8. Developer Deliverables

Developers must deliver:

1. Triage data entry interface (nurses).

2. Real-time patient queue system.

3. Departments dashboard.

4. Resource allocation dashboard.

5. Medicine tracking + pharmacy module.

6. Doctor portal.

7. Analytics dashboards.

8. API documentation.

9. Secure user authentication (role-based).

10. Full deployment + training materials.

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9. Expected Outputs

- Fully functional triage system

- Resource management dashboard

- Stock/medicine tracking

- Doctor and admin user portals

- Analytics & forecasting engine

- Deployment on hospital servers or the cloud

10. Success Indicators

- Triage time reduced from 10–15 mins → **2–4 mins**

- Doctors can see patient queues in real time

- Reduced waiting time for critical patients

- Better staff planning

- Reduction in medicine shortages

- Efficient allocation of rooms, beds, and labs