TEAM "AREA 51"

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Team #: **51**

Brief Team Bios

Tara: 1st year MD student at Virginia Tech Carilion, interested in health systems and global neurosurgery, all-rounder from design to programming
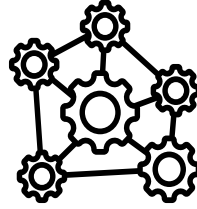
Jash: MS in data analytics engineering from Northeastern, comfortable with programming, as well as financial data; hoping to use this knowledge for global neurosurgery

Kirabo: Biomedical engineering background, interested in prototyping and developing for LMICs

Solution Category

- Technological/software solution

Pain Point & Problem Statement

Pain point: Ninety-seven ambulances and 1 single referral hospital, Connaught Hospital, serve the entire country of Sierra Leone (population 8 million, ~27,700 sq miles). X was injured in Freetown, near Connaught, but others like him may live at the periphery of Connaught's catchment area, several hours away by ambulance. Propose a triage system that can be deployed by ambulance dispatch at Sierra Leone's NEMS to prioritize neurotrauma cases (brain and spine) under the given resource constraints. Consider the advantages and disadvantages of manual vs. semi-automatic vs. automatic triage.

Problem Statement: How can we develop a triage system that optimizes ambulance dispatch to prioritize neurotrauma cases (brain and spine) in a resource-limited setting, considering the advantages and disadvantages of manual, semi-automatic, and automatic triage systems?

Our Solution?
SLANT (Sierra Leone Assessment for Neurotrauma Triage)

S.L.A.N.T

SIERRA LEONE ASSESSMENT
FOR NEUROTRAUMA TRIAGE

S.L.A.N.T

Purpose: SLANT is designed to prioritize and manage neurotrauma cases (brain and spine injuries) in Sierra Leone, focusing on effective resource utilization within the constraints of a low-resource setting.

Automated Triage Algorithm: The system uses a predefined algorithm to assess various medical parameters, such as Glasgow Coma Scale (GCS), pupil reactivity, limb mobility, and vital signs, to assign a triage score and priority level (Critical, High, Medium, Low).

Real-Time Notifications: High and Critical Priority cases trigger real-time notifications to the National Emergency Medical Service (NEMS) to dispatch ambulances immediately, ensuring timely medical intervention.

User-Friendly Data Collection: The interface is designed for first responders to input patient data easily. Instructions are provided in both English and Krio to accommodate local language needs.

Offline Functionality: The system can operate without an internet connection, storing data locally and synchronizing when connectivity is available, ensuring continuous operation in remote areas.

Patient Tracking and Status Updates: The system tracks patient status, marking High and Critical Priority cases as "En Route" and Medium and Low Priority cases as "Waiting," allowing for efficient resource allocation and monitoring.

S.L.A.N.T

S.L.A.N.T
SIERRA LEONE ASSESSMENT FOR NEUROTRAUMA TRIAGE

1. Vital Signs

- **Heart Rate**:
  - ≥ 150 bpm: 5 points
  - 120-149 bpm: 3 points
  - 80-119 bpm: 1 point
  - 60-79 bpm: 0 points
  - 40-59 bpm: 3 points
  - < 40 bpm: 5 points
- **Blood Pressure**:
  - ≥ 180 mmHg: 5 points
  - 160-179 mmHg: 3 points
  - 140-159 mmHg: 2 points
  - 120-139 mmHg: 1 point
  - 90-119 mmHg: 0 points
  - 70-89 mmHg: 3 points
  - < 70 mmHg: 5 points
- **Respiratory Rate**:
  - ≥ 30 breaths/min: 5 points
  - 25-29 breaths/min: 3 points
  - 20-24 breaths/min: 2 points
  - 15-19 breaths/min: 1 point
  - 12-14 breaths/min: 0 points
  - 10-11 breaths/min: 3 points
  - < 10 breaths/min: 5 points
- **Oxygen Saturation**:
  - ≥ 100%: 0 points
  - 95-99%: 1 point
  - 90-94%: 3 points
  - 85-89%: 5 points
  - < 85%: 5 points
- **Temperature**:
  - ≥ 40℃: 5 points
  - 39-39.9℃: 3 points
  - 38-38.9℃: 2 points
  - 37-37.9℃: 1 point
  - 36-36.9℃: 0 points
  - 35-35.9℃: 3 points
  - < 35℃: 5 points

2. Neurotrauma Parameters

- **Glasgow Coma Scale (GCS)**:
  - ≤ 8: 4 points
  - 9-12: 2 points
  - 13-15: 0 points
- **Pupil Reactivity**:
  - Both non-reactive: 4 points
  - Sluggish or unequal: 2 points
  - Both reactive: 0 points

3. Additional Signs

- **Seizures**:
  - Present: 2 points
  - Absent: 0 points
- **Altered Consciousness**:
  - Present: 3 points
  - Absent: 0 points
- **Severe Headache or Vomiting**:
  - Present: 1 point
  - Absent: 0 points

4. Pain Response

- **Pain Response**:
  - Normal: 0 points
  - Localized: 1 point
  - No response: 4 points

5. Motor Strength

- **Motor Strength**:
  - Normal: 0 points
  - Moderate weakness: 2 points
  - No movement: 4 points

6. Spinal Cord Injury

- **Spinal Cord Injury**:
  - None: 0 points
  - Pain without neurological deficit: 2 points
  - Pain with neurological deficit: 4 points

Priority Levels:

- **Critical Priority**: Total Score ≥ 30
- **High Priority**: Total Score 20-29
- **Medium Priority**: Total Score 10-19
- **Low Priority**: Total Score < 10

Minimum Viable Product

- **Purpose**: The SLANT MVP is designed to showcase the core functionalities of the Sierra Leone Assessment for Neurotrauma Triage system, focusing on optimizing ambulance dispatch and triage processes for neurotrauma cases.
- **Components**: The MVP includes a triage calculator, real-time patient tracking, priority-based ambulance dispatch, and a search function for patient records.
- Designed to be scalable, allowing for future expansion and integration with other systems.
- **Intuitive Design**: The MVP features a user-friendly interface that requires minimal training for healthcare workers to adopt and use effectively.
- **Clear Visual Indicators**: Priority levels are color-coded for easy identification and quick decision-making.

Example Simulation (Python)

- This simulation demonstrates how the SLANT system processes patient data, calculates a total triage score, and assigns a priority level.
  - Note integrated distance/hours to Connaught Hospital.
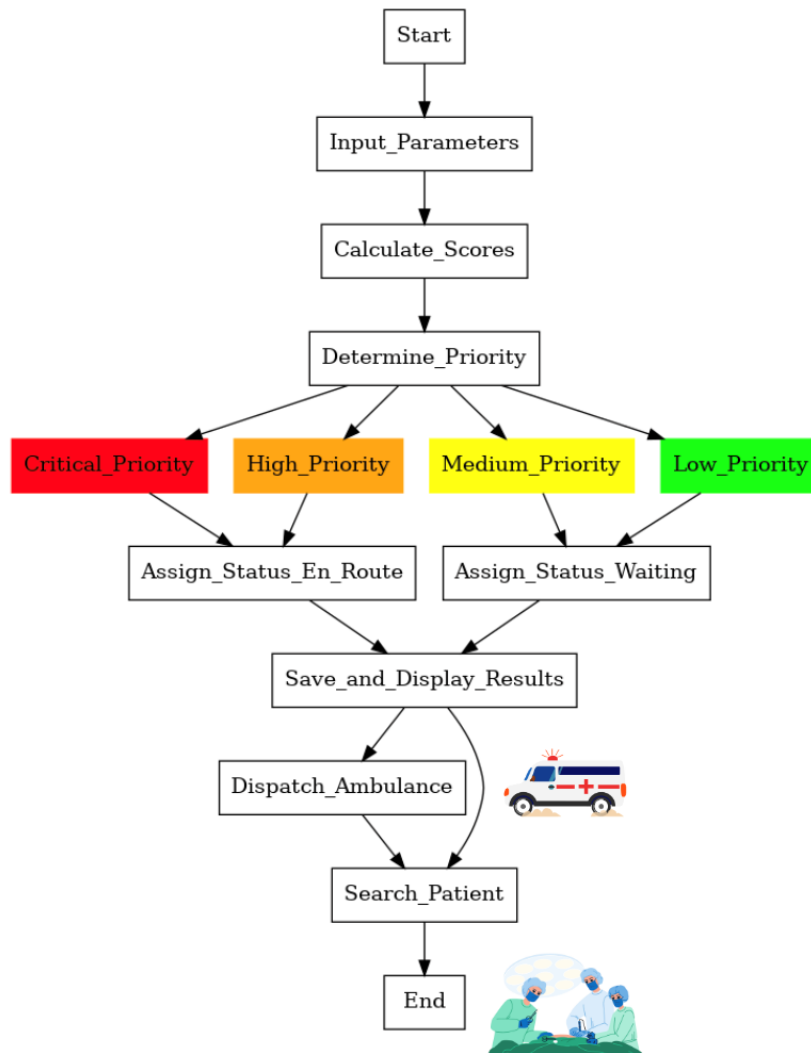 - Easy UI, straightforward usage

Flowchart

Business Model

- **Nonprofit Foundation**: Establish a nonprofit focused on emergency medical services (EMS) in Sierra Leone and other LMICs, if necessary
- **Global Health Investors**: Secure funding from global health organizations and philanthropic donors.
- **Grants and Donations**: Obtain support from international health grants and donations.
- **Strategic Partnerships**: Collaborate with international health organizations and NGOs.
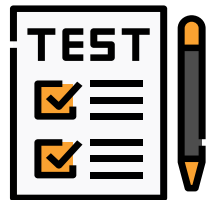
Landscape/Market Analysis

Customers:

- Government health agencies.
- National Emergency Medical Services (NEMS).
- International health organizations and NGOs.

Market Size:

- Population Served: 8 million people in Sierra Leone.
- Emergency Cases: Thousands of neurotrauma cases annually.

Current Solutions:

- Manual Triage Systems: Relies on subjective assessment, prone to human error, tends to be slow.
- Limited Emergency Infrastructure: Insufficient number of ambulances and referral hospitals.
- International Aid Programs: Often lack integrated, data-driven triage systems, especially for neurotrauma.

Go-to-Market Plan

Pilot Launch: Start with a pilot program in Freetown, near Connaught Hospital.

Beachhead Consumers: Government health agencies, NEMS, and key hospitals.

Beachhead Investors: Global health organizations (e.g., WHO, Gates Foundation), international NGOs, and philanthropic donors.

Partnerships: Collaborate with international health organizations and NGOs for support and funding.

Training Programs: Provide training for first responders and healthcare workers on using SLANT.

Scaling Strategy: Plan to expand SLANT to other LMIC regions and integrate with additional healthcare systems based on pilot success.

Validation/Evaluation

Prototype Testing: Conduct pilot testing in Freetown near Connaught Hospital. 🚀

Key Metrics:

- **Response Time**: Measure ambulance dispatch and arrival times.
- **Patient Outcomes**: Track mortality and morbidity rates.
- **Resource Utilization**: Monitor ambulance and medical resource usage.
- **User Feedback**: Collect feedback from healthcare workers and patients.
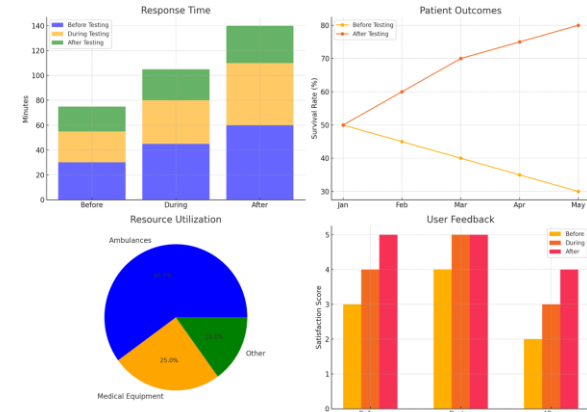
Continuous Improvement: Use collected data (only perioperative metrics, no private patient information) to refine the system and improve accuracy.

Outcomes need to be **published** in peer-reviewed journal to support our invention and goals

Thank you!