AI - BASED EARLY WARNING SCORE SYSTEM FOR POST-OPERATIVE RECOVERY

National Early Warning Score 2 (NEWS2) – Standards-Based Validation

1. Methodology Overview

The NEWS2 is an early warning score system used to identify clinical deterioration of patients with acute illness. NEWS 2 stands for National Early Warning Score 2 which was first introduced as NEWS (in 2012) and NEWS2(in 2017) is the updated version. NEWS is introduced by the Royal College of Physicians (RCP , UK) to standardize the monitoring and response to acutely ill patients, providing a common language for healthcare professionals to quickly identify deterioration, reduce mortality, and improve patient safety across the UK's NHS.

2. Intended Use Case

The AI-Based Early Warning Score system is mainly created to identify deterioration in post-surgical or post-operative patients receiving remote monitoring or telemonitoring. This system is mainly designed to identify and inform early detection of physiological deterioration in patients to their respective assistant or clinical nurse who's taking care of the patient in post-surgical recovery. The physiological patterns associated with sepsis onset in ward-level or home-monitored patients.The system is **not intended to replace clinical judgment**, but to function as a decision-support and escalation trigger tool.

3. NEWS2 - In detail

NEWS 2 consists of six physiological parameters which are routinely recorded which are Respiration rate , Oxygen saturation , Systolic blood pressure , pulse rate , level of consciousness and newly added confusion ('C') that make ACVPU and temperature. Additional plus 2 will be added if the patient is using supplemental oxygen. There are four trigger levels based on NEWS:

1. **LOW score:** an aggregate NEW score of 1–4

2. **A single red score:** an extreme variation in an individual physiological parameter (a score of 3 in any one parameter, which is colour-coded **red** on the NEWS2 chart)

3. **MEDIUM score:** an aggregate NEW score of 5 or 6. **A NEW score of 5 or more is a key threshold** and is indicative of potential serious acute clinical deterioration and the need for an urgent clinical response

4. **HIGH score:** an aggregate NEW score of 7 or more.

4.Trigger Thresholds (Red Flag Logic)

The "Red Scores" or Trigger ThresholdsA score of three is given to any vital sign that falls into the "Red" zone on a NEWS2 chart. Typical instances consist of:Heart Rate (Pulse): 40 bpm (severe bradycardia) or 131 bpm (extreme tachycardia). On the standard Scale 1, oxygen saturation (SpO2) is 91\%. Breathing Rate: 8 breaths per minute (respiratory depression) or 25 breaths per minute (severe respiratory distress). Level of Consciousness: A 3 on the ACVPU scale indicates any recent onset of agitation, confusion, or disorientation.

5.Application in our Project

The NEWS is used as an alert logic to inform the clinical assistant / doctor taking care of post-surgical patients. The vitals stored in the firebase cloud will be pulled to the EWS model which is made by python , cleans and smooths the data to prevent misreading. It is mainly a 24 - Hours trend because a heart rate of 100 isn't always scary, but a heart rate that was 70 this morning and is now 100 (a rising trend) is a major red flag. It uses Pandas to calculate the "Slope"**.** The vitals will be converted into NEWS 2 and passed through a pre-made AI - Risk prediction model which is made for identifying the future risk for e.g, "85% probability of a crisis in the next 4 hours". Explains which vital causes this increase and (Triage Dashboard & Alerting) moves the patient name to the top of the list.