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Clinical Information Leaflet

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A Systemic Approach To Identify Early Deterioration

In-hospital patient deterioration is often preceded by a period of abnormalities in vital signs. These are changes mainly in physiological parameters like pulse, blood pressure, respiratory rate and temperature [13]. Based on this premise, in the late 90's several studies were able to develop scores to anticipate these situations, and as a result, Early Warning Scores (EWS) were created to determine the degree of patients' illness based on their physiological parameters [14]. For example, in the UK, several reports from the National Institute for Health and Clinical Excellence (NICE) and the Royal College of Physicians, have advocated the use of the two most popular EWS systems worldwide, Modified Early Warning Score (MEWS) and National Early Warning Score (NEWS). NEWS2 is the latest version of NEWS, updated in 2017. All these protocols advocate a system to standardise the assessment and response to acute illness.

Until recently there has been a lack of consensus regarding the ideal EWS protocol, but there is evidence that certain parameters are better than others to identify early deterioration [15]. Listed below is a description of the physiological parameters included in most EWS systems:

- Respiratory rate is an important indicator of potential respiratory dysfunction.
- Systolic blood pressure, when its high it may indicate cardiovascular disease, while low systolic blood pressure may indicate circulatory compromise.
- Pulse rate, tachycardia may indicate circulatory compromise.
- Level of consciousness: Alert, a fully awake patient; Voice, the patient makes a response to voice; Pain, the patient delivers a response to a pain stimulus; Unresponsive, the patient does not give a response to voice or pain.
- Temperature, if too high or too low is a sensitive indicator of acute illness, especially infection.
- Oxygen saturation is an important parameter for the integrated assessment of pulmonary and cardiac function. Routine monitoring by pulse oximetry is recommended in NEWS and NEWS2 protocols.
- Patient on room air or supplemented oxygen: should be considered for NEWS and NEWS2.

National Early Warning Score 2 (NEWS2)

Physiological parameters	3	2	1	0	1	2	3
Respiratory rate (permin)	≤8	-	9-11	12-20	-	21-24	≥25
SpO_2 scale 1(%)	≤91	92-93	94-95	≥96	-	-	-
SpO_2 scale 2(%)	≤83	84-85	86-87	88-92/ ≥93 on air	93-94(on oxygen)	95-96(on oxygen)	≥97 on oxygen
Air or oxygen?	-	Oxygen	-	Air	-	-	-
Systolic BP (mmHg)	≤90	91-100	101-110	111-219	-	-	≥220
Pulse rate (per min)	≤40	-	41-50	51-90	91-110	111-130	≥131
Level of consciousness	-	-	-	A	-	-	C,V,P or U
Temperature (°C)	≤35.0	-	35.1-36.0	36.1-38.0	38.1-39.0	≥39.1	-

A=Alert | C=New confusion (delirium) | V=Response to verbal stimulation | P=Response to painful stimulation | U=Unresponsive

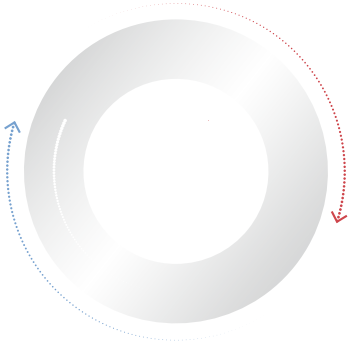
NEWS2 score	Clinicalrisk	Frequency of monitoring	Clinical response
Total score 0		Minimum 12 hourly	· Continue routine NEWS monitoring
Total score 1-4	Low	Minimum 4-6 hourly	· Inform registered nurse, who must assess the patient · Registered nurse decides whether increased frequency of monitoring and/or escalation of care is required
3 in a single parameter	Low-medium	Minimum 1 hourly	· Registered nurse to inform medical team caring for the patient, who will review and decide whether escalation of care is necessary
Total 5 or more: Urgent response threshold	Medium	Minimum 1 hourly	· Registered nurse to immediately inform the medical team caring for the patient · Registered nurse to request urgent assessment by a clinician or team with core competencies in the care of acutely ill patients · Provide clinical care in an environment with monitoring facilities
Total 7 or more: Emergency response threshold	High	Continuous monitoring of vital signs	· Registered nurse to immediately inform the medical team caring for the patient:this should be at least at specialist registrar level · Emergency assessment by a team with critical care competencies, including practition(s) with advanced airway management skills · Consider transfer of care to a level 2 or 3 clinical care facility, ie higher-dependency unit or ICU · Clinical care in an environment with monitoring facilities

A

To improve the detection of patient deterioration

It is recommended to use EWS during initial prehospital stage and throughout the entire patient's hospital journey [16]. The overall performance of the EWS system is not solely dependent on the scoring system but also the organization of the response. Successful implementation of an EWS in the hospital must go hand in hand with proper education of staff and increasing awareness of the necessity of structural patient monitoring [17]. A large retrospective study in the UK, a country where NEWS2 assessment is part of the standard of care in acute and ambulance settings, found that 38% of the scores were not fully completed or incorrectly calculated, hence not triggering important alerts in many cases [18].

EWS assessment should be performed as an adjunct to the clinical judgment of the doctor [14]. Automatisation of EWS into the vital signs monitoring system has decreased the time required for vital sign measurement and recording, an improvement in the proportion of rapid-response-team calls triggered by respiratory criteria, as well as an increase in the survival rate of patients receiving rapid-response-team calls [19].



Flexible and configurable protocols

Mindray's EWS solution provides flexible and configurable protocols including the standard MEWS, NEWS, and NEWS2, but will also allow users to create and save customised scoring protocols. To better satisfy patient needs, the individual parameter scoring (IPS) allows full control of all parameters and limits for healthcare professionals.

Automated EWS and Smart Alarming

Early warning scores are used to identify the patients at risk. With Mindray's automated EWS, patient's vital signs are automatically measured and the EWS is regularly calculated. Auto calculation of a new score can be triggered by each or all the three following events: pre-set time interval or interval according to the last EWS score, every new NIBP, or a vital sign alarm. The interval can be set by the user in a time range (from 5 minutes to 24 hours) or according to the patient's last EWS score result.

Once a deterioration is detected, the patient EWS monitor will start alarming based on predefined settings to inform the responsible staff about the change in patient condition at an early stage.

EWS solution on a Mindray VS-series monitor.

EWS dashboard, SmartAlarm and Trends View tools on Mindray BeneVision central monitoring system.

The BeneVision central monitoring system allows complete digital surveillance across Mindray patient monitors and vital sign monitors. View all patient data at a glance, in real-time, for a streamlined clinical workflow that improves visibility throughout the patient journey.

Under EWS Trends View, the changes in a patient's status are highlighted to allow early detection of deterioration and make appropriate recommendations.

Parameters and EWS View show details of patient vital signs and EWS. EWS countdown reminds caregivers to do the next round spot check on time.

The intuitive Early Warning Scoring dashboard provides caregivers with a fast and easy-to-understand assessment of patient deterioration, allowing faster, more confident responses and earlier interventions.

Aiming to create safer patient environments, Mindray incorporates early warning scoring (EWS) system in a wide range of patient monitors, from low to high acuity. By including EWS system, Mindray solutions contribute to safer and more efficient patient management by anticipating potential complications and improving workflows.

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