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Letter to the Royal College of Physicians regarding the suitability of the National Early Warning Score in the assessment of the unwell spinal cord injury patient

We recently undertook an audit on the utilisation of the National Early Warning Score (NEWS) in spinal cord injury (SCI) patients at the London Spinal Cord Injury Centre. At the same time we calculated and used the sensitivity and specificity to determine how suitable the NEWS was for this patient group, analysing the results separately for the tetraplegic and paraplegic groups.

The recommendations made in the Royal College of Physicians' report[1] stated: the NEWS should not be used in children (ie aged <16 years) or women who are pregnant because the physiological response to acute illness can be modified in children and by pregnancy. Furthermore, the chronically disturbed physiology of some patients with chronic obstructive pulmonary disease (COPD) could influence the sensitivity of the NEWS, which should be recognised when interpreting NEWS in these patients.

We also know that the sympathetic nervous system is disrupted in SCI patients (tetraplegic and high paraplegic patients), which in turn can lead to an altered baseline physiology and response to illness. Unopposed activity of vagal tone (parasympathetic system) in tetraplegics and high paraplegics can lead to lower baseline blood pressures and bradycardia. In addition, the usual vasomotor response to changes in environmental temperature can be impaired leading to poikilothermia (commonly a temperature less than 36°C). The patient is usually well, and these values represent their baseline physiological values. We postulated that these responses, unique to this patient group, may lead to the production of false 'triggers' on the NEWS system (Fig 1).

Autonomic dysreflexia is a condition commonly seen in SCI patients, and represents sympathetic overactivity below the level of the spinal cord lesion in patients with a T6 injury level and above. The condition results in vasoconstriction and severe hypertension. It is partly defined as a rise in systolic blood pressure of ≥20 mmHg above the patient's baseline and is a medical emergency and potentially fatal condition if not treated early. It therefore requires high sensitivity from the NEWS as an early warning test system for prompt recognition and treatment. However, these patients may not trigger on the NEWS as the scoring system tolerates systolic blood pressures of 111–219 mmHg (Fig 2).

In total, 100 separate NEWS records were identified at the London Spinal Cord Injury Centre (49 involving tetraplegics and 51 involving paraplegics). The NEWS was correlated with a medical assessment of the patient. The sensitivity, ie the ability of NEWS to trigger urgent clinical reviews for all patients who were unwell (a score of ≥5 correctly identifying unwell patients), and the specificity, ie the ability of NEWS not to trigger urgent clinical reviews for well patients (a score

PHYSIOLOGICAL PARAMETERS	3	2	1	0	1	2	3
Respiration rate	≤8		9–11	12–20		21–24	≥25
Oxygen saturations	≤91	92–93	94–95	≥96			
Any supplemental oxygen		Yes		No			
Temperature	≤35.0		35.1–36.0	36.1–38.0	38.1–39.0	≥39.1	
Systolic blood pressure	≤90	91–100	101–110	111–219			≥220
Heart rate	≤40		41–50	51–90	91–110	111–130	≥131
Level of consciousness				A			V, P, or U

Fig 1. Baseline physiological parameters in a well SCI patient producing a 'false trigger' score of 5 on the NEWS system. Reproduced with permission.[1] NEWS = National Early Warning Score.

PHYSIOLOGICAL PARAMETERS	3	2	1	0	1	2	3
Respiration rate	≤8		9–11	12–20		21–24	≥25
Oxygen saturations	≤91	92–93	94–95	≥96			
Any supplemental oxygen		Yes		No			
Temperature	≤35.0		35.1–36.0	36.1–38.0	38.1–39.0	≥39.1	
Systolic blood pressure	≤90	91–100	101–110	111–219			≥220
Heart rate	≤40		41–50	51–90	91–110	111–130	≥131
Level of consciousness				A			V, P, or U

Fig 2. Illustrates how an unwell SCI patient with autonomic dysreflexia will not trigger on the NEWS system. Reproduced with permission.[1] NEWS = National Early Warning Score.

of ≤4 excluding unwell patients), were calculated from the results.

Sensitivity was 63% for the tetraplegic patients and 35% for the paraplegic patients. Therefore, the NEWS system missed 37% of observation records for the tetraplegics who were unwell (main pathology being autonomic dysreflexia) and 65% of observation records for the paraplegics who were unwell (variety of pathologies including a pulmonary embolus and viral illness).

Specificity was 37% for the tetraplegic patients and 100% for the paraplegic patients. Therefore, the NEWS system incorrectly triggered urgent clinical reviews in 63% observation records of well tetraplegics (due to temperature, heart rate and blood pressure) and 0% of observation records of well paraplegics.

In conclusion, disruption to the autonomic nervous system in tetraplegic and high paraplegic patients alters baseline physiology and reaction to illness which impacts on the NEWS sensitivity and specificity. Therefore, in order to highlight this, we recommend an explicit caveat for patients with SCI, as there is for COPD. ■

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Osteoporotic vertebral fractures in older patients

Appropriate attention is directed at the urgent diagnosis and management of vertebral fractures (with or without spinal cord or nerve root compression) secondary to trauma or primary malignant/metastatic vertebral bone infiltration, reflecting the potentially devastating consequences of delay. However, similar clinical practice does not always pertain in the diagnosis and proactive management of older patients with suspected osteoporotic vertebral fractures (OVFs). In fact, OVF prevalence is unknown because most fractures do not come to the attention of clinicians;[1] a population-based US study showed that almost two-thirds of OVFs were undetected.[2] However, OVFs are a commonly seen complication of primary or secondary osteoporosis[3] which affects up to 2.5 million people in England and Wales.[1] OVF prevalence increases with age and is higher in women. In Europe, an annual incidence has been estimated at 1% for women and 0.6% for men aged 50–79 years.[4]

A cycle of nihilism and lack of urgency exists in relation to the OVFs, and the urgent attention paid to diagnosis and management in traumatic spinal or malignant fractures is often not applied to OVFs. Clear pathways regarding which clinician or specialty maintains overall responsibility for the diagnosis and management of older patients with OVFs are often lacking, particularly in district hospital settings where spinal surgeons do not maintain a visible presence. Delayed diagnosis and absent proactive management predisposes to suboptimal non-surgical management methods with resulting recurrent hospital admissions, poly-pharmacy with narcotic analgesics (poorly tolerated in older patients), decline in function and eventual loss of independence. OVFs can also lead to spinal deformity that may be associated with decreased pulmonary function and gastrointestinal problems.[5,6] All these factors eventually result in increased morbidity and mortality.[1] The suffering of older patients with OVFs could be alleviated by breaking the cycle of negativity which feeds into lack of prompt diagnosis and urgency in pursuing alternative management. The recommendations of NICE TA279 should move practice in the right direction. The guideline recommends vertebroplasty (VP) and balloon kyphoplasty (BKP) in selected patients, as alternative minimally invasive management, mostly done under local anaesthesia.