

Reply to: NEWS2 needs to be tested in prospective trials involving patients with confirmed hypercapnia

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Dear Editor,

O'Driscoll et al. raise interesting points about our comparison of the National Early Warning Score (NEWS) and its modification, NEWS2.¹

1. We did not test NEWS2 in clinical practice, as we used a retrospective validation design, standard practice when evaluating the potential effects of a scoring system prior to exposure to patients. In contrast, the Royal College of Physicians NEWS2 changes were neither tested by a clinical trial nor evaluated retrospectively prior to introduction, whereas NEWS² has been validated using the same study design as ours.¹ We could not test the assumption that NEWS2 will alter behaviour, nor whether any alteration will change patient outcomes. As NEWS2 did not improve prediction of 24-hour mortality in patients with "presumed hypercapnia", we found no evidence that NEWS2 better identifies a patient group where a behaviour change might change outcomes.

2. Our paper is entirely relevant to NEWS2. NEWS2 is advocated for use in all patients, and we presented data independently for each patient group. The British Thoracic Society recommends that³: “... *For most patients with known COPD or other known risk factors for hypercapnic respiratory failure ... a target saturation range of 88-92% is suggested pending the availability of blood gas results ...*” This statement risks confusion about which patients SpO₂ Scale 2 should be applied to when taken with the RCP guidance.⁴
3. The sensitivity of an early warning score (EWS) must be balanced with the workload generated. However, workload is dictated by escalation criteria, not the score itself. NEWS2 uses a fixed escalation protocol regardless of which SpO₂ scale is used. An alternative (as we suggested¹) would be to modify the escalation thresholds for specific patient groups.
4. We strongly caution against extrapolating from a distribution of oxygen saturations to conclude that a hospital has unsafe practice, particularly as many patients with documented Type 2 Respiratory Failure (T2RF) had saturations > 93% recorded on air.
5. The usual aim of an EWS is to identify patients who are ill or deteriorating. Whether also using an EWS to guide oxygen (or any other) therapy is beneficial is unknown. The authors cite a guideline, an observational study and a single centre pre-hospital intervention randomized trial, none restricted to patients with confirmed hypercapnia, neatly highlighting the gap between evidence and the NEWS2 recommendations.
6. Patients with respiratory disease are a high-risk group (irrespective of whether they are at risk of T2RF) where we believe patients and clinicians would prefer higher sensitivity. However, escalation ‘rules’ for such patients may need to be modified to prevent excessive workload.
7. As hospitals throughout the world use NEWS, the workload and human calculation errors associated with using paper charts remain relevant.

All studies^{1,5} to date comparing NEWS with NEWS2 performance suggest the added complexity of NEWS2 is unlikely to lead to a significant benefit to patients and might lead to harm. As NEWS2 is now mandated by NHS England, prospective monitoring of its implementation must be urgently and carefully conducted.

Conflicts of Interest

VitalPAC™, the system used to collect vital signs data in Portsmouth, is a collaborative development of The Learning Clinic Ltd (TLC) and Portsmouth Hospitals NHS Trust (PHT). At the time of the research, PHT had a royalty agreement with TLC to pay for the use of PHT intellectual property within the VitalPAC™ product. PS is employed by PHT. GS was an employee of PHT until 31/03/2011. DP was an employee of PHT until 31/07/2016. Until October 2015, PS and the wives of GS and DP were minority shareholders in TLC. GS is a member of the Royal College of Physicians of London’s National Early Warning Score (NEWS) Development and Implementation Group (NEWSDIG), which developed NEWS. DP assisted the Royal College of Physicians of London in the analysis of data validating NEWS. PW co-developed the System for Electronic Notification and Documentation (SEND), for which Sensyne Health has purchased a sole licence. The company has a research agreement with the University of Oxford and royalty agreements with Oxford University Hospitals NHS Trust and the University of Oxford. PW is Chief Medical Officer for Sensyne Health.

References

1. Pimentel MAF, Redfern OC, Gerry S, Collins GS, Malycha J, Prythherch D et al. A comparison of the ability of the National Early Warning Score and the National Early Warning Score 2 to identify patients at risk of in-hospital mortality: A multi-centre database study. *Resuscitation*. 2019; 134: 147-56
2. Smith GB, Prytherch DR, Meredith P, Schmidt PE, Featherstone PI. The ability of the National Early Warning Score (NEWS) to discriminate patients at risk of early cardiac arrest, unanticipated intensive care unit admission, and death. *Resuscitation* 2013; 84: 465-70
3. O'Driscoll BR, Howard LS, Earis J, Mak V; British Thoracic Society Emergency Oxygen Guideline Group; BTS Emergency Oxygen Guideline Development Group. BTS guideline for oxygen use in adults in healthcare and emergency settings. *Thorax*. 2017 Jun; 72(Suppl 1): ii1-ii90
4. Royal College of Physicians. National Early Warning Score (NEWS) 2 Standardising the assessment of acute-illness severity in the NHS. 2017
5. Hodgson LE , Congleton J , Venn R , Forni LG , Roderick PJ. NEWS 2 – too little evidence to implement? *Clin Med* 2018; 18: 371-3