DEVELOPMENT AND VALIDATION OF A PREDICTIVE MODEL OF THE RISK OF PAEDIATRIC SEPTIC SHOCK

Appropriately triaging paediatric patients with suspected sepsis to appropriate levels of care is challenging. A critical time point for intervention is arrival at the emergency department (ED). Scott *et al* (J Pediatr 2019; 10.1016/j.jpeds.2019.09.079) aimed to develop and validate a model to estimate the risk of septic shock in patients suspected of sepsis by ED clinicians which could be implemented at arrival in ED using routinely collected data from an electronic health record to maximise potential use of a future tool. An observational cohort study including patients between 60 days and 18 years old was used. The study recruited patients from six units with temporal and geographical cohorts for model validation. The primary outcome measure was hypotensive septic shock requiring administration of crystalloids or vasoactive medication within 24 hours of arrival to the ED. Of 2464 visits with clinician-determined risk of sepsis, septic shock occurred in 282 (11.4%). The area under the receiving operating characteristic in the test, temporal and geographical sets were 0.79, 0.75 and 0.87, respectively. A threshold of predicted risk was set to 90% sensitivity in the training set, resulting in a specificity of 47%. At this threshold, the sensitivity of the model was 82% and 90% in the temporal and geographic sets, respectively. The model tended to underestimate risk in the highest risk patients, and it relies on clinical suspicion of sepsis to be initiated, something which varies significantly between practitioners. Although the model delivers relatively low specificity the importance of the outcome and the potential for benefit of early intervention mean that the calculated number needed to screen of six would be acceptable to most clinicians.

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RESPECTIVE CONTRIBUTION OF INTENSIVE CARE UNIT-ACQUIRED LIMB MUSCLE AND SEVERE DIAPHRAGM WEAKNESS ON WEANING OUTCOME AND MORTALITY

Intensive care unit (ICU) acquired weakness (AW) and diaphragm dysfunction (DD) contribute to morbidity and mortality in critically ill patients. Dres *et al* (Critical Care 2019;23:370) set out to identify risk factors and evaluate the relative impact on weaning and mortality of ICU-AW and ICU-DD. Posthoc analysis was performed on 2 merged cohorts, with 116 patients included. DD was assessed by twitch tracheal pressure in response to bilateral phrenic nerve stimulation (cut-off <7 cmH₂O). AW was assessed using the Medical Research Council score (cut-off <48). Multivariate logistic regression identified age, sulfentanil exposure and ventilation duration as independent factors associated with DD. Exposure to norepinephrine and ventilation duration were associated with AW. Interestingly, DD but not AW was associated with weaning failure, whereas AW but not DD was associated with increased mortality. Combined DD and AW was associated with higher weaning failure and mortality rates. The study is the largest to concurrently evaluate both ICU-AW and ICU-DD providing an insight into the potential different risk factors and impacts of these common clinical phenomena. While providing data to identify those at risk, potential interventions to prevent or improve outcomes in these conditions need to be identified and examined.

CONSERVATIVE OXYGEN THERAPY DURING MECHANICAL VENTILATION IN THE ICU

Meta-analyses have indicated that conservative oxygen strategies are associated with improved clinical outcomes in acutely unwell patients. ICU-ROX investigators (NEJM 2019; 10.1056/NEJMoa1903297) hypothesised that using oxygen conservatively could increase ventilator free days in patients receiving invasive ventilation within 28 days. This multicentre international trial

randomised 1000 patients to receive conservative (target SpO₂ 91%–97%, FiO₂ reduced to 0.21 if SpO₂ >90%) or usual oxygen therapy (target SpO₂ >90%, no limits to FiO₂/SpO₂). The conservative oxygen group spent more time with an FiO₂ of 0.21 compared with the usual oxygen group and less time with an SpO₂ >97%. However, there was no significant difference in ventilator free days. Mortality at 90 days, 180 days and survival was not significantly different between the two groups. A decrease in ventilator free days was observed in patients with hypoxic ischaemic encephalopathy in the conservative oxygen group as well as a reduction in mortality with improved neurological outcomes. The use of an FiO₂ less than 0.3 was 'discouraged' in the usual oxygen group—the precise nature of how this translated to practice is unclear and difficult to reproduce. The data show no harm and possible benefit of conservative oxygen therapy in this unwell cohort.

EFFECT OF POSTEXTUBATION HIGH-FLOW NASAL OXYGEN WITH NON-INVASIVE VENTILATION VERSUS HIGH-FLOW NASAL OXYGEN ALONE ON REINTUBATION

Elderly patients or those with premorbid cardiac or respiratory disease are at high risk of extubation failure. Thille *et al* (JAMA, 2019;322:1465) compared 7-day reintubation rates in high-risk patients treated with non-invasive ventilation and high-flow therapy (HFT+NIV) or high-flow therapy (HFT). A total of 648 patients were randomised with 641 (302 HFT+NIV; 339 HFT) analysed. Reintubation rates 7 days after extubation were lower in the HFT+NIV group compared with HFT (−6.4%, 95% CI −12 to −1%, p=0.02). The treatment effect was most marked in hypercapnic (8% vs 21%, p=0.049) compared with normocapnic (13% vs 18%, p=0.01) patients. The HFT+NIV group was less likely to experience postextubation respiratory failure and was less likely to require treatment for longer than 2 days after extubation. There was no significant difference in mortality. The trial was unblinded but the majority of patients met objective criteria for reintubation. The trial demonstrated that HFT and NIV may be delivered together to reduce reintubation in high-risk patients.

Correspondence to Dr Alex Phillips, Lane Fox Respiratory Unit, St Thomas' Hospital, London SE1 7EH, UK; alex.phillips@doctors.org.uk