New bedside tool predicts critical care admission in febrile children

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A team of Liverpool researchers has developed a novel rapid bedside tool to improve the detection of serious infections in children.

The Liverpool quick Sequential Organ Failure Assessment Score (LqSOFA) is an adaptation of the age adjusted qSOFA score, a bedside prompt to help identify patients with suspected infection at greater risk for a poor outcome outside the intensive care unit. In over 12000 febrile children presenting to the Emergency Department, retrospectively identified from the electronic patient record at Alder Hey Children's NHS Foundation Trust, the score was able to accurately predict children admitted to critical care within 48 hours.

"Most febrile children presenting to the Emergency Department have a self-limiting or mild illness, and those with serious bacterial infections and sepsis represent the needle in the haystack," explains lead researcher Professor Enitan Carrol from the University of Liverpool.

"The challenge for clinicians in the paediatric ED is to accurately and rapidly identify children with serious bacterial infection and sepsis, so that urgent treatment can be administered, and poor outcomes such as ICU admission and death, can be prevented," she adds.

The score uses four vital signs, which can be easily measured at the bedside in under two minutes using only a watch. They are heart rate, respiratory rate, consciousness level (on an Alert/Voice/Pain/Unresponsive scale) and capillary refill time (a

measure of perfusion). Compared to the original qSOFA, the new score does not require the measurement of blood pressure, which is omitted in about two thirds of children presenting to the Emergency Department. This makes the score ideal for pre-hospital settings such as primary care, ambulance services, urgent care services, and low income settings.

The study also found that the Alder Hey Paediatric Early Warning Score (PEWS), designed to identify deterioration in hospitalised patients, had high discriminatory value in predicting critical care admission in febrile children attending the Emergency Department. PEWS scores often include several more variables, and are therefore more complicated and time-consuming to calculate.

Professor Enitan Carrol said: "The thing I am most proud about with this project, is that the work was almost entirely conducted by trainee doctors, who worked tirelessly to perform the herculean task of extracting the data and calculating the scores."

Dr. Sam Romaine, a Clinical Research Fellow and lead author on the study, said "Improving our detection of these serious infections is a really important area of research, so I'm very proud to have contributed to this study."

Dr. Jessica Potter, whose medical student research project first derived the score, said: "When I started the project in medical school, I never imagined the impact that the research could have. Having the opportunity to be a part of a research project that has grown into an important piece of work, so early on in my medical career, has allowed me to build skills that I can use during my foundation years and beyond."

To the team's knowledge, this is the largest study assessing the performance of quick assessment scores, including the qSOFA, in a paediatric Emergency Department population. The population reflects a

real-world high-income Emergency Department setting, with a low prevalence of sepsis.

"Overall, the findings of the study demonstrate the superior performance of the Liverpool qSOFA and question the use of the original qSOFA to identify children at risk of sepsis in the paediatric Emergency Department," concludes Professor Carrol.

The other Liverpool contributors were Dr. Rachel McGalliard (NIHR Academic Clinical Fellow), Dr. Aakash Khanijau (Clinical Research Fellow) and Dr. Gemma Wright (Paediatric Registrar, Alder Hey Children's Hospital).

Researchers from the Centre for Trials Research, Cardiff, and the Paediatric Intensive Care Unit—Queensland Children's Hospital, Australia, also contributed to the work.

The study is published in *Pediatrics*, the official journal of the American Academy of Pediatrics.

More information: Sam T. Romaine et al. Accuracy of a Modified qSOFA Score for Predicting Critical Care Admission in Febrile Children, *Pediatrics* (2020). DOI: 10.1542/peds.2020-0782

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