Computer-aided diagnosis tool for prediction of sepsis-related mortality in neonatal intensive care units

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Abstract

Computer-aided diagnosis (CAD) based on machine learning (ML) can already be leveraged to be part of computer-controlled robotic systems to predict sepsis mortality in patients admitted to Intensive Care Units (ICUs). The same principle applies to Neonatal ICUs (NICUs) where early infant exitus are often caused by sepsis. In this context, an embedded CAD tool can assist clinicians in making medical decisions based on historical case results that the artificial intelligence (AI) machine has learned. The neonatal stage starts with the patient's date of birth and is terminated 28 days after birth. If the baby is born prematurely, the delivery of care in NICUs could continue beyond the first 28 days. The provision of care in NICUs is known to be especially complex in healthcare organizations where the decisions and results can be influenced by factors such as technology, people, setting, logistics, skills, culture, and experience of professionals. Because of these factors, healthcare professionals working at NICUs suffer a high level of stress that has a direct impact on the attention given to neonates. The continuous fatigue experienced by doctors and nurses in these settings may reduce the sepsis diagnosis accuracy, treatment definition, and patients' monitoring. The situation worsens considering that the sepsis scoring systems for neonates differ in small but fundamental details from adult sepsis. Sepsis in neonates presents the highest disease incidence among all age groups of patients with three million cases by year. In 2018, almost 15% of neonatal deaths (375,000) were caused by sepsis. In 2001 a task force of 19 critical care clinicians defined sepsis as a "life-threatening organ dysfunction caused by a dysregulated response to infection" but there is no a homogeneous criteria for neonatal sepsis