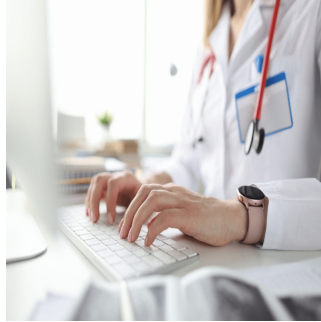


Human-Centred AI Tool for Sepsis Management



A new artificial intelligence tool, SepsisLab, has been developed to assist clinicians in making decisions about hospital patients at risk for sepsis, with a distinctive feature: it acknowledges its uncertainty. It indicates which demographic data, vital signs, and lab test results are needed to enhance its predictive accuracy. The research was published in KDD '24: Proceedings of the 30th ACM SIGKDD Conference on Knowledge Discovery and Data Mining and presented at SIGKDD 2024 in Barcelona, Spain.

SepsisLab was created based on input from doctors and nurses working in emergency departments and ICUs, where sepsis is most prevalent. Clinicians have expressed dissatisfaction with existing AI tools that generate patient risk scores using only electronic health records without clinician input.

Developed by scientists at The Ohio State University, SepsisLab predicts a patient's risk of sepsis within four hours, actively identifying missing information, quantifying its importance, and visually illustrating to clinicians how specific data could impact the final risk prediction. Experiments using public and proprietary patient data demonstrated that incorporating 8% of the recommended information increased prediction accuracy by 11%.

Current models operate under a human-AI competition framework, often producing false alarms in ICUs and ERs without clinician input. For this particular model, study researchers have embedded AI in every decision-making step, embracing an 'AI-in-the-human-loop' concept. Hence, this is not just an AI tool but one that collaborates closely with clinicians. It's a partnership between computer scientists and physicians to create a human-centred system that puts clinicians in control.

Sepsis can swiftly lead to organ failure and is challenging to diagnose due to its nonspecific symptoms like fever, low blood pressure, increased heart rate, and breathing difficulties. SepsisLab builds upon an earlier model by the same team that assessed the best timing for administering antibiotics to patients suspected of sepsis.

Typically, AI models handle missing data through imputation—a process that assigns a single value. However, "imputation can introduce uncertainty, which can affect downstream predictions. If the imputation isn't accurate and the missing value is crucial, it should be directly observed. This tool has an active sensing algorithm that identifies these missing values and suggests which additional data clinicians should collect to improve the model's accuracy.

A critical aspect of reducing system uncertainty over time is providing clinicians with actionable insights, including ranked lab tests based on diagnostic value and projections of how sepsis risk might shift with specific treatments.

Experiments showed that adding just 8% of new data from lab tests, vital signs, and other key variables reduced the uncertainty in the model by 70%, leading to an 11% increase in prediction accuracy.

SepsisLab is designed to deliver swift risk predictions and updates hourly as new data becomes available. The algorithm pinpoints the most important variables, and the clinician's actions help reduce uncertainty.

Source: [Ohio State University](#)

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