'AI Clinician' can aid doctors in treating sepsis patients

Researchers from Imperial College London have created an artificial intelligence system that could help treat patients with sepsis. Aptly named AI Clinician, the system could predict the best treatment strategy for patients. Tests conducted by the researchers showed that 98 percent of the time, the AI system matched or was better than the human doctors' decision.

The system "learnt" the best treatment strategy for a patient by analysing the records of about 100,000 hospital patients in intensive care units and every single doctor's decisions affecting them. This AI tool could be used alongside medical professionals, to help doctors decide the best treatment strategy for patients, according to the findings published in the journal Nature Medicine.

In the study, researchers looked back at U.S. patient records from 130 ICUs over a 15-year period to explore whether the AI system's recommendations might have been able to improve patient outcomes, compared with standard care. The researchers now hope to trial the system in ICUs in the UK.

"Sepsis is one of the biggest killers in the UK – and claims six million lives worldwide – so we desperately need new tools at our disposal to help patients," said senior author Dr. Aldo Faisal, from the Departments of Bioengineering and Computing at Imperial. "Our new AI system was able to analyse a patient's data – such as blood pressure and heart rate – and decide the best treatment strategy. We found that when the doctor's treatment decision matched what the AI system recommended, they had a better chance of survival."

Sepsis can cause a drastic drop in blood pressure which can leave organs deprived of blood flow and oxygen, and can ultimately lead to multiple organ failure and death. To raise blood pressure and keep the heart pumping, doctors give extra fluids, usually in the form of a salt solution, as well as medication that tightens blood vessels and raises blood pressure, called vasopressors.

To help doctors decide which approach would boost a patient's chance of survival, the research team created an AI system that would assess a patient's vital signs and recommend the best treatment approach.

The system analysed the medical records of 96,000 US patients with sepsis in ICUs. Using a process called reinforcement learning – where robots learn how to make decisions and solve a problem – the AI Clinician went through each patient's case and worked out the best strategy of keeping a patient alive. The system calculated 48 variables including age, vital signs and pre-existing conditions. The system then predicted the best treatment strategy for each patient with sepsis.

The study also found that mortality was lowest in patients where the human doctor's doses of fluids and vasopressor matched the AI system's suggestion. However, when the doctor's decision differed from the AI system, a patient had a reduced chance of survival.

The team found when the doctor's decision varied from the AI Clinician's suggestion, it was on average to administer too much fluid and too little vasopressor but importantly it varied between individual patients.

Professor Anthony Gordon, senior author from the Department of Surgery & Cancer at Imperial explained: "The AI Clinician was able to 'learn' from far more patients than any doctor could see in a lifetime. It has learnt from 100,000 patients and 'remembered' them all equally whereas doctors are always susceptible to recall bias, where they particularly remember recent cases or unusual cases".

The team now plans to trial the AI Clinician in UK hospitals. Dr. Faisal added: "The only way for any technology to help a patient is to turn it into a product that doctors and hospitals can prescribe, therefore we are seeking to commercialise."

Source: Imperial College London
Image Credit: iStock

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