

Artificial intelligence helps improve outcomes for depression treatment

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An international team of scientists, including a Western University researcher, have developed an artificial intelligence (AI) tool that facilitates more personalized treatments for depression and improves

patient outcomes.

"Our clinical trial shows that this new method of treatment selection improves the effectiveness of currently available treatments, with a small and affordable increase in overall treatment costs, since it fast-tracks more patients to intensive treatments when they need them," said Shehzad Ali, professor of public health economics at the Schulich School of Medicine & Dentistry.

Ali, a Canada Research Chair in Public Health Economics, was the lead health economist and statistician on the study, which was led by the University of Sheffield in the U.K.

Current practice for treating depression often involves a stepped care approach. Patients are first offered a low-intensity treatment, such as group therapy, with those who remain unwell later being moved to more intensive, lengthy treatment.

The researchers behind the new tool have shown that implementing AI helps patients receive more tailored care to treat their depression much quicker.

"Depression is one of the most common and disabling [mental health problems](#) and is said to affect around 280 million people worldwide. One of the biggest challenges health-care professionals face is deciding which treatment will work for each individual patient out of several psychological and pharmaceutical treatments," said Jaime Delgadillo, the study's lead investigator at the University of Sheffield.

"If we are able to offer the right treatment to the right patient at the right time, treatment outcomes could be improved for thousands of patients each year without a need to develop any new interventions."

Findings of the AI tool's efficacy were recently published in *JAMA Psychiatry* following a three-year clinical trial in England.

Use of the tool led to improvements in [patient outcomes](#), increasing the probability of reliable and clinically significant improvements in depression symptoms.

The study marks the first clinical trial to demonstrate the benefits of using AI in mental health services.

"Our machine learning algorithm uses patients' intake state of depression and anxiety, [personality traits](#), level of social functioning, employment status and socio-demographic characteristics and predicts the type of treatment they would most benefit from," Ali said. "Based on what the algorithm tells us, some of them are stepped up to high-intensity treatment straight away rather than spending three to four months trying out a treatment they are less likely to benefit from."

The tool was developed by analyzing data from more than 1,000 patients previously treated in psychological services to identify which treatments are most helpful for patients with specific symptoms and personality traits.

The clinical study itself involved more than 900 patients in Lancashire, Rotherham and Doncaster, U.K., through England's National Health Service.

Along with researchers at Western University and the University of Sheffield, scientists at the University of California and the University of Pennsylvania also collaborated on the research.

Ali said incorporating the AI tool into [mental health services](#) in Canada and around the world could help prevent many patients from dropping

out of the care system—a common problem when those who need high-intensity treatment become despondent after not seeing results with low-intensity care.

"Mental health services have a significant dropout rate. We are losing these patients, they are not improving, and they are going out of the health system, while their mental health challenges persist," he said. "With AI, we can allocate patients more appropriately to the right treatment."

Oftentimes, patients who drop out of lower-intensity treatment will later appear in emergency rooms or other settings that require more time, intensity and resources to treat them, Ali explained.

"We've lost this huge window of opportunity to identify and treat them in a way that is much more cost-effective," he said.

As a public health economist, Ali said he's acutely aware of the need to balance appropriate care with the cost to health care systems—something his team's algorithm would be poised to do.

He said an AI tool could be easy to implement in certain health-care settings, integrating with digital patient intake software.

For Ali, AI and precision medicine are not only the way of the future, but necessary components to tackle the growing global mental health crisis.

"In the past few years, studies have found that mental health disorders are one of the largest contributors of the global burden of disease," Ali said. "The economic burden of mental health is huge. If we don't do anything about this now, the mental health bill, not just on the health system but the economy, is going to be massive."

More information: Jaime Delgadillo et al, Stratified Care vs Stepped Care for Depression, *JAMA Psychiatry* (2021). [DOI: 10.1001/jamapsychiatry.2021.3539](https://doi.org/10.1001/jamapsychiatry.2021.3539)

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