

Using AI to detect heart failure

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A new artificial intelligence (AI) tool could improve early diagnosis of heart failure, according to research led by the University of Leeds.

This would help people with [heart failure](#) begin treatments earlier, when symptoms can be managed more effectively, and its progress slowed. The researchers hope that the algorithm, FIND-HF, Future Innovations in Novel Detection of Heart Failure, could be available for GPs to identify those at most risk with a simple push of a button in as little as three to five years.

Heart failure happens when the heart cannot pump blood effectively around the body, and affects more than one million people in the UK, with 200,000 new diagnoses each year. Sadly, around half of those with heart failure will die within five years of diagnosis.

In the new study, researchers led by Chris Gale, Professor of Cardiovascular Medicine in Leeds' School of Medicine, and Consultant Cardiologist at Leeds Teaching Hospitals NHS Trust, trained a type of AI called machine learning to predict who is at highest risk of developing heart failure. The algorithm, called FIND-HF, does this by identifying tell-tale patterns in an individual's patient health records from visits to their GP.

Dr. Ramesh Nadarajah, a Health Data Research UK Fellow in Leeds' School of Medicine, presented the research at the [British Cardiovascular Society Conference](#) in Manchester.

He said, "Many people receive their diagnosis of heart failure at too late a stage when disease modifying treatments are potentially less effective, especially women and [older people](#). We are using machine learning tools with routinely collected data to identify people with heart failure earlier,

so that they can get the right treatment and prevent hospital admissions and death, and improve quality of life."

Early warning system

The FIND-HF algorithm was trained to recognize the early symptoms most likely to lead to a heart failure diagnosis, using patient records from 565,284 UK adults. It was then further tested on another database of 106,026 records from Taiwan National University Hospital.

The team found that FIND-HF could accurately predict who was at highest risk of developing heart failure, and who could be hospitalized by it, in the next five years. This indicated that the algorithm could be used as an early warning system for GPs to recognize which patients are at most risk. This could allow earlier tests and diagnoses of heart failure, and so earlier management of the condition.

Professor Chris Gale said, "Data are collected about patients in every interaction they have with health care. This is an extremely powerful and unique national resource, and it is time to use these data to benefit patients. FIND-HF could potentially bring diagnoses forward by two years, opening a crucial window of opportunity for treatments to make the most difference."

Professor Bryan Williams, chief scientific and medical officer at the British Heart Foundation, said, "Heart failure is a devastating condition, which is often only diagnosed at an advanced stage when it is already severely impacting people's lives. But with early diagnosis, patients can access the right treatments and effective management of their condition. Harnessing the power of AI through research like this takes us a step closer to improving lives for many more people affected by heart failure."

Next, the researchers plan to test FIND-HF by inviting those identified in primary care records as being at highest risk to be assessed for heart failure. They hope that in future FIND-HF could be routinely used by GPs to assess heart failure risk when patients present with very early symptoms, reducing the time from initial symptoms to diagnosis with a simple push of a button.

Provided by University of Leeds

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