PRESS RELEASE

AI tool outperforms human emergency call handlers in identifying stroke, new study shows

A team of researchers from Denmark have developed a new artificial intelligence (AI) framework to address the number of strokes that go unrecognised by human emergency call handlers.[1] The framework outperformed emergency call handlers in recognising stroke for both sexes and across all age groups studied, indicating its potential as a supplementary tool for early and precise stroke identification in the future.

The retrospective study, presented today at the European Stroke Organisation Conference (ESOC) 2023, drew from the Danish Stroke Registry and a dataset of over 1.5 million calls made to the Copenhagen Emergency Medical Services between 2015 and 2020, which included over 7000 stroke-related calls. Researchers utilised this data to train an AI framework to firstly transcribe the call audio and then predict the risk of stroke based on the transcribed text.

The results, which were evaluated on calls from 2021, revealed that the AI framework performed more effectively than emergency call handlers in identifying stroke cases. The AI framework achieved a recall (sensitivity) of 63.0% and a precision (positive predictive value) of 24.9%, which resulted in an F1 score of 35.7.* In contrast, emergency call handlers had a recall of 52.7% and precision of 17.1%, resulting in an F1 score of 25.8.

Dr Jonathan Wenstrup, one of the lead authors of the study from Copenhagen University Hospital, commented, "As one of the first points of contact for patients seeking medical assistance, emergency call handlers play a critical role in facilitating early and accurate stroke recognition. Many stroke cases can go undetected at this stage, leading to delays in treatment that can have potentially life-threatening consequences for patients."

Across Europe, stroke is the second leading cause of death and a major cause of adult disability, affecting over 1 million people each year.[2,3] As populations continue to grow and age, the number of people living with stroke is projected to increase by 27% between 2017 and 2047 in the European Union (EU).3 Despite this, many strokes can be prevented, and if treated early, the likelihood of a positive outcome can be greatly improved.[4,5]

"With the implementation of this new, cost-effective supporting tool, we can enhance stroke identification by call handlers and ensure more patients receive appropriate and timely care, ultimately improving patient outcomes", added Dr Wenstrup.

"As with any new tool, further research and development are necessary to improve the framework's accuracy and expand its capabilities. In the future, it may be possible to train the framework directly from the call audio, bypassing the transcription step, as well as incorporating non-word audio – such as a slurred voice – into the training data. However,

given the promising results of this study, it is already clear that technologies like this have the capability to completely transform stroke diagnosis and care."

ENDS

*Key terms defined:

1. Recall (sensitivity): A measure of the proportion of actual positive cases that are correctly identified
2. Precision (positive predictive value): A measure of the proportion of predicted positive cases that are actually positive
3. F1: A harmonic mean of precision and recall, which combines both metrics into a single score

Four facts about stroke:

1. In 2017, there were 1.12 million incident strokes in the EU and 460,000 deaths[3]
2. In 2017, there were 7.06 million disability-adjusted life years lost due to stroke in the EU[3]
3. In 2017, the cost associated with stroke was estimated at €45 billion across the EU, including direct and indirect costs of care provision and productivity loss[3]
4. Approximately 1 in 4 stroke survivors will have another one, but up to 80% of strokes may be prevented with a combination of medication and healthy habits[4]

References:

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