

# Processing Text With Domain-Specific Spreading Activation Methods

Cincinnati Children's Hospital Medical Center



The launch of Clarigent Health's *Clarity* app comes as clinicians respond to a mental health crisis linked to months of stress, anxiety, and isolation due to the COVID-19 pandemic. The continued need for social distancing has propelled the use of telehealth appointments, which bring new challenges for mental health professionals trained to look for signals in a face-to-face environment.

The app's HIPAA-compliant listening tool is designed to provide clinical decision support to mental health professionals. Its technology is based on "spreading activation," a

neuropsychiatry platform that uses natural language processing. *Clairity* analyzes speech to identify vocal biomarkers – noninvasive, objective indicators of mental health states calibrated to identify suicidal risk and provide an additional objective metric to mental health professionals.

The foundational science comes from research at Cincinnati Children's Hospital Medical Center led by John Pestian, PhD and Tracy Glauser, MD. The research team enlisted volunteers from online suicide support communities to review the world's largest collection of suicide notes. Written between 1950 and 2011, the notes were read one by one, transcribed, anonymized, and annotated. In the last words, sentences and phrases used by those who died by suicide, the researchers identified emotions such as anger, blame, fear, guilt, and very often, loss of hope. The notes, as well as consented recordings of patient-provider conversations at multiple clinical sites, were used to develop a corpus of "words of despair" from which the algorithms analyzed for patterns, with the goal of better identifying those at risk of self-harm.

Pestian, the director of Computational Medicine Center at Cincinnati Children's, believes "The holy grail of mental health care is early identification. When used in the hands of a professional caregiver, technology can help find patients in need much earlier."

The algorithms became the backbone of a Cincinnati Children's spin-out company in 2018. Cincinnati Children's tech transfer office, [Cincinnati Children's Innovation Ventures](#), helped establish [Clarigent Health](#) by helping to select the management team and secure funding. Clarigent Health has since brought to market an app to help clinicians detect risk of suicide and other mental health concerns, and has plans to broaden their product offering.

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