

Innovative Program Using Machine Learning to Address Challenge of Delays in Diagnosis

by Ed Becker



Despite advances made in the research, understanding, and treatment of vasculitis, the reality is that delay of diagnosis continues to be a critical issue. As a rheumatologist, Antoine Sreih, MD, says that every day he sees the unfortunate result when patients are referred to him. Dr. Sreih is an Assistant Professor of Clinical Medicine at the University of Pennsylvania in Philadelphia.

Many of the patients are suffering from advanced kidney disease or suffering organ damage directly because their vasculitis wasn't detected earlier when critical treatment could be introduced.



1Tony Sreih, MD

Although it's a challenging issue, Sreih is also optimistic that a study called Pathways to Diagnosis (P2D) may be a potential breakthrough which will improve the rate of earlier diagnosis thus significantly impacting the outcome for patients with vasculitis. Sreih is principal investigator and project director for this new study.

Simply explained, P2D is a way that doctors who otherwise wouldn't suspect vasculitis in a patient are alerted to the possibility by a sophisticated computerized program which is integrated with a patient's medical records.

Sreih, in partnership with the Vasculitis Foundation, the Vasculitis Patient-Powered Research Network, the University of Pennsylvania, and many other academic health care systems has been working on this innovative solution which utilizes today's computing technology to find a possible solution to delayed diagnosis.

Delays in Diagnosis

Sreih says many factors can impede diagnosis and one of the most common is that when a patient exhibits with subtle, unremarkable symptoms the physician doesn't immediately think of a rare disease as the culprit. Moreover, the patient is often referred to numerous specialists which results in a loss of valuable time and cost.

"It is becoming more difficult and challenging for physicians to gather and analyze all the data on a patient. That is why you often see general physicians referring more and more patients to specialists. Waiting to see a specialist can sometimes take months, so we're losing valuable time as the disease

causes further damage," says Sreih. "There is often insufficient time for the primary care physicians to understand, gather, or even piece together patients' complex and often fragmented medical histories."

Turning to Today's Technology: Harnessing the power of "big data."

The core idea behind P2D is a program which integrates with a patient's medical records so that multiple, seemingly unrelated symptoms can be analyzed quickly, and the physician is alerted to consider a diagnosis that would otherwise never be on their radar.

Sreih likens the P2D application as an invisible physician's electronic aide processing volumes of data looking for a cluster of symptoms and test results that may point to vasculitis. He gives an example of how critical dots could be connected.

"Imagine a patient presents with a chronic cough that doesn't respond to standard treatment. He may be sent to a pulmonologist where a CAT scan reveals a nodule and immediately the doctor thinks cancer," explains Sreih. "However, the patient also has a history of chronic sinusitis and hearing loss. P2D will analyze this cluster of symptoms from an individual's medical history and alert the doctor to consider vasculitis. Getting that notification will help the doctor to think about a cause that they might otherwise never have considered. Now we have that ability to use artificial intelligence or predictive analytics to help us shorten that time and expedite treatment."

A pop-up alert would not only suggest testing for vasculitis, but it would also provide a link so the doctor can make an immediate referral to a rheumatologist or other specialists. Also, it would raise awareness by reminding physicians about vasculitis for any future patients that may present in the same way.

Next Steps to Implementation

The study has been in development for nearly two years and is currently being evaluated with great interest as sources of funding are explored. Sreih says two major healthcare networks are prepared to participate in its implementation and once funding is secured the project will be ready to launch.

Sreih credits a diverse team including support from predictive analytics experts at the University of Pennsylvania, the Vasculitis Patient-Powered Network (VPPRN), and the Vasculitis Foundation for its development.

However, he credits an obvious source – patients themselves – for P2D's creation. "Through our interaction with patients in the VPPRN we learned that improving delays in diagnosis was a top goal for research," said Sreih. "It was one of the ways patient's outcome with this disease could be positively impacted. We are hopeful that Pathways to Diagnosis will be a tool that will make it a reality."