Electronic records with decision support help optimize emergency care for stroke patients

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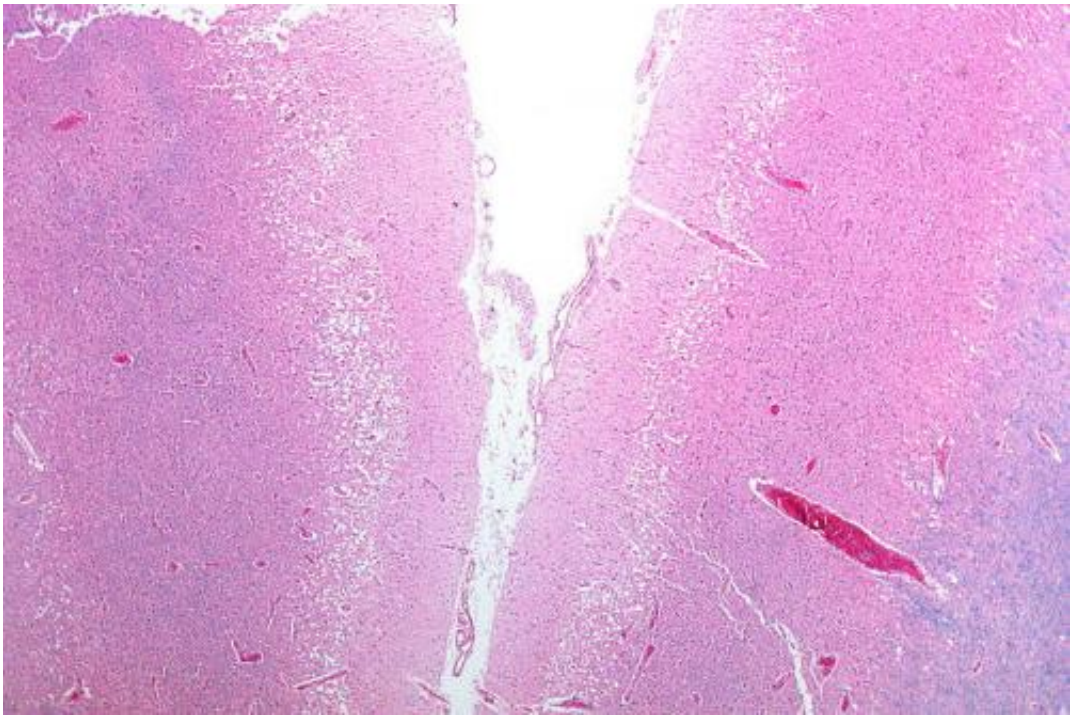

Micrograph showing cortical pseudolaminar necrosis, a finding seen in strokes on medical imaging and at autopsy. H&E-LFB stain. Credit: Nephron/Wikipedia

The timely administration of a clot-dissolving treatment for emergency department patients with acute ischemic stroke nearly doubled following the introduction of new technology that enabled electronic order entry and offered care-decision support for physicians, according to a study published today in the *Annals of Emergency Medicine*.

The study was conducted during the staged implementation of computerized physician order entry when integrated into electronic health records across 16 Kaiser Permanente Northern California medical centers from 2007 to 2012. After implementation, emergency department stroke guidelines were made available to physicians using an electronic template, known as an "order set." Order sets are designed to provide standardized laboratory, radiographic and drug ordering, as well as information to help guide doctors in making clinical decisions.

"This study demonstrates that computerized physician order entry generally—and an orderset embedded with decision support specifically—can facilitate the delivery of time-sensitive interventions for stroke while minimizing errors," said lead author Dustin Ballard, MD, an emergency medicine physician at the Kaiser Permanente San Rafael (California) Medical Center and an adjunct researcher at the Kaiser Permanente Division of Research. "In this case, the investigation showed that these tools can safely lead to more frequent administration of medication to thin blood and break up blood clots in the brain, a treatment that has been associated with better neurological recovery after stroke."

Stroke is a major cause of death and a leading cause of serious long-term disability in the United States. Ischemic stroke, the most common type, is caused by a clot obstructing the flow of blood and oxygen to the brain, which can result in the death of brain cells. Consequently, time is of the essence in assessment and emergency treatment.

"While the technology is not likely to be solely responsible for the improved outcomes observed in this study, it may represent a proxy measure for optimum care for certain patients, in particular those for whom the speed of initiating therapy, the completeness of information available to the clinician, and the intensity of inpatient care make a real difference in short-term outcomes," added co-author David Vinson, MD,

an emergency medicine physician at the Kaiser Permanente Roseville (California) Medical Center.

A systematic approach to the acute management of patients with ischemic stroke—including the timely administration of intravenous tissue plasminogen activator (or IV tPA) for eligible patients—can help avoid complications and improve outcomes. IV tPA helps to thin the blood and dissolve clots, with the goal of restoring blood flow through blocked arteries in the brain. Emergency department evaluation of patients with suspected stroke is focused on rapidly assessing eligibility for time-sensitive interventions such as IV tPA, which has been shown to improve neurological outcomes for acute ischemic stroke.

Of the 10,081 patients examined during the study period, 6,686 (66.3 percent) were treated in medical centers after computerized physician order entry had been implemented. IV tPA was administered in the emergency department to 8.9 percent of these patients, compared to 3.3 percent of patients in emergency departments at medical centers without the new technology—more than doubling the rate of IV tPA administration. When the stroke order set was employed in combination with the computerized physician order entry, IV tPA administration increased to 12.7 percent—a nearly three-fold increase. Even after accounting for variable factors, these differences held steady.

Together, Drs. Ballard and Vinson are co-founders of the Clinical Research in Emergency Services and Treatments (CREST) Network, a group of emergency medicine physician-researchers affiliated with the Kaiser Permanente Division of Research.

"Ultimately, we see the order set itself as optimizing the confluence of two separate processes—a robust computerized physician order entry that integrates care across many providers and locations while limiting errors of omission, combined with a quality initiative that has identified

disease-specific best practices and guidelines," Dr. Ballard wrote. "We believe that our findings represent a dawning era of electronic health records, one that blends decision support and best practices."

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