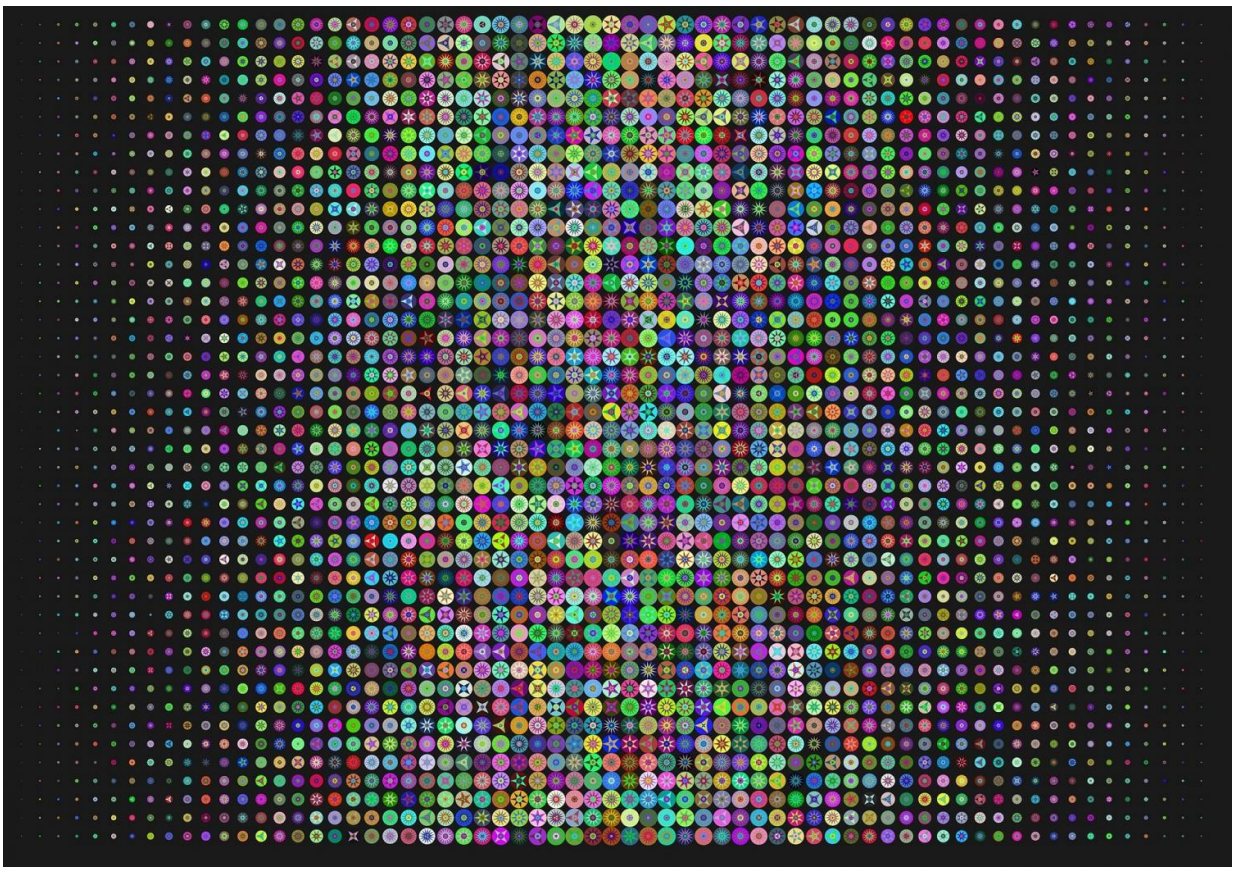
Medical Xpress

Machine-learning algorithms can help correctly diagnose alcohol-associated hepatitis, acute cholangitis

July 1 2022



Credit: CC0 Public Domain

Acute cholangitis is a potentially life-threatening bacterial infection that

often is associated with gallstones. Symptoms include fever, jaundice, right upper quadrant pain, and elevated liver enzymes.

While these may seem like distinctive, telltale symptoms, unfortunately, they are similar to those of a much different condition: alcohol-associated hepatitis. This challenges emergency department staff and other health care professionals who need to diagnose and treat patients with liver enzyme abnormalities and systemic inflammatory responses.

New Mayo Clinic research finds that machine-learning algorithms can help health care staff distinguish the two conditions. In an article published in *Mayo Clinic Proceedings*, researchers show how algorithms may be effective predictive tools using a few simple variables and routinely available structured clinical information.

"This study was motivated by seeing many medical providers in the emergency department or ICU struggle to distinguish acute cholangitis and alcohol-associated hepatitis, which are very different conditions that can present similarly," says Joseph Ahn, M.D., a third-year gastroenterology and hepatology fellow at Mayo Clinic in Rochester. Dr. Ahn is first author of the study.

"We developed and trained machine-learning algorithms to distinguish the two conditions using some of the routinely available lab values that all of these patients should have," Dr. Ahn says. "The machine-learning algorithms demonstrated excellent performances for discriminating the two conditions, with over 93% accuracy."

The researchers analyzed electronic health records of 459 patients older than age 18 who were admitted to Mayo Clinic in Rochester between Jan. 1, 2010, and Dec. 31, 2019. The patients were diagnosed with acute cholangitis or alcohol-associated hepatitis.

Ten routinely available laboratory values were collected at the time of admission. After removal of patients whose data were incomplete, 260 patients with alcohol-associated hepatitis and 194 with acute cholangitis remained. These data were used to train eight machine-learning algorithms.

The researchers also externally validated the results using a cohort of ICU patients who were seen at Beth Israel Deaconess Medical Center in Boston between 2001 and 2012. The algorithms also outperformed physicians who participated in an online survey, which is described in the article.

"The study highlights the potential for machine-learning algorithms to assist in clinical decision-making in cases of uncertainty," says Dr. Ahn. "There are many instances of gastroenterologists receiving consults for urgent endoscopic retrograde cholangiopancreatography in patients who initially deny a history of alcohol use but later turn out to have alcohol-associated hepatitis. In some situations, the inability to obtain a reliable history from patients with altered mental status or lack of access to imaging modalities in underserved areas may force providers to make the determination based on a limited amount of objective data."

If the machine-learning algorithms can be made easily accessible with an online calculator or smartphone app, they may help health care staff who are urgently presented with an acutely ill patient with abnormal liver enzymes, according to the study.

"For patients, this would lead to improved diagnostic accuracy and reduce the number of additional tests or inappropriate ordering of invasive procedures, which may delay the correct diagnosis or subject patients to the risk of unnecessary complications," Dr. Ahn says.

The authors are from the Division of Gastroenterology and Hepatology

and the Division of Internal Medicine at Mayo Clinic in Rochester, and from the Department of Computer Science at Hanyang University in Seoul, South Korea.

More information: Joseph C. Ahn et al, Machine Learning Techniques Differentiate Alcohol-Associated Hepatitis From Acute Cholangitis in Patients With Systemic Inflammation and Elevated Liver Enzymes, *Mayo Clinic Proceedings* (2022). DOI: 10.1016/j.mayocp.2022.01.028

Provided by Mayo Clinic

Citation: Machine-learning algorithms can help correctly diagnose alcohol-associated hepatitis, acute cholangitis (2022, July 1) retrieved 1 May 2024 from https://medicalxpress.com/news/2022-07-machine-learning-algorithms-correctly-alcohol-associated-hepatitis.html

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.