New algorithm tracks pediatric sepsis epidemiology using clinical data

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Researchers at Children's Hospital of Philadelphia (CHOP) have developed a novel computational algorithm to track the epidemiology of pediatric sepsis, allowing for the collection of more accurate data about outcomes and incidence of the condition over time, which is essential to the improvement of care.

The tool was described in a paper published in the February 2020 issue of *Pediatric Critical Care Medicine*.

"We were able for the first time to have a consistent, objective, and unbiased definition of sepsis applied over a period of eight years, without having to rely on laborious and expensive manual chart review or claims data that suffer from variability across providers and time," said Scott Weiss, MD, MSCE, an attending physician in the pediatric intensive care unit at CHOP and first author of the study.

Sepsis is a deadly complication to infection that occurs when the immune system stops fighting the infectious agent and instead turns on itself, attacking tissue in the lungs, kidneys and other vital organs. It is a leading cause of death in hospitals and contributes significantly to high health care costs.

Tracking the incidence of sepsis is critical to understanding the prevalence of the condition and improving outcomes and survival, but to date there has not been an effective tool for monitoring sepsis incidence in the pediatric population. Current methods that involve gathering insurance claims data or manual chart review are inconsistent and often leave out patients groups, such as those who transfer to a hospital for sepsis treatment when their sepsis was diagnosed elsewhere.

To allow for more precise tracking, the research team developed an algorithm with the help of the CHOP Research Institute's Arcus Pediatric

Knowledge Network, an integrated data science platform that links the clinical and research data of more than 2 million patients. The program developed the algorithm using data from suspected or confirmed sepsis cases seen at CHOP between September 1, 2017 and June 30, 2018. Researchers then validated the algorithm on suspected or confirmed sepsis cases seen at CHOP between July 1, 2018 and January 31, 2019.

Once researchers had developed and validated the algorithm, they then applied it to the 832,550 patients seen at CHOP in an emergency department or inpatient visit between 2011 and 2018 to gather the epidemiology of sepsis at CHOP.

They found that among more than 200,000 hospital admissions over the study period, the incidence of sepsis was 2.8%, and the incidence of sepsis among all hospital encounters increased over time after controlling for age, sex, and race. They also found that mortality was 6.7% and did not change over time, in contrast to claims-based sepsis data that has shown mortality has trended downward over time.

"This study is one example of how our program can partner with Arcus and the CHOP Research Institute to become a national leader in sepsis care," said Fran Balamuth, MD, Ph.D., Co-Director of CHOP's Center for Sepsis Excellence, Director of Research in the Emergency Department, and co-author of the paper. "The next step will be to externally validate the algorithm across different hospitals to make sure that it is not just applicable to CHOP, but at other academic children's hospitals and community hospitals as well."

Provided by Children's Hospital of Philadelphia

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