Put It on the Board

Disruptive technologies at the point of care

September 2023—A wrist-worn high-sensitivity cardiac troponin I monitor was one of the wearable devices and health monitors highlighted in a session on emerging technologies for point-of-care testing at the Association for Diagnostics and Laboratory Medicine meeting in July.

James Nichols, PhD, D(ABCC), of Vanderbilt University Medical Center, in his talk on disruptive technologies, cited a study published this year in which a transdermal infrared spectrophotometric sensor was shown to be clinically feasible for rapid, bloodless prediction of elevated hs-cTnI levels in patients with acute coronary syndromes (Sengupta S, et al. *Eur Heart J Digit Health*. 2023;4[3]:145–154).

For the study, 238 hospitalized patients with ACS at five sites in India were enrolled. The final diagnosis of myocardial infarction (with or without ST elevation) and unstable angina was adjudicated using ECG, cardiac troponin testing, echocardiography, and coronary angiography. A transdermal infrared spectrophotometric sensor-derived deep-learning model was trained (three sites) and externally validated with hs-cTnI (one site) and echocardiography and angiography (two sites). Overall, an AUC-ROC of 90 percent and higher was observed.

Dr. Nichols

Continuous glucose monitors were among the other technologies Dr. Nichols spoke of, including some of the questions CGM raises: Where should nursing staff enter CGM data? In the lab area of the electronic health record, much like manual POC test results? Or in nursing notes? What data is important for clinicians to trend? Is there a difference in CGM data preferences for clinicians between inpatient and outpatient use? How should accuracy and reliability be documented?

A standard for the Integration of Continuous Glucose Monitor Data into the Electronic Health Record, known as iCoDE, was released in 2022 (diabetestechnology.org/icode/).

“Wearable devices and health monitors are expanding, and we as laboratorians can’t ignore this,” said Dr. Nichols, medical director of clinical chemistry and POC testing and professor of pathology, microbiology, and immunology. “It is health data, and it may not be regulated under CLIA, but it clearly is laboratory data that’s being integrated for use in diagnosis and management of the patient. And we need to figure out how to get it into the medical record and how to keep it separate from traditional laboratory analyses.”

A third device he highlighted is an artificial intelligence application studied at Mayo Clinic, where researchers applied AI to smartwatch ECG recordings to identify patients with left ventricular dysfunction (Attia ZI, et al. *Nat Med*. 2022;28[12]:2497–2503). The authors concluded that consumer watch ECGs can be used to identify patients with cardiac dysfunction.

The International Federation of Clinical Chemistry and Laboratory Medicine has a committee on mobile health and bioengineering in laboratory medicine. “It is looking at the engineering, evaluation, and validation of sensors and wearables and the connectivity of that data with the patient’s electronic medical record,” Dr. Nichols said, “as well as the use of artificial intelligence algorithms.”

—Sherrie Rice