

A new risk score to help predict possible contrast-associated kidney injury after percutaneous coronary intervention

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Credit: George Hodan/public domain

A new, updated risk score can help predict possible contrast-associated acute kidney injury (CA-AKI) among patients undergoing percutaneous coronary intervention (PCI), Mount Sinai researchers report.

They said the simple and unique assessment tool can enhance

management of patients at high risk of CA-AKI before, during, and after PCI, and improve their prognosis following the procedure.

The risk score, called "The Mehran-2 CA-AKI Risk Score," was developed by Roxana Mehran, MD, Professor of Medicine (Cardiology), and Population Health Science and Policy, and Director of Interventional Cardiovascular Research and Clinical Trials at the Icahn School of Medicine at Mount Sinai, along with other Mount Sinai cardiologists. Their results were presented as late-breaking science on Monday, November 15, at the American Heart Association Scientific Sessions 2021, with simultaneous publication in *The Lancet*.

Patients with [coronary artery disease](#)—plaque build-up inside the arteries that leads to chest pain, shortness of breath, and [heart attack](#)—often undergo PCI, a non-surgical procedure in which interventional cardiologists use a catheter to place stents in the blocked coronary arteries to restore blood flow. Cardiologists use X-ray imaging, known as angiography, to determine which arteries have the most severe blockages, and inject a fluid called iodinated contrast into the bloodstream to make the blockages visible on X-ray. That fluid is toxic, and [high-risk groups](#) can have kidney problems as a result.

"Although the incidence of CA-AKI has decreased over the past few years, it remains a significant complication of PCI and is associated with mortality, prolonged hospital stay, and increased medical costs. As the number of high-risk patients undergoing PCI increases every year, it is really crucial to risk-stratify these patients to optimize outcomes and minimize cardiorenal complications," explains Dr. Mehran. "Simple measures can be taken around the time of procedure when a patient is identified to be at high risk of CA-AKI, and we hope this new score is widely adopted to enhance the care of patients and improve outcomes."

Dr. Mehran's new risk score expands upon her initial risk score

developed in 2004 that was widely implemented in cardiac catheterization labs around the world. The updates take into account changes in practice surrounding PCI, including more advanced imaging techniques that require less toxic contrast agents, as well as improved stents.

To update the risk score, researchers looked at records of 30,000 patients who underwent PCI at The Mount Sinai Hospital from 2012 to 2020. All patients had documented creatinine tests—measuring how well kidneys are working and filtering waste from the blood—both pre procedure and 48 hours post procedure, as well as a one-year follow-up.

Dr. Mehran and her team created a predictor model identifying which patients are at highest risk of [acute kidney injury](#) based on baseline risk factors, which included diabetes, anemia, congestive heart failure, advanced kidney disease, acute heart attack, and ST-segment elevation myocardial infarction (STEMI), or complete blockage of a major heart artery. Being older than 75 was also considered a risk factor. They assigned an individual score to each of those risk factors, then calculated patients' overall risk score, putting them in specific groups: between 0-4 was "low risk," 5-9 was "moderate risk," 10-13 was "high risk," and anything above 14 was "extremely high risk."

By calculating patients' risk score and figuring out what risk category they fit into, doctors can modify their periprocedural management approach to improve outcomes. This may include increasing hydration before PCI, administering statins, and minimizing the amount of contrast used during the procedure. The [risk score](#) may also help doctors increase monitoring before and after PCI, potentially doing additional blood tests. More specifically, if a patient is low risk, doctors can measure creatinine level once after the procedure, compared to high-risk patients who may need several measurements.

"Acute kidney injury after invasive procedures remains a mystery since it has such a robust adverse prognosis, yet we still don't know of a clear responsible mechanism. Therefore, it remains a very challenging and interesting research field," explains senior author George Dangas, MD, Ph.D., Professor of Medicine (Cardiology) and Director of Cardiovascular Innovation at the Zena and Michael A. Wiener Cardiovascular Institute at Icahn Mount Sinai. "The fact that periprocedural events have only minor contribution to the overall predictive power makes this model even more important, as its [risk](#) assessment is accurately available before the start, and plans can be made very early on."

"We plan to design [clinical trials](#) and incorporate this score to evaluate both external validation in predicting acute kidney injury but also clinical outcomes," adds Dr. Mehran.

More information: Roxana Mehran et al, A contemporary simple risk score for prediction of contrast-associated acute kidney injury after percutaneous coronary intervention: derivation and validation from an observational registry, *The Lancet* 2021.

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