PROJECT INFORMATION

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Using Different Data Sets to Test How Well Clinical Prediction Models Work to Predict Patients' Risk of Heart Disease

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What was the project about?

Clinical prediction models, or CPMs, are statistical models that can predict a patient's risk for a specific event, such as a health problem, adverse effect, or even death. To create a CPM, researchers use a single data set, such as data from a clinical trial. To find out whether the CPM accurately predicts risks for patients who weren't part of the original data, researchers can test the CPM with other data sets. This testing can help researchers know if the CPM is accurate for patients from diverse backgrounds and whether it can be used to make health decisions. But few CPMs have been tested with other data sets.

In this study, the research team used other data sets to look at how well CPMs for heart disease predict patients' risks. They also looked at how to improve CPMs.

What did the research team do?

First, the research team reviewed existing studies that tested CPMs with other data sets. They found that 58 percent of CPMs had never been tested with other data sets. Also, CPMs varied in how well they predicted patients' risks when tested with other data sets.

Next, the research team identified 36 other data sets to test 108 heart disease CPMs. To see whether the CPMs accurately predicted patients' risks, the team tested each CPM with these other data sets. They also looked at whether decisions about health care based on the CPMs would do more harm than good.

Finally, the research team tested three statistical methods to improve CPMs so that they predict risks more accurately.

What were the results?

When tested using other data sets, the selected heart disease CPMs often didn't accurately predict patients' risks. For over 80 percent of the CPMs, health decisions based on the CPM would have done more harm than good.

The three statistical methods helped improve the accuracy of the selected CPMs so that fewer CPMs led to decisions that would have done more harm than good.

Working with researchers and doctors, the research team created a website to share information about heart disease CPMs. The website shows how many times a CPM has been tested with other data sets and how well it predicted patients' risks.

What were the limits of the project?

The data sets used to create the CPMs, and the data sets used to test the CPMs, didn't always have consistent information. As a result, the research team could only test 108 CPMs. Findings may have differed if the team had tested other CPMs.

Future research could look at why CPM results vary across different patient data sets.

How can people use the results?

Researchers can use the results to test and improve CPMs. Doctors can use the website to learn about heart disease CPMs.

To learn more about this project, visit www.pcori.org/Kent379.