PROJECT INFORMATION

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Developing Software to Predict Patient Responses to Knee Osteoarthritis Treatments and to Identify Patients for Possible Enrollment in Randomized Controlled Trials

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Organization

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What was the research about?

Comparative effectiveness research compares two or more treatments to see which one works better for certain patients. This research may include randomized controlled trials, or RCTs, in which researchers assign patients to one of the treatments by chance.

A patient may enroll in an RCT when, based on current knowledge of that patient's traits, the treatments being tested have about the same chance of helping. If one treatment is known to have a better chance of helping a patient, then the patient would not enroll and would receive that treatment from the doctor.

Sometimes there isn't enough research to show if one treatment has a better chance of helping than another. In this case, researchers may use computer programs. The programs estimate how well different treatments work in patients with certain traits. For example, a person's age and pain level may affect how much a treatment helps.

These programs would be useful for patients with knee osteoarthritis. Not many RCTs have compared total knee replacement surgery with other treatments such as medicine or physical therapy.

In this study, the research team made a computer program for patients with knee osteoarthritis. It uses data from electronic health records. The program could help identify patients for whom

- The treatments in the study have about the same chance of helping. These patients may wish to take part in an RCT.
- A certain treatment may help more than another. These patients could choose that treatment.

The research team also made an online system based on the program for patients and doctors to use during a visit. Doctors can use the results from the system to talk with patients about treatment. If appropriate, they could talk about taking part in an RCT.

What were the results?

The program is useful to estimate how well treatments work in patients with certain traits.

For one year after treatment, the program estimates

- How much pain a patient is likely to have
- How well a patient is likely to function, such as how well they can walk

What did the research team do?

To make the program, the research team needed information about the long-term effects of total knee replacement and nonsurgical treatments. The team used information from 1,322 patients with knee osteoarthritis. Some patients had a total knee replacement. Other patients had nonsurgical treatments. The information came from four databases. The databases had survey information about patients' pain and function one year after treatment.

The research team paired each total knee replacement patient in the databases with a patient who didn't have surgery. The paired patients had similar traits, like similar ages, health problems, and pain before treatment. This pairing let the team compare results in similar patients who had different treatments. The team used information from the paired patients to make and test the computer program. They wanted to see how well the program could use information on patients' traits to figure out if a certain treatment may help more than another. Then, the team made an online system for doctors and patients.

During the study, the team worked with a group of knee osteoarthritis researchers, patients, doctors, and patient advocates. The group gave input on research questions and study design.

What were the limits of the study?

Differences in the databases made it hard to pair patients who had surgery with similar patients who had nonsurgical treatment. This may have affected how well the computer program was able to estimate treatment results for patients.

The information on how well patients function after treatment came from a survey on overall physical function. A survey that asked specifically about patients' knee function, separate from pain, may have helped the research team better predict knee function.

Future research could use newer ways to analyze information from patients. Researchers could also use information from more patients. Such research may help researchers make programs that better estimate treatment results.

How can people use the results?

The computer program could help doctors identify patients with knee osteoarthritis who, based on their traits, could take part in an RCT. The program may also help doctors identify patients who may get more, or less, benefit from a certain treatment.

To learn more about this project, visit www.pcori.org/Selker114.