Why Do Radiation Doses in CT Differ across Hospitals and Countries?

Principal investigator

Rebecca Smith-Bindman, MD, BS

Organization

University of California San Francisco

What was the research about?

Doctors often use computerized tomography, or CT, scans to take detailed pictures of the inside of a patient's body. A CT scan can help find a wide range of health problems, including infections and cancers. The CT scan exposes the patient to a small amount of radiation, called a CT dose. That radiation slightly increases a patient's risk of cancer.

In this study, the research team wanted to learn if CT doses vary across hospitals and countries and, if so, why.

What were the results?

CT doses varied slightly by scanner and by hospital. But CT doses varied a lot across countries. Hospital rules, such as who could change CT scanning procedures, were more important than other factors, such as type of scanner, in determining why doses varied.

What did the research team do?

The study looked at data from about two million CT scans of adult patients. Of these scans, 36 percent were of the abdomen, 24 percent were of the chest, 4 percent were of the chest and abdomen, and 26 percent were of the head. The patients were from 151 hospitals in seven countries.

The research team compared average CT dose for different scanners, hospitals, and countries. The team also compared the percentage of scans with high

doses. If a dose was higher than 75 percent of the doses during the first six months of the study, the team defined it as a high dose.

To learn why CT doses differed, the team used statistical methods. The team looked at factors such as features of CT scanners and hospital policies about CT scans. The team also considered factors such as patient age and weight.

Patients, doctors who specialize in CT scans, and hospital administrators helped design the study.

What were the limits of the study?

All hospitals used the same software, Radimetrics™, to monitor CT doses. Results may differ if the study had collected data from hospitals that use other software or no software. Only a small number of hospitals outside the United States took part in the study. Data may not represent all hospitals in those countries.

Future research could collect data from hospitals that use other monitoring software. Researchers could also try to collect data from more hospitals outside the United States.

How can people use the results?

Doctors and hospital administrators can use these results when considering how to improve hospital policies to reduce CT doses.

To learn more about this project, visit www.pcori.org/SmithBindman255.