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# Breast cancer diagnosis, mammography improved by considering patient risk

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A new approach to examining mammograms that takes into account a woman's health risk profile would reduce the number of cancer instances missed and also cut the number of false positives, according to a paper being presented at a conference of the Institute for Operations Research and the Management Sciences (INFORMS).

Mehmet U.S. Ayvaci of the University of Texas Dallas will present his research group's findings about the role of risk profiling in the interpretation of mammograms at Advances in Decision Analysis, a conference sponsored by the INFORMS Decision Analysis Society (DAS). The conference takes place June 16-18 at Georgetown University in Washington, DC.

The researchers found that providing radiologists with the patient's risk profile information for breast cancer at the most advantageous time when examining the mammogram , together with statistical weighting based on profile risk, reduces false negatives by 3.7%, thus alerting women whose cancer would have gone undiagnosed at an early stage, when treatment is most effective. It also reduces false positives by 3.23%, thus cutting unnecessary healthcare costs and sparing patients' needless distress.

Risk factors include family history, reproductive history, age, and ethnicity, and others forming the risk profile information.

The paper examines the tricky questions of whether providing risk

profile information about women being screened for cancer biases radiologists and, if there is bias, whether this bias actually helps make readings more accurate.

Historically, available clinical evidence has been inconclusive on the use of profile information when interpreting mammograms. One position is that profile information helps radiologists make better decisions and should be employed when reading mammograms. A contradictory position holds that profile information may bias the radiologists. However, whether bias always causes harm is unclear.

The authors explored profile information and potential bias in mammography interpretation using a decision science technique called linear opinion pooling, which assigns weights to better aggregate probability estimates.

They analyzed the decision performance of three groups: (1) a mammogram-only reading, with no risk profile information about the patient, (2) an unbiased reading, in which radiologists consult the risk profile after examining the mammogram and (3) biased or "influenced" readings, in which radiologists consult a woman's risk profile as they examine the mammogram. Then they examined the conditions in which profile information could help improve biopsy decisions.

Numerical analysis using a clinical dataset from the Breast Cancer Surveillance Consortium revealed that use of profile information with an appropriate weight could reduce the false positives and the number of missed cancers when compared to cases where profile information was not examined.

Breast cancer is the second most deadly non-skin cancer. In 2013, approximately 232,000 breast cancer diagnoses were made and about 39,000 women died from the disease.

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