Team develops model to predict hernia surgery recovery outcomes

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Could patients experience less pain and possibly have better recovery outcomes if their fears or emotional issues were addressed before surgery?

Three researchers at the University of Tennessee, Knoxville, recently developed a predictive model to examine that question.

Rebecca Koszalinski, assistant professor in the College of Nursing; Anahita Khojandi, assistant professor in the Department of Industrial and Systems Engineering in the Tickle College of Engineering; and Bruce Ramshaw, a physician and adjunct professor in the Haslam College of Business, examined data collected from 102 patients who underwent ventral hernia repair surgery.

A ventral hernia is a bulge of tissue that pushes through a point of weakness in an abdominal wall muscle, requiring surgical correction. Approximately 350,000 ventral hernia procedures occur each year in the US and are associated with an estimated $3 billion in health care costs.

The predictive model suggests that the emotional status of the patient prior to surgery—levels of depression, anxiety, grief, or anger—influence recovery outcomes. Patients may experience less pain if their fears or emotional issues are addressed before surgery.

"If we begin prehabilitation, which includes a holistic assessment—not limited to physical and emotional condition—of the person prior to the intervention, then we may be able to affect outcomes," Koszalinski said.

The researchers looked at historical patient data, including demographics and details from the surgical procedures, and examined patterns that led to complications following surgery. By associating the information collected before and during the patients' surgeries to their outcomes, the researchers developed a predictive model to identify future at-risk patients.

The predictive model, generated by Python programming, could be used as a decision support tool, allowing practitioners and patients to more

easily assess the risks involved in this type of surgery. Using predictive modeling to examine health data sets is one example of how [artificial intelligence](#) can transform modern health care.

"There is a lot of potential for developing decision support tools using data science and artificial intelligence," Khojandi said. "We hear about similar models in the news every day, focused on detecting tumors in chest X-rays, among other things. This is an example of how a tool can be used for shared decision-making and change how individuals interact with the health care system."

The study suggests using the model as a tool for physicians, [nurse practitioners](#), and other clinicians to simulate various scenarios for different patients, examining how the risk factors change for patients. The [model](#) could assist in avoiding overtreatment.

The [predictive model](#) could help direct efforts on patient education and quantify the impact lifestyle changes have on patients.

"I focus on the person and how they may be better informed and empowered to share in decision-making," Koszalinski said. "The hope is that predictive modeling coupled by empowered patients and expert clinical professionals could result in optimal patient outcomes."

The study, "Improving Shared Decision-Making and Treatment Planning Through Predictive Modeling: Clinical Insights on Ventral Hernia Repair," was published in the journal *CIN: Computers, Informatics, Nursing* by Wolters Kluwer Health.