MedicalXpress

ACS NSQIP now offers a pediatric surgical risk calculator

September 22 2016

For many of the most common pediatric operations performed in the U.S., the new American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP) Pediatric Surgical Risk Calculator provides an individualized estimate of the chance of a young patient experiencing postoperative complications, according to research findings appearing online in the *Journal of the American College of Surgeons*. The study will be published in a print edition of the Journal later this year.

"The NSQIP Pediatric Surgical Risk Calculator is the first web-based tool to help surgeons estimate the surgical risk for a pediatric patient across multiple surgical specialties," said study coauthor Clifford Y. Ko, MD, MS, MSHS, FACS, Director of the ACS Division of Research and Optimal Patient Care, which administers ACS NSQIP.

Although ACS NSQIP has offered its popular multispecialty Surgical Risk Calculator for adults since 2013, this new risk assessment tool is designed to give customized surgical risk estimates for patients younger than 18 years of age. Made available to the public in July, the NSQIP Pediatric Surgical Risk Calculator can, as part of a discussion with the surgeon, help a young patient's family make an informed decision about whether to go forward with a planned elective operation or even an emergency procedure, said Dr. Ko, who also is a professor of surgery at the University of California-Los Angeles David Geffen School of Medicine.

A pediatric-specific risk calculator is needed because infants and

children have different risk factors; may undergo similar procedures as adults do, such as colon operations, for entirely different reasons; and may undergo operations that are unique to the pediatric population, according to coauthor Shawn J. Rangel, MD, MSCE, FACS, a pediatric surgeon at Boston Children's Hospital who chairs the ACS Children's Surgery Data Committee. Children typically do not have cardiovascular disease and other chronic medical conditions often associated with adult patients undergoing surgery. However, they may have other serious conditions that are unique to the pediatric population, including prematurity, birth defects, and other conditions that may affect their immune system and ability to heal, he explained.

"Currently pediatric surgeons often must quote surgical risk estimates from data that have been published in the literature, and often this information is markedly outdated and [comes] from single hospitals that are not their own," Dr. Rangel said. "Development of the NSQIP Pediatric Surgical Risk Calculator is an important milestone because it gives pediatric surgeons a tool to be much more precise in estimating a child's risk of complications."

Until recently, there were insufficient pediatric data to support a risk calculator for a broad selection of procedures and potential unfavorable outcomes for children's surgery, according to Dr. Ko. In 2008, the ACS in collaboration with the American Pediatric Surgical Association developed a new database, ACS NSQIP Pediatric, so that participating hospitals could collect and share reliable outcomes data specifically for pediatric surgical specialties. Data collection began in 2011.

To create the new risk prediction tool, the investigators used standardized NSQIP Pediatric data between 2012 and 2014, which included 181,353 patient cases from 67 hospitals and 382 standard Current Procedural Terminology codes identifying procedures performed in the U.S. Among the procedure codes that NSQIP Pediatric

collects, only those that occurred at least 25 times in the dataset were used for this study. Specialties included general surgery, cardiothoracic surgery, neurosurgery, orthopaedic surgery, otolaryngology, gynecology, urology, and plastic surgery. The research team reported that each surgical case had a 30-day follow-up for complications.

"NSQIP Pediatric has among the best, if not the best, data available for children's surgery," Dr. Ko said.

From the three years of data, the researchers used a random sample of two-thirds as a training dataset and the other one-third as a test dataset to validate the accuracy of the calculator. Overall, they reportedly found excellent agreement between the predicted postoperative risks and actual outcomes, known as calibration. An exception was a small tendency to underpredict risk in the patients at highest risk, the authors wrote in the article.

To use the risk calculator, a surgeon or other user enters, from drop-down menus, the planned surgical procedure by its procedure code or name; whether the operation is elective, emergent, or urgent; and whether it will be performed on an outpatient or inpatient basis. Other selections to be completed are patient-specific preoperative risk factors, including age and sex; physical status (fitness for an operation); and whether the patient was admitted from home or transferred from the emergency department, intensive care unit, or other facility. The included risk factors are health conditions, such as a neuromuscular or bleeding disorder, heart problem, brain or spinal cord abnormality, developmental delay, infected wound, or recent bloodstream infection.

The risk calculator then estimates a pediatric patient's chance, compared with an average person's risk, of experiencing any of nine potential complications within the first month after an operation. Those complications are pneumonia, a cardiac problem such as an irregular

heart rhythm, infection at the surgical site, urinary tract infection, blood clot, kidney failure, tracheal reintubation (insertion of a breathing tube after removal of the anesthesia tube), any complication, or death.

After receiving the risk score, the surgeon can adjust the score if needed based on his or her subjective assessment of the patient.

Information from the risk estimates may lead to better patient outcomes after the operation, Dr. Ko suggested. "The risk calculator," he said, "calls out the chance of specific postoperative problems, some of which we can try to prevent before the procedure."

As ACS NSQIP Pediatric continues to grow, Dr. Rangel said future versions of the calculator will be able to predict risk of more-specific complications, such as wound infections, thereby providing even greater value for parents in understanding the risks of a surgical procedure for their child.

The NSQIP Pediatric Surgical Risk Calculator is available online at riskcalculator.facs.org/peds .

More information: Kari Kraemer et al. Development and Evaluation of the American College of Surgeons NSQIP Pediatric Surgical Risk Calculator, *Journal of the American College of Surgeons* (2016). DOI: 10.1016/j.jamcollsurg.2016.08.542

Provided by American College of Surgeons