

# Patient Safety Tip of the Week

May 31, 2016

## More Frailty Measures That Predict Surgical Outcomes

There are a number of systems and tools available for predicting surgical complication rates or mortality rates. But we've also done numerous columns highlighting that measures of frailty, including some very simple ones, may be valuable in predicting complications or adverse outcomes in patients undergoing surgery. Some of the simplest have included the timed up and go test, gait speed, handgrip strength, etc. Even just identifying patients who have fallen at least once in the previous six months can help identify patients at risk for complications of surgery.

Recently, several more studies have further demonstrated that simple measures of frailty are valuable preoperatively in predicting surgical complications. One such study assessed the value of the **timed stair climb** in predicting perioperative complications in patients undergoing abdominal surgery ([Reddy 2016](#)). Reddy and colleagues compared patient performance on the timed stair climb against results of the American College of Surgeons NSQIP risk calculator. They chose the timed stair climb because it correlates with blood pressure and heart rate changes as an indicator of stress. Over 97% of the patients were able to complete the timed stair climb test. Patients with slower stair climb times had increased complication rates, and in multivariable analysis, stair climb time was the single strongest predictor of complications. Patients with slower timed stair climbs also had greater deviations from predicted length of hospital stay. The timed stair climb actually had predictive value superior to that of the American College of Surgeons NSQIP risk calculator. The authors suggest further validation of the timed stair climb in larger populations and those undergoing other types of surgery. The test is simple to administer and takes less than a minute. The "course" is up and down a 7-step set of stairs and the average time is 18 seconds.

We mentioned above **gait speed** as a predictor of surgical complications. A new study looked at the relationship between 5-meter gait speed with operative mortality and morbidity in over 15,000 older adults undergoing cardiac surgery ([Afilalo 2016a](#)). Gait speed was an independent predictor of adverse outcomes after cardiac surgery, with each 0.1-m/s decrease conferring an 11% relative increase in mortality. Adding gait speed to the Society of Thoracic Surgeons risk prediction tool further increased the predictive value of the tool.

5-meter gait speed was also a component of the Short Physical Performance Battery (SPPB) studied recently by the same group ([Afilalo 2016b](#)) in patients undergoing surgical or transcatheter aortic-valve replacement (TAVR). The other components were 5 chair rises and a balance test. Afilalo and colleagues found in over 900 patients that the SPPB and the Fried+ frailty scales optimally predicted mortality and were the only scales to yield a significant integrated discrimination improvement when added to the Society of Thoracic Surgeons risk model.

Note that another recent study on patients undergoing aortic valve replacement surgery used a modified version of Ganapathi's frailty index which includes six variables (age >70 years, BMI <18.5, hematocrit <35%, history of stroke, albumin <3.5, and partially or totally dependent functional status) to predict mortality, morbidity and hospital length of stay ([Esses 2016](#)).

Another recent study compared a simple measure of upper-extremity frailty (UEF) in trauma patients age 65 and older ([Toosizadeh 2016](#)). Rapid **elbow flexion speed** during a 20-second trial, as measured by a wearable device, was compared to a validated modified Rockwood questionnaire, the Trauma-Specific Frailty Index (TSFI), as the gold standard for frailty. Parameters of the UEF indicative of slowness, weakness, and exhaustion during elbow flexion were independent predictors of the TSFI score. Correlations were also observed between UEF parameters and number of falls within a previous year, with highest correlation observed for elbow flexion slowness. The authors conclude that this simple test of 20-second elbow flexion may be practical and sensitive to identify frailty among hospitalized older adults. The UEF test is independent of walking assessments, reflects several frailty markers, and it is practical for bed-bound patients.

And yet another study showed that the **Modified Frailty Index** was predictive of postoperative critical care support after surgery for head and neck cancer ([Abt 2016](#)). Their Modified Frailty Index, however, included 15 variables. It is not known whether simpler measures of frailty would have been as useful in predicting complications.

And since we mentioned above the American College of Surgeons [NSQIP Surgical Risk Calculator](#) we should mention that it has recently been recalibrated and updated ([Liu 2016](#)). Before recalibration there apparently was a tendency for it to overestimate risks for the lowest and highest risk patients. The authors concluded that performance of NSQIP Surgical Risk Calculator models was shown to be excellent and was improved with recalibration. Surgeons and patients can rely on the calculator to provide accurate estimates of surgical risk.

While we would recommend that anyone contemplating surgery (surgeon or patient) estimate risk using a validated tool like the ACS NSQIP surgical risk calculator, we really like the increasing use of simpler measures of frailty, at least in the 65 and older population, as predictors of complications, morbidity and mortality. These simpler measures can be easily performed in the office setting and are not time consuming.

And don't forget that these simple measures, like gait speed assessment, may also be valuable in patients not undergoing surgery. Another recent study assessed the relationship between gait speed and the risk for death and/or hospital admission in older patients with heart failure ([Pulignano 2016](#)). Gait speed was measured over 4 meters in over 300 community-dwelling patients age 70 or older who had heart failure. One-year mortality rates were 38.3%, 21.9%, and 9.1% for those with gait speeds of  $\leq 0.65$  m/s, 0.66 to 0.99 m/s, and  $\geq 1.0$  m/s. Gait speed was also associated with a lower risk for hospitalization for HF and all-cause hospitalization.

**Some of our prior columns on preoperative assessment and frailty:**

- March 31, 2009 "[Screening Patients for Risk of Delirium](#)"
- January 26, 2010 "[Preventing Postoperative Delirium](#)"
- June 2010 "[The Frailty Index and Surgical Outcomes](#)"
- August 17, 2010 "[Preoperative Consultation – Time to Change](#)"
- August 31, 2010 "[Postoperative Delirium](#)"
- August 9, 2011 "[Frailty and the Surgical Patient](#)"
- September 2011 "[Modified HELP Helps Outcomes in Elderly Undergoing Abdominal Surgery](#)"
- October 18, 2011 "[High Risk Surgical Patients](#)"
- November 2011 "[Timed Up-and-Go Test and Surgical Outcomes](#)"
- April 3, 2012 "[New Risk for Postoperative Delirium: Obstructive Sleep Apnea](#)"
- August 7, 2012 "[Cognition, Post-Op Delirium, and Post-Op Outcomes](#)"
- August 14, 2012 "[Gait Speed: A New Vital Sign?](#)"
- September 25, 2012 "[Preoperative Assessment for Geriatric Patients](#)"
- September 3, 2013 "[Predicting Perioperative Complications: Slow and Simple](#)"
- November 2013 "[Predicting Perioperative Complications: Even Simpler!](#)"
- June 2014 "[Another Study Linking Frailty to Surgical Complications](#)"
- September 2, 2014 "[Frailty and the Trauma Patient](#)"
- February 17, 2015 "[Functional Impairment and Hospital Readmission, Surgical Outcomes](#)"
- June 2015 "[Get a Grip on It!](#)"
- January 26, 2016 "[More on Frailty and Surgical Morbidity and Mortality](#)"
- May 2016 "[Guidelines for Perioperative Geriatric Care](#)"

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