When cardiac surgery is considered to treat diseases of the valves or coronary arteries, an assessment and discussion of the operative risk of mortality or major morbidity is routine. Beyond simply providing the patient with a rough probability of success, this risk assessment is critical for 2 primary reasons. First, it addresses the question of whether the anticipated risks of the procedure are outweighed by the anticipated benefits in terms of survival and quality of life; that is, should an intervention be performed at all? Second, in the age of expanding transcatheter and percutaneous approaches to coronary and valve disease, risk stratification has important implications for selecting the approach taken to treat the cardiovascular condition. In the United States, the primary instruments used for the assessment of cardiac surgical risk are the Society of Thoracic Surgeons (STS) predicted risk of mortality score and the predicted risk of mortality or major morbidity score. However, the STS scores do not include factors that reflect aging-
related risk beyond simply capturing chronological age, which is an important limitation since the rate and effect of aging vary considerably among individuals.

Frailty is characterized by increased vulnerability to stressors (eg, surgery) owing to diminished physiological, homeostatic reserve (homeostasis). It results from impairment in multiple, interrelated systems and is not specific to an organ or disease. Core components of frailty include slowness, weakness, exhaustion, shrinking (eg, weight loss, sarcopenia), and inactivity; impaired cognition and mood disturbance are often included as well. Recognizing frailty is important for predicting a patient’s likely response to the acute stress of cardiac surgery. But it also provides a window into the future—seeing the trajectory of that patient apart from the procedure being considered—in that frailty is associated with multiple adverse health outcomes, including more frequent hospitalization, falls, disability, institutionalization, and increased mortality. Identification of frailty may have implications for the anticipated benefit (conceptualized holistically) of the proposed procedure.

Frailty has long been incorporated into clinical decision making using the subjective “eyeball” test (ie, visually assessing the patient’s physical condition). Increasingly, there is a push to make frailty assessment more objective with tests such as the 5-m gait time, handgrip strength, and timed up-and-go. Whether a multistep assessment is required vs a simpler, single-test screening protocol is not yet clear. Whatever the assessment performed, it needs to be pragmatic and not overly burdensome or it will not be widely adopted clinically.

In this issue of JAMA Cardiology, Afifalo et al provide data on the use of the 5-m gait speed as a complement to the STS score to predict perioperative mortality and major morbidity after coronary artery bypass graft (CABG) surgery, valve repair or replacement, or a combination of these procedures. This study extends prior work as it evaluates the utility of the 5-m gait speed test in more than 15 000 patients entered in a national registry for cardiac surgery. Patients were included if they were 60 years or older and excluded if they could not safely walk or if they were clinically unstable. Reporting of gait speed started in July 2011, and this analysis includes 3 years of data. Slower gait speed was associated with female sex, larger body size, higher prevalence of comorbidities, worse symptoms of heart failure, and the need for more urgent surgery. After adjustment for the STS score, a slower gait speed was associated with increased operative mortality for all surgical procedures (adjusted pooled odds ratio, 1.11 per 0.1-m/s decrease in gait speed; 95% CI, 1.07-1.16) and increased mortality or major morbidity (adjusted odds ratio, 1.03 per 0.1-m/s decrease in gait speed; 95% CI, 1.00-1.05). Among those with an STS score indicating low risk (<4), 3189 patients (25.7%) had a slow gait speed (lowest tertile); for these patients, this test may highlight unrecognized risk. Among those with an STS score indicating intermediate or high risk (≥4), 452 patients (16.5%) had a fast gait speed (fastest tertile); for these patients, this may somewhat lessen concerns about procedural risk. While gait speed was an independent predictor of mortality and major morbidity, the incremental value of adding gait speed to the STS score was limited because there was no significant change in the C statistic and the integrated discrimination improvement was very modest. However, as pointed out by the authors, this in part reflects the fact that the STS score alone has excellent discriminatory power for these perioperative outcomes.

In the era of transcatheter cardiac procedures, increased attention has been directed at how aging-related factors influence procedural risk and clinical outcomes after cardiac surgery. Afifalo and colleagues demonstrate that a simple assessment of gait speed is independently associated with mortality and morbidity after cardiac surgery. These results are broadly applicable in that they were derived from a large national database and the findings were consistent for different surgical procedures. However, an exploratory analysis raises some questions as to whether the association between 5-m gait speed and outcomes is altered by age, sex, or other clinical factors. In addition, more than two-thirds of potentially eligible patients did not have gait speed recorded, and it is likely that these patients were more frail and functionally disabled than those who were able to complete the 5-m walk test. Another limitation, mentioned by the authors, is that the current analysis does not include patients undergoing transcatheter aortic valve replacement. Further information on the prognostic utility of the 5-m gait speed test in patients undergoing transcatheter aortic valve replacement is forthcoming from the Transcatheter Valve Therapy registry.

Our understanding of how aging-related factors intersect with clinical outcomes after cardiovascular procedures is in its infancy. Important questions remain to be answered. Which tools and tests are best for objectively assessing frailty in patients undergoing cardiac procedures? Are certain tools better in particular subgroups of patients? Should we combine a simple screening test with more detailed assessments (eg, short physical performance battery) in those who perform poorly on the screening test (2-tiered approach)? Furthermore, how will adding these assessments alter clinical management and treatment decisions? It is one thing to show that a tool to measure frailty is independently associated with clinical outcomes. But how might these tools facilitate the identification of patients who would be better served by a less invasive procedure, even if it provides a less optimal technical result? Can we identify frail patients whose frailty will reverse after a cardiac procedure vs those who will experience progressive and worsening frailty and disability despite a technically successful procedure? How can these tools assist patients in making more informed decisions aligned with personal preferences and overall health care goals? Frailty assessment may provide useful information on a patient’s projected postprocedure quality of life, not just the periprocedural risk of complications and death. In this regard, how might these tools answer important and challenging questions regarding the anticipated benefit vs futility of any intervention no matter how minimally invasive?

The association between frailty and outcomes after cardiovascular procedures is more than one of risk, though. In most cases, despite the presence of some degree of frailty, a
cardiac procedure will likely be performed. Rather, this adverse association is a reminder that we are treating a whole person—a complex system—and not just a valve, ventricle, or coronary artery. Accordingly, we need to identify adjunctive therapies and implement treatment plans for the whole patient, in this regard specifically targeting frailty. In this context, the recognition of frailty before a procedure helps to identify the patient who may have a suboptimal outcome. Research is needed to test treatment strategies, including medicines, nutritional supplements, and novel approaches to rehabilitation as adjuncts to cardiac procedures to optimize patient-centered outcomes.

With the aging of the population, the high prevalence of cardiovascular disease, and the evolving types and growing number of cardiovascular interventions allowing us to treat older and sicker patients, these issues have broad clinical, ethical, and economic implications. A new path is being charted, but there is a long road ahead.

REFERENCES