

Only the strong survive: The impact of frailty on patients undergoing leadless pacemaker implantation



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Medical complexity, as defined by the number and weighting of comorbidities, is a significant contributor to morbidity, mortality, and the risk of complications after medical and surgical procedures. Yet, individuals are more than a list of diagnoses or abnormal laboratory values. For example, a 60-year-old patient with heart failure and a left ventricular ejection fraction (LVEF) of 25% but with few functional limitations is generally perceived to be at lower periprocedural risk than an octogenarian patient who also has heart failure and an LVEF of 25% but who requires assistance with activities of daily living, has a body mass index <20 kg/m² from recent unintended weight loss, and experiences frequent falls despite the use of a walker. Thus, the integration of comorbidities, functional ability, strength, and the resilience to recover from physiologic insults may more closely reflect the intricacy of being human. As the character Rocky Balboa once said, “It’s about how hard you can get hit and keep moving forward.”¹

Frailty is a powerfully predictive concept that integrates patient complexity, social determinants of health, and functional status. The World Health Organization defines frailty as “a clinically recognizable state in which the ability of older people to cope with everyday or acute stressors is compromised by an increased vulnerability brought by age-associated declines in physiological reserve and function across multiple organ systems.”² Frailty is related to cardiovascular disease and outcomes, and this association has been demonstrated in multiple patient/procedural cohorts. For example, frail patients have an increased risk of death and disability after transcatheter or surgical aortic valve replacement as well as worse outcomes following stroke and transient ischemic attacks.^{3,4} Heart failure patients with significant frailty had greater mortality, had longer length of hospital stay, were less likely to be discharged to home, and had higher total costs when compared with similar heart failure patients who were not frail.⁵ In a recent post hoc analysis from the landmark SCD-HeFT (Sudden Cardiac Death in Heart Failure Trial) trial, high frailty, as determined by the frailty index,⁶ significantly modulated the degree of benefit from implanting a primary prevention implantable cardioverter-defibrillator on total and cardiovascular mortality.⁷

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Validated frailty assessments can be qualitative or quantitative, performed directly at an individual level, or ascertained indirectly from administrative datasets. Two recent comprehensive reviews summarize the available tools for assessing frailty in cardiovascular patients, address the impact of frailty on specific arrhythmia diagnoses, and provide further recommendations on interventions to improve frailty status.^{2,8} It is important to note that frailty status is dynamic and amenable to interventions that can reduce an individual’s degree of impairment.

In this issue of *Heart Rhythm* *O₂*, Diaz-Arocutipa and colleagues⁹ report an elegant analysis using the Hospital Frailty Risk Score (HFRS) applied to 16,825 patients in the National Inpatient Sample between 2017 and 2019 who underwent leadless pacemaker implantation. The HFRS is a frailty measure derived from administrative data. The specified outcomes from this analysis, mortality, complications, length of stay, and cost, were confined to the index hospitalization. Patients were categorized into low-, intermediate-, and high-frailty terciles. The patients with intermediate or high frailty, when compared with patients with low frailty, had adjusted risk ratios of 5.15 (95% confidence interval 3.04–8.72) and 6.37 (95% confidence interval 3.31–12.26), respectively, for in-hospital mortality. Similar associations were observed in length of stay and total cost endpoints. Frailty, however, was not associated with procedural complications, suggesting that procedural complications may not be the primary driver of mortality. These data add important additional information on the impact of frailty on outcomes for this contemporary electrophysiology procedure. Importantly, the authors’ recommendations for careful patient selection with personalized care plans and close monitoring during postprocedure management to include occupational or physical therapy, addressing nutritional goals and minimizing polypharmacy, are quite reasonable.

However, there are practical implementation issues worth considering. The HFRS is calculated from administrative International Classification of Diseases codes and was not calculated prior to the index hospitalization. The study design precluded in-person measurements of physical frailty as well as real-time assessments of patient self-rated health, physical activity, and mood. So, what is a clinician to do when assessing a patient prior to leadless pacemaker implantation? Knowledge of other frailty instruments and familiarity with

their implementation is necessary.² One such available direct physical measure of frailty that has been associated with the development of future heart failure and coronary heart disease is hand-grip strength utilizing a dynamometer.¹⁰ Frailty indices can be incorporated into electronic medical records as well, providing real-time information that clinicians can incorporate into their decision making.¹¹

As 2024 brings the hope and promise of a new year, might it be time to add an assessment of frailty to the standard pre-procedural evaluation? Although pain assessment had been proposed previously as the fifth vital sign,¹² contemporary practice incorporating a measurement of frailty may provide a more holistic assessment of functional cardiovascular wellness. Grip strength and walk speed can be performed during essentially any patient-facing encounter. The systematic, consistent use of a validated frailty measurement tool throughout a healthcare system is also worthwhile to pursue.¹¹ As illustrated in the current analysis, recognizing the presence and impact of frailty on our patients and procedural outcomes, and striving to reduce frailty and improve functional status is an important endeavor for us all.

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