

# The Importance of Frailty Evaluation Before Cardiac Surgery



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## Introduction

As a result of the dramatic improvements in cardiac surgical techniques and expertise over the past 50 years, along with the aging population, patients undergoing cardiac surgery are progressively older and with greater comorbidities [1]. It is therefore not surprising that in the current era of cardiac surgery, those aged 75 years and older represent a growing subset of patients, and among them the prevalence of frailty ranges between 25% and 50% [2-3], higher rates than those estimated in non-cardiac surgery (around 10%) [4]. Frailty is considered a multi-dimensional syndrome typically associated with aging and characterized by vulnerability to stressors due to loss of physiologic reserve; thus it is an umbrella term that encompasses the concept of malnutrition, sarcopenia, exhaustion, wasting, weakness, slowness, inactivity but also psychological and social aspects [5]. Therefore, despite being inextricably linked to each other, frailty is not a mere representation of the chronologic age but a much more complex clinical entity.

The aim of this mini-review is to answer, in accordance with the most recent data in the literature, to three main clinical questions regarding the neglected relationship between frailty and cardiac surgery.

### What is the frailty impact on cardiac surgery outcomes?

To date, extensive data supports the hypothesis that frailty, regardless of how it is defined and which type of assessment tool is used, is a major risk predictor for poor outcomes after cardiac surgery [6]. Indeed, frail patients have been observed to experience not only higher intra-operative mortality and in-hospital mortality, but also prolonged intensive care unit and hospital length of stay [7]. Furthermore, according to a recent systematic review and meta-analysis of 66,448 patients, frailty is associated with greater risk of stroke, sternal wound

complications and with almost 5-fold risk of non-home discharge after post-surgical cardiac rehabilitation (“unsuccessful cardiac rehab”) [8]. Not only short-term outcomes after cardiac surgical procedures (both major and minimally invasive) can be predicted by frailty but also long-term mortality, functional decline [9], 12-month post discharge number of readmissions [10] and late major adverse cardiac and cerebrovascular events [11].

### How to assess frailty before cardiac surgery?

The two major scoring systems that are commonly used to predict the risk of negative outcomes after cardiac surgery and to guide surgical strategy are the Society of Thoracic Surgery-Predicted Risk of Mortality or Major Morbidity (STS score) and the EuroSCORE II. Neither was created to assess frailty as a pivotal aspect of pre-operative assessment. While the EuroSCORE II is generally considered to overestimate perioperative risk, the STS score is considered to underestimate perioperative risk in frail patients [12-13]. Even before it was defined as a syndrome, surgeons, whether consciously or unconsciously, have always evaluated frailty. As recalled by cardiac surgeon Keith B. Allen, watching the patient get out of bed and walk across the room and testing the firmness of the handshake are all part of a seasoned surgeon’s “eyeball” test for frailty [14]. Unfortunately ‘eyeballing’ is by nature subjective and tends to be inconsistent with poor inter-rater reliability [15]. Although there are more than twenty different validated objective assessment tools to properly measure frailty in the preoperative setting, currently there is no widely accepted and standardized measure for cardiac surgical patients. The phenotypic approach, such as the well-known Fried frailty phenotype, examines a set of observable characteristics allowing, in a relatively short time, to define frailty as the presence of three of five of the following criteria: slowness, weakness, unintentional weight loss, low physical activity, exhaustion

( 0, robust; 1-2, prefrail;  $\geq 3$  frail) [5]. In contrast, the deficit accumulation approach, such as the Rockwood frailty index, allows to mathematically express frailty in terms of the numeric count of health deficits that typically accumulate during the process of aging, allowing also to graduate the severity of frailty [16]. In clinical practice the optimal frailty assessment for cardiac surgical candidates, in addition to having an high predictive ability, should also be quick and easy to perform (or calculate). Given that comprehensive measures (e.g. the Comprehensive Assessment of Frailty, CAF), although more time-consuming, may be more appropriate to assess pre-operative frailty [17], also easily applied measures have been shown to be useful in predicting both mortality and prolonged institutional care [7]. Considering the growing time constraints during clinical practice, the application of rapid assessment-tools, such as the simplified CAF score, the Edmonton Frail Scale score which predicts length of hospital stay post cardiac surgery and readmission rate or the 4-item Essential Frailty Toolset (lower-extremity weakness, cognitive impairment, anaemia and hypoalbuminemia) which predicts mortality, disability at 1 year, and death at 30 days [10] could be of greater practical interest. Similarly, a Clinical Frailty Scale greater than 4 points is another practical strategy to easily detect frailty at the bedside before cardiac surgery [16]. Finally, Afilal et al, in a large study of 15,171 patients undergoing CABG, valve surgery, or a combination, found that slow preoperative gait speed is independently associated with operative mortality (11% relative increase with each 0.1m / s decrease) and confers a 2- to 3-fold increased risk predictive ability beyond the STS score and EuroSCORE II [18]. Following this evidence, the STS score has included in their most recent version the easily measured 5-m gait speed as a marker of frailty. Despite this choice can be considered a step in the right direction, it must be stressed that this single-component parameter does not capture the true impact of frailty and therefore the optimal method of assessment still need to be developed. Given these considerations, we strongly believe in the role of a multidisciplinary team approach for the assessment of frailty before cardiac surgery. A valuable option would be to include a cardio-geriatrician in the multidisciplinary "Heart-Team" so that his/her consult could help to identify vulnerable patients, correct reversible frailty related preoperative patient characteristics and provide appropriate care in the postoperative period.

### What is the utility of assess frailty before cardiac surgery?

From our point of view, at least 4 "because" justify the preoperative assessment of frailty before cardiac surgery:

**Because frailty assessment can clarify patient expectations and modify their preferences.** Characterizing frailty status is an important first step to establish realistic expectations about postoperative outcomes and to elicit patient preferences. Indeed, it is possible that frail patients would not

choose an invasive treatment that would keep them alive but with a real underlying risk of subsequent severe functional or cognitive impairments [19].

### Because frailty assessment can guide surgical decision-making on treatment options.

Frailty identification may modify goals of therapy, switching from complete recovery to improve quality of life, prevent worsening chronic disease and reduce the risk of catastrophic outcomes. In this setting, an useful example is the way frailty status may affect the clinical decision between interventions for aortic stenosis: transcatheter aortic valve implantation versus surgical aortic valve replacement versus palliative medical management [20].

### Because frailty assessment can allow the attempt to "defrail" elective patients.

The identification of at-risk frail individuals opens the doors to the so-called "prehab", that is a preoperative implementation of a set of interventions to improve patient's mental, nutritional status and physical capacity with the ultimate aim of making frail patients better prepared for their procedure and consequently improve outcomes [21]. We are now expecting the final results from The Pre-operative Rehabilitation for Reduction of Hospitalization After Coronary Bypass and Valvular Surgery trial (PREHAB trial) which goal is to examine the effect of prehab consisting of 8-weeks of exercise and education intervention in frail patients.

### Because frailty assessment can improve the health care systems economic sustainability.

Frailty is known to lead to an approximately 30% increase in hospitalization-costs associated with cardiac surgery [22]. A correct assessment of preoperative frailty should push the "Heart-Team" to reflect on the effective predicted outcomes of the procedure, ensuring that a more informed decision is made to avoid careless allocation of health care systems economic resources.

## References

1. Yanagawa B, Puskas JD, Verma S, Friedrich JO (2016) Coronary Artery Bypass Graft Should Be Considered in Octogenarians With Multivessel Coronary Disease. *Can J Cardiol* 32(9): 1045.e1-3.
2. Afilalo J, Mottillo S, Eisenberg MJ, Alexander KP, Noiseux N, et al. (2012) Addition of frailty and disability to cardiac surgery risk scores identifies elderly patients at high risk of mortality or major morbidity. *Circ Cardiovasc Qual Outcomes* 5(2): 222-228.
3. Sündermann S, Dademasch A, Rastan A, Praetorius J, Rodriguez H, et al. (2011) One-year follow-up of patients undergoing elective cardiac surgery assessed with the comprehensive assessment of frailty test and its simplified form. *Interact Cardiovasc Thorac Surg* 13(2): 119-123.
4. Makary MA, Segev DL, Pronovost PJ, Syin D, Bandeen-Roche K, et al. (2010) Frailty as a Predictor of Surgical Outcomes in Older Patients. *J Am Coll Surg* 210(6): 901-908.

5. Fried LP, Ferrucci L, Darer J, Williamson JD, Anderson G (2004) Untangling the Concepts of Disability, Frailty, and Comorbidity: Implications for Improved Targeting and Care. *J Gerontol A Biol Sci Med Sci* 59(3): 255-263.
6. Yanagawa B, Graham MM, Afilalo J, Hassan A, Arora R (2018) Frailty as a risk predictor in cardiac surgery: Beyond the eyeball test. *J Thorac Cardiovasc Surg* 156(1): 172-176.e2.
7. Lee DH, Buth KJ, Martin BJ, Yip AM, Hirsch GM (2010) Frail patients are at increased risk for mortality and prolonged institutional care after cardiac surgery. *Circulation* 121(8): 973-978.
8. Lee JA, Yanagawa B, An KR, Arora RC, Verma S, et al. (2021) Frailty and pre-frailty in cardiac surgery: a systematic review and meta-analysis of 66,448 patients. *J Cardiothorac Surg* 16(1): 184.
9. Kim DH, Kim CA, Placide S, Lipsitz LA, Marcantonio ER (2016) Preoperative frailty assessment and outcomes at 6 months or later in older adults undergoing cardiac surgical procedures: A systematic review. *Ann Intern Med* 165(9): 650-660.
10. Lal S, Gray A, Kim E, Bunton RW, Davis P, et al. (2020) Frailty in Elderly Patients Undergoing Cardiac Surgery Increases Hospital Stay and 12-Month Readmission Rate. *Heart Lung Circ* 29(8): 1187-1194.
11. Sepehri A, Beggs T, Hassan A, Rigatto C, Shaw-Daigle C, et al. (2014) The impact of frailty on outcomes after cardiac surgery: A systematic review. *J Thorac Cardiovasc Surg* 148(6): 3110-3117.
12. Green P, Woglom AE, Genereux P, Daneault B, Paradis JM, et al. (2012) The impact of frailty status on survival after transcatheter aortic valve replacement in older adults with severe aortic stenosis: A single-center experience. *JACC Cardiovasc Interv* 5(9): 974-981.
13. Barili F, Pacini D, Capo A, Rasovic O, Grossi C, et al. (2013) Does EuroSCORE II perform better than its original versions? A multicentre validation study. *Eur Heart J* 34(1): 22-29.
14. Allen KB (2014) Frailty: It's hard to define, but you know it when you see it. *J Thorac Cardiovasc Surg* 148(6): 3117-3118.
15. Hubbard RE, Story DA (2015) Does Frailty Lie in the Eyes of the Beholder? *Heart Lung Circ* 2(6): 525-526.
16. Rockwood K, Song X, MacKnight C, Bergman H, Hogan DB (2005) A global clinical measure of fitness and frailty in elderly people. *CMAJ* 173(5): 489-495.
17. Sündermann S, Dademasch A, Praetorius J, Kempfert J, Dewey T, et al. (2011) Comprehensive assessment of frailty for elderly high-risk patients undergoing cardiac surgery. *Eur J Cardio-thoracic Surg* 39(1): 33-37.
18. Afilalo J, Kim S, O'Brien S, Brennan JM, Edwards FH et al. (2016) Gait speed and operative mortality in older adults following cardiac surgery. *JAMA Cardiol* 1(3): 314-321.
19. Graham A, Brown CH (2017) Frailty, aging, and cardiovascular surgery. *Anesth Analg* 124(4): 1053-1060.
20. Arai T, Lefèvre T (2014) Who is the right patient for TAVI? *J Cardiol* 63(3): 178-181.
21. Arthur HM, Daniels C, McKelvie R, Hirsh J, Rush B (2000) Effect of a preoperative intervention on preoperative and postoperative outcomes in low-risk patients awaiting elective coronary artery bypass graft surgery: A randomized, controlled trial. *Ann Intern Med* 133(4): 253-262.
22. Goldfarb M, Bendayan M, Rudski LG, Morin JF, Langlois Y, et al. (2017) Cost of Cardiac Surgery in Frail Compared With Nonfrail Older Adults. *Can J Cardiol* 33(8): 1020-1026.



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