The how and why of assessing frailty syndrome in cardiac surgery

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Abstract

Frailty syndrome (FS) is one of the most important variables that have a proven impact on the increased risk of morbidity and mortality in cardiac surgery. However, FS assessment is not routinely incorporated into daily clinical practice or included in commonly used risk assessment models. The inclusion of FS in perioperative risk prediction models in cardiac surgery would not only allow for a more accurate assessment but could also assist in the selection of an appropriate treatment strategy while favoring the appropriate use of clinical resources. The identification of FS in the qualification process must not be seen as an absolute contraindication to cardiac surgery but as an opportunity to adequately prepare the patient for the procedure. However, the literature is heterogeneous in terms of the selection of an appropriate tool for identifying FS. Selected tools commonly used in the assessment of FS in patients with cardiovascular disease, including those of greatest relevance in cardiac surgery, are presented in this editorial.

Key words: cardiac surgery, frailty syndrome, older adult, perioperative risk

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Introduction

Cardiac surgery is currently facing a preponderance of older adult patients with coexisting frailty syndrome (FS), which poses significant clinical, social and economic challenges.[1] Worldwide, there has been a deterioration in the clinical profile of patients qualified for cardiac surgery. Indeed, patients are characterized by higher than before perioperative risk and more comorbidities, with the average duration of surgery and stay in the postoperative ward increasing.[2] The qualification and perioperative risk stratification should consider all variables that will determine treatment outcomes in the short and long term. Frailty syndrome is one of the most important variables that have a proven impact on the increased risk of morbidity and mortality in cardiac surgery.[3,4] However, FS assessment is not routinely incorporated into everyday clinical practice or included in commonly used risk assessment models, such as The European System for Cardiac Operative Risk Evaluation II (EuroSCORE II) or The Society of Thoracic Surgeons (STS) risk score. In clinical decision-making, frailty is still assessed using unstandardized methods, either at the bedside (e.g., foot-of-the-bed assessment) or by using the so-called "eyeball test".[5] However, these rapid and subjective assessment methods are not reliable for assessing frailty.[6] There is still no consensus on a specific multidimensional tool for assessing FS in cardiac surgery that has a high-risk predictive value. Incorporating FS into perioperative risk prediction models in cardiac surgery would allow for a more accurate assessment and help select an appropriate treatment strategy while promoting the appropriate use of clinical resources. Importantly, these risk scales can aid during Heart Team discussions to ensure balanced multidisciplinary decision-making in cardiac surgery, especially in line with the patient's goals and values. The overarching goals of cardiac surgery management should always be patient-centered. Cardiac surgery is designed to alleviate symptoms of disease and improve patient survival. The identification of FS in the qualification process must not be seen as an absolute contraindication for cardiac surgery, but rather an opportunity to adequately prepare the patient for this procedure. Given the high importance of FS in cardiac surgery, it is important to continue research efforts aimed at improving models that predict perioperative risk, as well as to implement routine assessment of FS during the qualification process. The literature, however, is heterogeneous in terms of choosing an appropriate tool for identifying FS. This is due to the development and availability of multiple research tools, as well as the existence of different approaches to operationalizing frailty. Broadly speaking, there are unidimensional tools for assessing frailty, most often physical frailty, and multidimensional tools that assess frailty in both physical and psychosocial aspects.

Commonly used assessment tools

A selection of commonly used tools for assessing FS in patients with cardiovascular disease, including those of greatest relevance in cardiac surgery, are described below.

The 5-meter gait speed is often used in research studies of cardiac surgery as a tool that reliably predicts the risk of perioperative complications. Walking a distance of 5 m in ≥6 s is considered a slow gait speed.[10] Many researchers recognize the superiority of this test over others in predicting perioperative complications in cardiac surgery.[7]

The frailty phenotype consists of 5 criteria to identify frailty, including weight loss, feelings of exhaustion, decreased physical activity, slowed gait speed, and weakened handgrip strength. Frailty is diagnosed when a minimum of 3 criteria are met, whilst meeting from 1 to 2 criteria indicates pre-frailty, a condition predisposing to frailty.[8]

The frailty index was developed from the Canadian Study of Health and Aging. It assesses the accumulation of deficits such as decreased mobility, cognitive impairment, reduced energy and functional capacity, worse mood, lack of social support, unintentional weight loss, and loss of appetite, among others.[9,10]

The Clinical Frailty Scale involves clinically assessing patients and classifying them into one of 9 states, where No. 1 means that the patient is very fit, and No. 9 means that the patient is terminally ill and has a life expectancy of less than 6 months. Each score on the scale corresponds to a written description of frailty that is supplemented by a corresponding graphic to support the frailty classification. A score ≥5 indicates frailty.[10]

The Tilburg Frailty Indicator is a multidimensional assessment tool for FS. It consists of 25 questions and provides data on general frailty, as well as frailty in terms of physical, mental and societal domains. Frailty is recognized with a score ≥5 points.[11–13]

The Groningen Frailty Indicator is a multidimensional tool composed of 15 items that include physical, cognitive, social, and psychological factors. Scores range from a minimum score (0 points) to a score ≥4 points, which indicates frailty.[14]

The simple frailty questionnaire (FRAIL) scale consists of 5 items that address subjective feelings of fatigue, difficulty walking 10 steps without resting, difficulty walking several hundred meters, chronic disease, comorbidities, and unintentional weight loss. Frailty is identified when from 3 to 5 elements are reported, whilst pre-frailty is diagnosed when 1 to 2 elements are reported.[15]

The Edmonton Frail Scale takes into account the assessment of cognitive function, general health, functional independence, social support, medication intake, nutritional status, mood, incontinence, and functional capacity. The scores range from 0 (no frailty) to 17 (severe frailty).[16]

The Essential Frailty Toolset predicts the annual risk of death in patients scheduled for either transcatheter

or surgical aortic valve surgery. The tool assesses preoperative anemia, hypoalbuminemia, 5 repetitions of standing up from a chair to a standing position without the use of arms, and cognitive impairment. A score of 5 indicates a high risk of 1-year mortality (65% for transcatheter and 50% for surgical), whilst a score of 0–1 indicates a risk of 1-year mortality of 6% for transcatheter and 3% for surgical intervention.[17]

Comprehensive assessment of frailty was introduced as a more precise preoperative assessment of frailty in elderly cardiac surgery patients. This assessment includes elements specific to the frailty phenotype and clinical frailty assessment. In addition, it assesses performance in basic and complex activities of daily living, balance and physical fitness. It also includes the results of laboratory tests (albumin, creatinine, natriuretic peptide) and takes into account the functional status of the respiratory system.[18]

Frailty Predicts Death One Year after Elective Cardiac Surgery Test (FORECAST) is a simplified version of the comprehensive assessment of frailty, consisting of 5 items with the highest predictive value. Tests involve sitting down and getting up from a chair, patient-declared feelings of weakness within 2 weeks, climbing stairs, assessment using the Clinical Frailty Scale, and serum creatinine level. This assessment has shown promising results in predicting annual mortality in the cardiac surgery patient population.[19]

Conclusions

Identification of FS in cardiac surgery may have different practical purposes. Screening tools are appropriate for perioperative risk stratification, while formal, in-depth FS assessment may be necessary to define specific and individualized preoperative management to optimize the patient's condition and reduce complications.[20] In an ideal clinical setting, FS assessment tools should have the ability to differentiate between potentially reversible frailty and irreversible frailty. This aims to enhance the identification of patients who may not only be candidates for cardiac surgery but are also highly likely to survive it while maintaining or improving their quality of life.[21,22]

Table 1 shows issues related to the assessment of frailty in cardiac surgery. Table 2 presents selected methods used to assess frailty in cardiac surgery.

Table 1. Issues related to the assessment of frailty in cardiac surgery

Analysis of frailty in valvular heart disease	ESC/EACTS Guidelines* → decision-making should take into account frailty, which is associated with an increased risk of morbidity and mortality after both SAVR and TAVI. The basis for assessing frailty should not be subjective but a combination of various objective indicators. In patients at increased surgical risk (STS risk score or EuroSCORE II ≥ 4% or logistic EuroSCORE I ≥ 10% or other risk factors not included in the above scales, such as frailty syndrome), the choice between SAVR and TAVI should be made at the Heart Team meeting and should be preceded by careful individual evaluation of each patient. Increased frailty (presence of >2 Katz scale factors) is a factor in favor of choosing TAVI.[23]
	ACC/AHA guidelines** → decision-making should be individualized on the basis of patient-specific factors that affect longevity or quality of life, such as comorbid cardiac and noncardiac conditions, frailty, dementia, and other factors. Frailty score provides the assessment of risk of procedure and chance of recovery of quality of life. Validated frailty scores include the Katz Score (independence in feeding, bathing, dressing, transferring, toileting, and urinary continence) plus independence in ambulation (no walking aid or assistance required, or completion of a 5-m eter walk in <6 s). Other scoring systems can be applied to calculate no, mild or moderate to severe frailty.[24]
Frailty as a contraindication to cardiac surgery	The clinical decision to select appropriate interventions or to decline cannot be made solely on the basis of calculated perioperative risk, taking into account frailty assessment. Achieving optimal clinical outcomes always requires the use of expert judgement (Heart Team assessment), taking into account patient preferences. Risk prediction models such as STS risk score or EuroSCORE II extended with FS assessment are therefore intended to support, but not guide, clinical decisions.

* 2021 European Society of Cardiology/European Association for Cardio-Thoracic Surgery (ESC/EACTS) Guidelines for the management of valvular heart disease; ** 2020 American College of Cardiology/American Heart Association (ACA/AHA) Guideline for the Management of Patients with Valvular Heart Disease; TAVI – transcatheter aortic valve implantation; SAVR – surgical aortic valve replacement; EuroSCORE – The European System for Cardiac Operative Risk Evaluation; STS – The Society of Thoracic Surgeons.

Table 2. The selected methods to assess frailty in cardiac surgery

Method	Scoring
The 5-meter gaid speed – simple measure of frailty that identifies slowed gait speed. It is very often used in cardiac surgery research as a tool that predicts the risk of perioperative complications in elderly patients.[10]	frailty – distance of 5 m in ≥6 s (gait speed ≥0.83 m/s)
The Clinical Frailty Scale – simple clinical assessment that classifies a patient into one of 9 clinical states, where state No. 1 means that the patient is fit, and state No. 9 means that the patient is terminally ill and has a life expectancy of less than 6 months. Each point on the scale corresponds to a written description of frailty, supplemented by a corresponding graphic to support the frailty classification.[10]	frailty – score ≥5
The Essential Frailty Toolset – 4-item based frailty assessment scale that predicts the annual risk of death in patients scheduled for either transcatheter or conventional aortic valve surgery. The tool takes into account preoperative anemia, hypoalbuminemia, 5 repetitions of standing up from a chair to a standing position without the use of arms, and cognitive impairment.[17]	frailty status: robust = 0, prefrail = 1–2, frail = 3–5

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References

1. Singh M, Stewart R, White H. Importance of frailty in patients with cardiovascular disease. *Eur Heart J*. 2014;35(26):1726–1731. doi:10.1093/eurheartj/ehu197
2. Szychta W, Majstrak F, Opolski G, Filipiak KJ. Change in the clinical profile of patients referred for coronary artery bypass grafting from 2004 to 2008: Trends in a single-centre study. *Kardiol Pol*. 2015;73(7):493–501. doi:10.5603/KP.a2015.0055
3. Bagnall NM, Faiz O, Darzi A, Athanasiou T. What is the utility of preoperative frailty assessment for risk stratification in cardiac surgery? *Interact Cardiovasc Thorac Surg*. 2013;17(2):398–402. doi:10.1093/icvts/ivt197
4. Wilson CM, Kostsuca SR, Boura JA. Utilization of a 5-meter walk test in evaluating self-selected gait speed during preoperative screening of patients scheduled for cardiac surgery. *Cardiopulm Phys Ther J*. 2013;24(3):36–43. PMID:23997690. PMCID:PMC3751713.
5. Bridgman PG, Lainchbury JG, Hii TBK. Does frailty lie in the eyes of the beholder? *Heart Lung Circ*. 2015;24(12):1238. doi:10.1016/j.hlc.2015.08.001
6. Hii TBK, Lainchbury JG, Bridgman PG. Frailty in acute cardiology: Comparison of a quick clinical assessment against a validated frailty assessment tool. *Heart Lung Circ*. 2015;24(6):551–556. doi:10.1016/j.hlc.2014.11.024
7. Chen MA. Frailty and cardiovascular disease: Potential role of gait speed in surgical risk stratification in older adults. *J Geriatr Cardiol*. 2015;12(1):44–56. doi:10.11909/j.issn.1671-5411.2015.01.006
8. Fried LP, Tangen CM, Walston J, et al. Frailty in older adults: Evidence for a phenotype. *J Gerontol A Biol Sci Med Sci*. 2001;56(3):M146–M157. doi:10.1093/gerona/56.3.M146
9. Robinson TN, Walston JD, Brummel NE, et al. Frailty for surgeons: Review of a National Institute on Aging Conference on Frailty for Specialists. *J Am Coll Surg*. 2015;221(6):1083–1092. doi:10.1016/j.jamcollsurg.2015.08.428
10. Rockwood K. A global clinical measure of fitness and frailty in elderly people. *Can Med Assoc J*. 2005;173(5):489–495. doi:10.1503/cmaj.050051
11. Gobbens RJJ, van Assen MALM, Luijkx KG, Wijnen-Sponselee MTh, Schols JMGA. The Tilburg Frailty Indicator: Psychometric properties. *J Am Med Dir Assoc*. 2010;11(5):344–355. doi:10.1016/j.jamda.2009.11.003
12. Uchmanowicz I, Gobbens R, Jankowska-Polanska B, Loboz-Rudnicka M, Manulik S, Loboz-Grudzien K. Cross-cultural adaptation and reliability testing of the Tilburg Frailty Indicator for optimizing care of Polish patients with frailty syndrome. *Clin Interv Aging*. 2014;9:997. doi:10.2147/CIA.S64853
13. Gobbens RJJ, Boersma P, Uchmanowicz I, Santiago LM. The Tilburg Frailty Indicator (TFI): New evidence for its validity. *Clin Interv Aging*. 2020;15:265–274. doi:10.2147/CIA.S243233
14. Dent E, Kowal P, Hoogendijk EO. Frailty measurement in research and clinical practice: A review. *Eur J Intern Med*. 2016;31:3–10. doi:10.1016/j.ejim.2016.03.007
15. Morley JE, Malmstrom TK, Miller DK. A simple frailty questionnaire (FRAIL) predicts outcomes in middle aged African Americans. *J Nutr Health Aging*. 2012;16(7):601–608. doi:10.1007/s12603-012-0084-2
16. Graham MM, Galbraith PD, O'Neill D, Rolfson DB, Dando C, Norris CM. Frailty and outcome in elderly patients with acute coronary syndrome. *Can J Cardiol*. 2013;29(12):1610–1615. doi:10.1016/j.cjca.2013.08.016
17. Afilalo J, Lauck S, Kim DH, et al. Frailty in older adults undergoing aortic valve replacement. *J Am Coll Cardiol*. 2017;70(6):689–700. doi:10.1016/j.jacc.2017.06.024
18. Sündermann S, Dademasch A, Praetorius J, et al. Comprehensive assessment of frailty for elderly high-risk patients undergoing cardiac surgery. *Eur J Cardiothorac Surg*. 2011;39(1):33–37. doi:10.1016/j.ejcts.2010.04.013
19. Sundermann S, Dademasch A, Rastan A, et al. 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*. 2011;13(2):119–123. doi:10.1510/icvts.2010.251884
20. Robinson TN, Walston JD, Brummel NE, et al. Frailty for surgeons: Review of a National Institute on Aging Conference on Frailty for Specialists. *J Am Coll Surg*. 2015;221(6):1083–1092. doi:10.1016/j.jamcollsurg.2015.08.428
21. Joyce E. Frailty in advanced heart failure. *Heart Fail Clin*. 2016;12(3):363–374. doi:10.1016/j.hfc.2016.03.006
22. Kluszczyńska M, Młynarska A. Influence of frailty syndrome on patient prognosis after coronary artery bypass grafting. *Adv Clin Exp Med*. 2021;30(9):923–931. doi:10.17219/acem/137558
23. Vahanian A, Beyersdorf F, Praz F, et al. 2021 ESC/EACTS Guidelines for the management of valvular heart disease. *Eur Heart J*. 2022;43(7):561–632. doi:10.1093/eurheartj/ehab395
24. Otto CM, Nishimura RA, Bonow RO, et al. 2020 ACC/AHA Guideline for the Management of Patients With Valvular Heart Disease: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. 2021;143(5):e35–e71. doi:10.1161/CIR.0000000000000923