

## Making the Most of the Right Metrics – An Action Plan

### Authors:

Hadley H.K. Wesson

Michael E. Zenilman

### \* Corresponding author.

Hadley H.K. Wesson

Department of Surgery,  
Johns Hopkins School of  
Medicine, Baltimore,  
Maryland, USA.

Tel: 410-730-1988.

Fax: 410-367-2249.

E-mail:

[hwesson1@jhmi.edu](mailto:hwesson1@jhmi.edu)

**Funding Sources:** None

**Key Words:** Frailty;  
Geriatrics; Surgery

### Abstract

Over the last two decades the literature has repeatedly shown that frailty is a strong independent predictor of increased postoperative morbidity and mortality. Multiple studies have put forth various types of assessment tools to measure different aspects of elderly patients at risk, each providing sound, statistically significant evidence to argue their metric is superior to others. Despite this, even if we are successful in assessing a frail patient's risk for surgery, we do not have a system in place that can translate data gathered from risk-assessment metrics into effective interventions that will improve outcomes. We must put what we know into practice and implement a plan that informs the preoperative, intraoperative, and postoperative processes. In this article, we present an action plan that seeks to do just that to implement a Frailty Clinical Surgical Pathway to be offered to frail patients as a comprehensive approach to surgery.

Over the last two decades the literature has repeatedly shown that frailty is a strong independent predictor of increased postoperative morbidity and mortality [1-4]. In an earlier article, we outlined the need to develop outcome variables to measure frailty [5]. However in the last two years since the article was published, we admit we still do not know what the ideal metrics are and how to make the most of these metrics.

Multiple studies have put forth various types of assessment tools to measure different aspects of frailty, each providing sound, statistically significant evidence to argue their metric is superior to others [2, 6-11]. There is agreement within this body of literature that the ideal tool should be quick and easily administered in an outpatient setting, and linked to improved outcomes. Yet there is

much debate as to which tool or combination of tools best achieves these objectives.

Even identifying which patients are considered ‘frail’ raises much discussion as frailty is not necessarily associated with age, but rather an umbrella term that includes malnutrition, wasting, weakness, slowness, and inactivity [12]. Some authors have proposed the Clinical Frailty Scale as a relatively simple way to determine which patients should be further assessed (Figure 1) [1]. The scale allows the surgeon to use their clinical judgment as a first step to identify frail patients.

Once a patient has been identified as frail, there is a need to assess the patient before surgery. This should include cognitive, functional, and nutritional status. The importance of this preoperative risk stratification has been well documented throughout the literature [13-17]. However, even if we successfully assess a frail patient’s risk for surgery, we do not have a system in place that can translate data gathered from risk-assessment metrics into effective interventions that will improve outcomes [5].

In this article, we present an action plan to implement a Frailty Clinical Surgical Pathway to offer frailty patients a comprehensive approach to surgery (Figure 2). We maintain that in 2016 it is not enough to merely identify patients at risk for poor postoperative outcomes. We must put what we know into practice and implement a plan that informs the preoperative, intraoperative, and postoperative processes.

## **I. Preoperative Assessment**

The first step of this action plan occurs during the initial preoperative encounter when the surgeon determines if a patient would benefit from enrolling in the Geriatric Surgical Clinical Pathway. The surgeon bases their decision on the patient's age and if the patient scored greater than three on the Clinical Frailty Scale (Figure 1). If the patient meets these criteria, the surgeon introduces them to the concept of the pathway. The patient then participates in a series of preoperative assessments administered by the surgeon's trained staff during the initial office visit (Table 1). Results are entered into the patient's electronic medical record and are available to the patient, their family, the patient's primary care provider, and the hospital team that will care for the patient during their hospital stay.

The patient is then referred to a multidisciplinary preoperative frailty clinic comprised of five different providers from the departments of anesthesia, palliative care, nutrition, physical therapy, and social work. Through this clinic, the patient will meet with the anesthesiologist who can become familiar with the patient, their specific medical comorbidities, and the proposed surgery. This will help guide the choice of anesthesia and inform anesthesia's intraoperative plan [18, 19].

The patient will meet with a member of the palliative care team to allow them and their family to articulate and understand the goals of care, particularly surgical care [20]. This would also serve as an opportunity to discuss and document advance directives in a relatively stress-free setting. At this meeting, patients and their families can discuss critical issues such as accessing existing social support systems, identifying a

surrogate decision maker such as a power of attorney, and establishing health priorities.

The patient will meet with a dietician who will use the results from the in-office nutritional assessment that includes assessing weight loss, calculating body mass index, and measuring serum concentrations of albumin and prealbumin [21]. Not only will this help to identify patients at risk of malnutrition, but it will allow the dietician will discuss ways to maximize nutrition intake in the preoperative setting and provide the patient with a prehabilitation nutrition plan [22]. This may include oral nutritional supplements or immune modulating formulas for patients who do not meet their energy needs from a regular dietary intake. This is particularly important in patients who are at severe nutritional risk with a weight loss of greater than 10% in the last six months, a BMI of less than 18.5 kg/m<sup>2</sup>, or a serum albumin less than 30g/l

[23]. The patient will also have an opportunity to discuss ways to ensure their postoperative diet goals can be achieved and plan for any post-surgical diet changes, such as a low fiber diet following colorectal resections.

Based on findings from the functional assessment, the patient will be referred to a physical therapist in the preoperative setting. The physical therapist can begin to introduce the patient to fundamental strengthening exercises that they can to perform in the preoperative setting and continue postoperatively. The concept of ‘prehabilitation’ is relatively new in the surgical literature. However, studies show not only the importance of a prehabilitation program, but that targeting the preoperative period may be even more effective than the more conventional postoperative rehabilitation [24, 25]. Bruns et al recently reviewed the literature to specifically

explore the effect of prehabilitation in the elderly undergoing colorectal surgery. They found that although the quality of much of the reviewed literature was poor, the ability to implement a prehabilitation program for the elderly is feasible with the potential to improve a patient's physical condition [26].

As part the pathway, the patient will meet with a social worker who will be able to provide the patient with guidance regarding their anticipated hospital stay and discharge disposition to either their home, rehabilitation, or a skilled nursing facility. At this encounter, the social worker can provide information regarding these options to the patient and their family so they can make appropriate plans not only for the surgery but for the anticipated aftercare as well. As social care policies increasingly advocate a personalized approach, this key component of the multidisciplinary clinic

would empower the patient to understand their options postoperatively [27].

## **II. Intraoperative Approach**

During the preoperative assessment in the Geriatric Surgical Clinical Pathway, the patient will have an anesthesia plan put in place prior to their arrival in the hospital on the day of their planned surgery. This will take into account ways to minimize intraoperative complications [28]. Additionally, lessons learned from the Enhanced Recovery After Surgery (ERAS) guidelines such as the use of mid-thoracic epidural, normothermia intravenous fluids, intraoperative goal directed fluid therapy, and venous thromboembolism prophylaxis can be applied to the frail population [29].

## **III. Postoperative Period**

The postoperative period is a continuum of care in the Geriatric Clinical Surgical Pathway. When the patient arrives on the

floor postoperatively, providers are able to refer to the patient-specific care packet developed in the preoperative setting that outlines postoperative goals, particularly with regards to nutrition, mobility, and disposition. Through a team approach involving the surgeon, geriatrician or hospitalist, pharmacist, dietician, physical therapist, and social worker, the plan builds on Hardin et al's work that has shown the importance of a multidisciplinary, integrated team to appropriately guide care [30]. A recent review of the literature further supports this, showing that inpatient geriatric consultation teams improve mortality at six and eight months following discharge [31].

There are significant physiological changes that occur with frailty; understanding of how these changes affect the pharmacodynamics of agents is of utmost importance in the perioperative setting [32]. As such, a

pharmacist will assist the team in creating frailty-specific postoperative ordersets to minimize medication side effects such as delirium, acute renal failure, respiratory failure, and aspiration [33].

During the patient's recovery, the physical therapist will be able to refer to the surgical care packet to achieve the postoperative mobility goals that were established in the preoperative setting. The patient will also benefit from the social worker's input as they build upon relationships with community nursing homes, rehabilitation centers, and hospice. Once the patient is admitted to the hospital, the social worker can continue to work with the patient and their family to plan for a timely and appropriate disposition from the hospital. A patient-specific discharge packet with continued cognitive, mobility, and nutritional goals will be provided to the patient at the time of discharge so their care

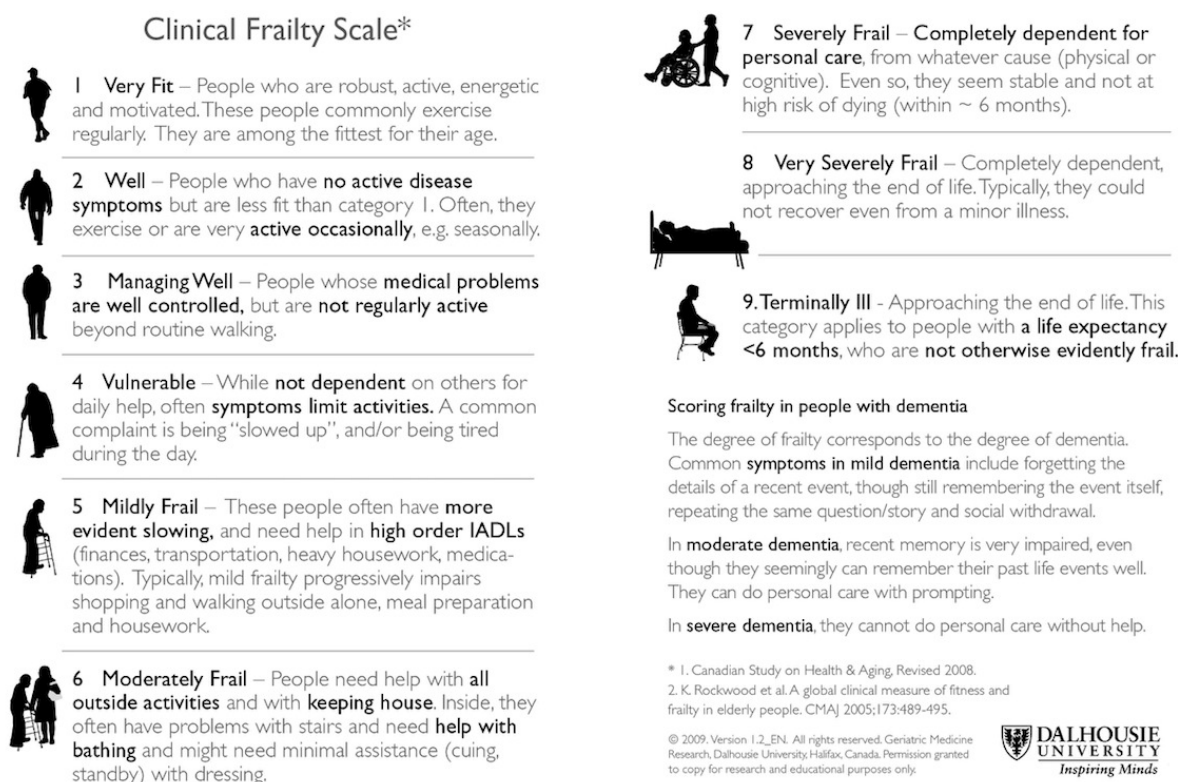
truly will be a continuum of care as they transition out of the hospital.

Ultimately we know that frailty assessment tools can help predict outcomes following surgery. But our next challenge is to actually put these tools to the test and develop a patient-specific plan that will

improve our patients' mortality, morbidity, and quite frankly, satisfaction from surgery.

Through a step-by-step multidisciplinary approach such as the one outlined here, we can address this challenge and change the way we care for frail patients.

**Figure 1: The Clinical Frailty Scale as a Tool to Identify Frailty**



Source:

K. Rockwood et al. A global clinical measure of fitness and frailty in elderly people. CMAJ 2005;173:489-495. Reprinted with permission of Geriatric Medicine Research, Dalhousie University, Halifax, Nova Scotia.

Figure 2: Frailty Surgical Clinical Pathway

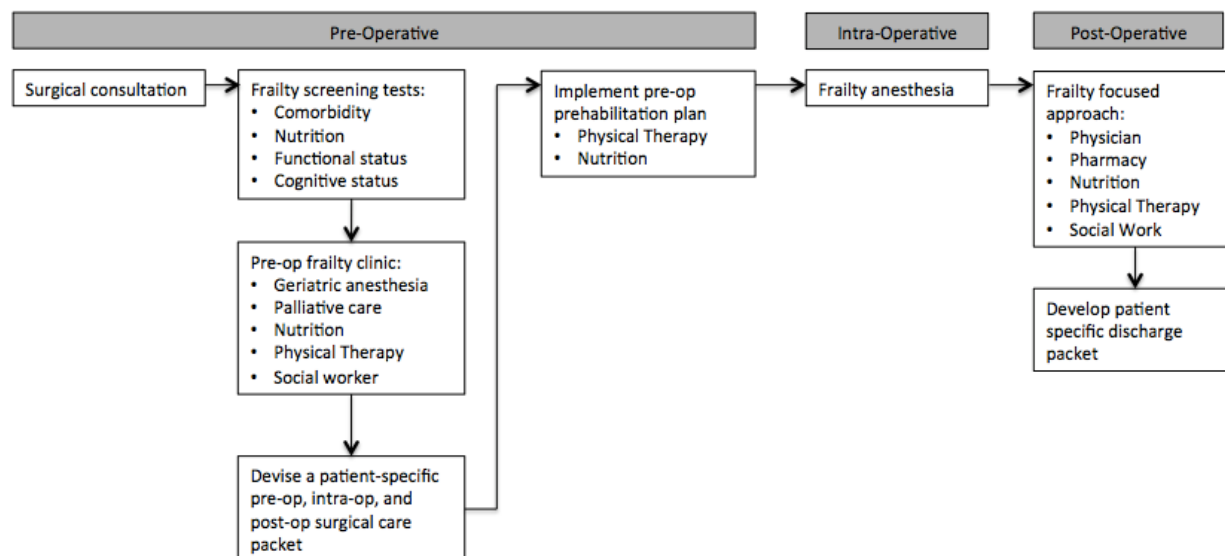


Table 1: Frailty Screening Tools

Variable	Assessment Tool
Comorbidity	Charlson Scale Chronic Illness Rating Scale
Function	Activities of Daily Living (ADL) Instrumental Activities of Daily Living (IADL) Timed Up and Go Test
Mental Function	Folstein Mini Mental Status (MMS) Dementia Rating Scale (DRS) Depression with the Patient Health Questionnaire-2
Malnutrition	Mini Nutritional Assessment



## References

1. Sepehri A, Beggs T, Hassan A, *et al.* (2014) The impact of frailty on outcomes after cardiac surgery: a systematic review. *J Thorac Cardiovasc Surg* 148; 3110-3117
2. Melin AA, Schmid KK, Lynch TG, *et al.* (2015) Preoperative frailty Risk Analysis Index to stratify patients undergoing carotid endarterectomy. *J Vasc Surg* 61; 683-689
3. Makary MA, Segev DL, Pronovost PJ, *et al.* (2010) Frailty as a predictor of surgical outcomes in older patients. *J Am Coll Surg* 210; 901-908
4. Arya S, Kim SI, Duwayri Y, *et al.* (2015) Frailty increases the risk of 30-day mortality, morbidity, and failure to rescue after elective abdominal aortic aneurysm repair independent of age and comorbidities. *J Vasc Surg* 61; 324-331
5. Zenilman ME (2014) Getting to the right metrics. *Am J Surg* 208; 747-748
6. Kapoor A, Shaffer NS, McDonough CM, *et al.* (2016) Examining New Preoperative Assessment Tools. *J Am Geriatr Soc*
7. Robinson TN, Wu DS, Pointer L, *et al.* (2013) Simple frailty score predicts postoperative complications across surgical specialties. *Am J Surg* 206; 544-550
8. Revenig LM, Canter DJ, Taylor MD, *et al.* (2013) Too frail for surgery? Initial results of a large multidisciplinary prospective study examining preoperative variables predictive of poor surgical outcomes. *J Am Coll Surg* 217; 665-670 e661
9. Kim KI, Park KH, Koo KH, *et al.* (2013) Comprehensive geriatric assessment can predict postoperative morbidity and mortality in elderly patients undergoing elective surgery. *Arch Gerontol Geriatr* 56; 507-512
10. Indrakusuma R, Dunker MS, Peetoom JJ, *et al.* (2015) Evaluation of preoperative geriatric assessment of elderly patients with colorectal carcinoma. A retrospective study. *Eur J Surg Oncol* 41; 21-27
11. Karam J, Tsiouris A, Shepard A, *et al.* (2013) Simplified frailty index to

- predict adverse outcomes and mortality in vascular surgery patients. *Ann Vasc Surg* 27; 904-908
12. Clegg A, Young J, Iliffe S, *et al.* (2013) Frailty in elderly people. *Lancet* 381; 752-762
13. Kolh P, De Hert S, De Rango P (2016) The Concept of Risk Assessment and Being Unfit for Surgery. *Eur J Vasc Endovasc Surg* 51; 857-866
14. Partridge JS, Harari D, Martin FC, *et al.* (2014) The impact of pre-operative comprehensive geriatric assessment on postoperative outcomes in older patients undergoing scheduled surgery: a systematic review. *Anaesthesia* 69 Suppl 1; 8-16
15. Lyons WL (2016) Approach to Evaluating the Multimorbid Patient with Cardiovascular Disease Undergoing Noncardiac Surgery. *Clin Geriatr Med* 32; 347-358
16. Buigues C, Juarros-Folgado P, Fernandez-Garrido J, *et al.* (2015) Frailty syndrome and pre-operative risk evaluation: A systematic review. *Arch Gerontol Geriatr* 61; 309-321
17. Axley MS, Schenning KJ (2015) Preoperative Cognitive and Frailty Screening in the Geriatric Surgical Patient: A Narrative Review. *Clin Ther* 37; 2666-2675
18. Dewan SK, Zheng SB, Xia SJ (2012) Preoperative geriatric assessment: comprehensive, multidisciplinary and proactive. *Eur J Intern Med* 23; 487-494
19. Nakhaie M, Tsai A (2015) Preoperative Assessment of Geriatric Patients. *Anesthesiol Clin* 33; 471-480
20. Surgical Palliative Care Guide 2006. Available at: <https://www.facs.org/education/roles/residents>. Accessed September 1, 2016.
21. Chow WB, Rosenthal RA, Merkow RP, *et al.* (2012) Optimal preoperative assessment of the geriatric surgical patient: a best practices guideline from the American College of Surgeons National Surgical Quality Improvement Program and the American Geriatrics Society. *J Am Coll Surg* 215; 453-466

22. Evans DC, Martindale RG, Kiraly LN, *et al.* (2014) Nutrition optimization prior to surgery. *Nutr Clin Pract* 29; 10-21
23. Weimann A, Braga M, Harsanyi L, *et al.* (2006) ESPEN Guidelines on Enteral Nutrition: Surgery including organ transplantation. *Clin Nutr* 25; 224-244
24. Carli F, Scheede-Bergdahl C (2015) Prehabilitation to enhance perioperative care. *Anesthesiol Clin* 33; 17-33
25. Santa Mina D, Scheede-Bergdahl C, Gillis C, *et al.* (2015) Optimization of surgical outcomes with prehabilitation. *Appl Physiol Nutr Metab* 40; 966-969
26. Bruns ER, van den Heuvel B, Buskens CJ, *et al.* (2016) The effects of physical prehabilitation in elderly patients undergoing colorectal surgery: a systematic review. *Colorectal Dis* 18; O267-277
27. Gridley K, Brooks J, Glendinning C (2014) Good practice in social care: the views of people with severe and complex needs and those who support them. *Health Soc Care Community* 22; 588-597
28. Lester L (2015) Anesthetic Considerations for Common Procedures in Geriatric Patients: Hip Fracture, Emergency General Surgery, and Transcatheter Aortic Valve Replacement. *Anesthesiol Clin* 33; 491-503
29. Feldheiser A, Aziz O, Baldini G, *et al.* (2016) Enhanced Recovery After Surgery (ERAS) for gastrointestinal surgery, part 2: consensus statement for anaesthesia practice. *Acta Anaesthesiol Scand* 60; 289-334
30. Hardin RE, Le Jemtel T, Zenilman ME (2009) Experience with dedicated geriatric surgical consult services: meeting the need for surgery in the frail elderly. *Clin Interv Aging* 4; 73-80
31. Deschodt M, Flamaing J, Haentjens P, *et al.* (2013) Impact of geriatric consultation teams on clinical outcome in acute hospitals: a systematic review and meta-analysis. *BMC Med* 11; 48

32. Vuyk J (2003) Pharmacodynamics in the elderly. Best Pract Res Clin Anaesthesiol 17; 207-218
33. Clegg A, Young JB (2011) Which medications to avoid in people at risk of delirium: a systematic review. Age Ageing 40; 23-29