

# Preoperative comprehensive geriatric assessment and its utility in predicting surgical outcomes in older adults

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Review Article

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## Background:

Comprehensive Geriatric Assessment (CGA) is an individualized evaluation of older adults that integrates critical data across cognitive, clinical, functional, and social domains using various scales. As physiological and mental reserves decline with age, the capacity to respond to stress, such as surgery, can be particularly burdensome for frail and sarcopenic patients. Assessing cardiopulmonary capacity and muscle strength before surgery in older adults is as crucial as a marathon runner's preparation for a marathon. Risk stratification and assessment are essential for decision-making and planning interventions to improve functional and emotional states in anticipation of surgery. Frailty has emerged as a global health burden with significant implications for clinical practice and public health. Its prevalence is expected to rise with the rapid growth of the global population. Frailty is characterized by a decline in multiple physiological systems' functioning, leading to increased vulnerability to stressors. It heightens the risk of adverse outcomes such as falls, hospitalization, and mortality. This research provides an overview of the global impact and burden of frailty, its utility in clinical practice for managing surgical patients, and potential targets for preventing complications during medical care. Advanced age is a significant predictor of adverse postoperative outcomes due to the substantial stress surgery entails. Frailty is a key factor to consider. Patients with frailty should not only undergo conventional cardiac risk assessments but also more specific studies if high-risk factors are detected. These should be coupled with CGA tools, considering various factors associated with hospital stay duration and conditions. The Frailty Index (FI) integrates deficits across multiple domains, including functional, nutritional, cognitive, emotional, social, and geriatric syndromes and diseases. It is calculated by dividing the number of deficits by the total number of possible deficits.

**Keywords:** Geriatric assessment.

**C**omprehensive Geriatric Assessment (CGA) is an individualized evaluation of older adults that integrates important data across various areas (cognitive, clinical, functional, and social) collected through different scales. Physiological and mental reserves decrease with age, and the capacity to mount a response to stress, such as surgery, can pose a significant burden for frail and sarcopenic patients. It is necessary to evaluate cardiorespiratory capacity and muscle strength before surgery in older individuals and prepare accordingly, much like how a marathon runner prepares before a full marathon. Evaluation and risk stratification are essential for decision-making and planning interventions aimed at improving functional and emotional status in anticipation of surgery (1).

Frailty emerges as a global health burden with significant implications for clinical practice and public health. The prevalence of frailty is expected to

increase along with the rapid growth of the global population. Frailty is characterized by a decline in the functioning of multiple physiological systems, accompanied by increased vulnerability to stressors. Being frail increases the risk of adverse outcomes, such as falls, hospitalization, and mortality (2,3).

This research provides an overview of the impact and global burden of frailty, the utility of the concept of frailty in clinical practice in the management of surgical patients, and potential targets for preventing complications during their medical care (3,4).

Advanced age is a significant predictor of adverse postoperative outcomes due to the substantial stress that surgery entails; therefore, frailty is a key factor to consider. However, frail patients should be approached not only with conventional cardiac risk assessment studies but also with more specific studies

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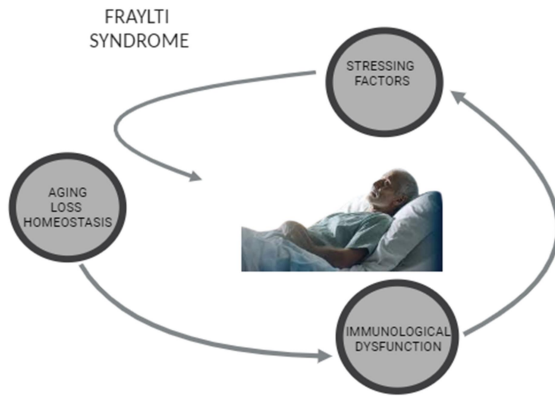


Figure 1. Frailty syndrome.

if any high-risk predictive factors are detected, in conjunction with comprehensive geriatric assessment tools. Additionally, consideration should be given to various factors associated with hospital stay, duration of stay, and hospital conditions (5,6) (Figure 1).

The frailty index is a scale that allows us to integrate all accumulated deficits from different domains, including functional, nutritional, cognitive, emotional, social, and geriatric syndromes and diseases. It is calculated by dividing the number of deficits by the total number of possible deficits (7).

**Methods**

An exhaustive literature review was conducted using the PubMed medical database. The search terms included "preoperative geriatric assessment," "frailty," "postoperative complications," "elderly patients," and "surgical outcomes." Studies published in the last 10 years that investigated the relationship between preoperative geriatric assessment and surgical outcomes in patients over 65 years old were included. Articles were selected that described prospective observational studies, randomized controlled trials, and systematic reviews evaluating the effectiveness of preoperative geriatric assessment in predicting postoperative complications in elderly patients undergoing surgery.

**Results**

Twelve studies were selected that describe frailty as a complex, age-related clinical condition characterized by a decline in physiological capacity across multiple organ systems, resulting in increased susceptibility to stressors. Due to the heterogeneity in the clinical presentation of frailty, it is important to have effective care strategies that encompass the spectrum of frailty severity (3,8).

Several authors highlight in their studies that healthcare costs and utilization are clearly increased in association with frailty. Although all older adults are

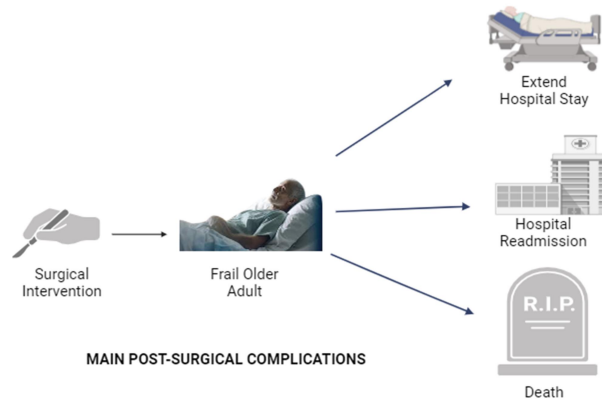


Figure 2. Main post-surgical complications.

at risk of developing frailty, this risk is considerably higher among those with comorbidities, low socioeconomic status, poor diet, and sedentary lifestyles. Lifestyle and clinical risk factors are potentially modifiable through specific interventions and preventive actions. Although the concept of frailty is increasingly used in primary, acute, and specialized care, a consensus on a standard instrument to identify frailty has not yet been achieved (3).

The articles reviewed point to cognitive function as a source of clinical information, evaluated using tests such as the Mini-Mental State Examination (MMSE), which helps identify dementias secondary to underlying conditions such as type 2 diabetes mellitus, hypertension, and cerebrovascular events. Functionality is assessed using scales like the Short Physical Performance Battery (SPPB), Basic Activities of Daily Living (BADL), and Instrumental Activities of Daily Living (IADL) (4,8).

Other authors highlight the social domain as a parameter to evaluate the environment of the elderly, including support networks, income, and the presence of a primary caregiver. This evaluation helps identify factors that can influence health status and postoperative care needs once discharged from the hospital. They also establish the values obtained through this comprehensive multidimensional assessment, allowing the identification of the most vulnerable patients with the highest risk of hospital readmission, prolonged hospital stays, postoperative complications, morbidity, and mortality (5,6) (Figure 2).

Frailty is also discussed as the result of an accelerated loss of functionality associated with aging, described as a multidimensional and complex syndrome characterized by the loss of homeostasis in multiple systems, resulting in a diminished response to stressors. By identifying these agents before a surgical procedure, we can manage the patient to reduce postoperative risks (such as prolonged hospital stay, readmission, and mortality). This lays the groundwork

<b>LINDA FRIED 'S CRITERIALS: FRAGILITY QUESTIONNAIRE IN OLDER ADULT</b>
¿ARE YOU TIRED ?
¿ IS UNABLE TO CLIMB A FLIGHT OF STAIRS?
¿ IS UNABLE TO WALK A BLOCK?
¿HAS MORE THAN 5 DISEASES?
¿ HAVE LOST MORE THAN 5% OF THEIR BODY WEIGHT IN THE LAST 6 MONTHS?
<b>AFFIRMATIVE ANSWER.</b>
<b>1-2 PREFRAGIL, 3 OR MORE FRAGILE</b>

**Figure 3.** Linda Fried's criteria.

for future studies considering the frailty syndrome as a risk factor for postoperative complications, though it does not constitute an absolute contraindication for surgical procedures. Therefore, intervening and stabilizing the patient before surgery is essential in perioperative management (6).

Various authors demonstrated a significant association between comprehensive preoperative geriatric assessment and better prediction of surgical outcomes in elderly patients. It was found that patients identified as frail through geriatric assessment had a higher risk of postoperative complications, prolonged hospital stays, and mortality (6,7).

Moreover, assessing frailty using tools such as the frailty index allowed for more precise risk stratification in elderly surgical patients, helping surgical teams make better-informed decisions about perioperative management (7,8).

In summary, the findings from the selected articles highlight the importance of conducting a comprehensive preoperative geriatric assessment in elderly patients before surgery. It is considered the ideal complement to preoperative cardiac risk assessment, as it can provide valuable information to predict and mitigate postoperative complications and improve surgical outcomes in this vulnerable population (7,8).

## Discussion

The authors cited examine the impact of frailty on adverse outcomes in elderly and very elderly surgical patients. A systematic review of studies published between 2010 and 2015 that evaluated the relationship between frailty and postoperative outcomes in surgical patients with an average age of 75 years or older documented 23 medium to high-quality studies. These studies included patients undergoing cardiac, oncological, general, vascular, and hip fracture surgeries, showing various associations between frailty and increased mortality at 30 days, 90 days, and one year post-surgery,

postoperative complications, and prolonged hospital stays (4).

This suggests that frailty assessment can be a valuable tool in perioperative evaluation and that different frailty assessment tools may be more suitable for different types of surgical patients. However, more research is needed on the association between frailty and return to previous function, discharge destination, and quality of life after surgery (4).

Another group of authors examined the influence of preoperative comprehensive geriatric assessment (CGA) and frailty on postoperative morbidity, mortality, and delirium. They evaluated a total of 108 patients using various instruments, including the Katz Index of Independence in Activities of Daily Living (ADL), the Lawton Brody Instrumental Activities of Daily Living Scale (IADL), the Mini Nutritional Assessment (MNA), the Mini-Mental State Examination (MMSE), and the Geriatric Depression Scale (GDS). Fried's Criteria were used to assess physical frailty. Various scores were applied to determine postoperative morbidity and mortality risk, showing that patients with morbidity and mortality had significantly lower scores in IADL, MNA, and MMSE, and higher scores in the POSSUM physiology and operation scores and the Charlson Comorbidity Index (CCI). Patients with delirium also showed greater frailty and lower scores in IADL and MMSE. Frailty, the POSSUM operation score, and preoperative systolic blood pressure were independent factors related to postoperative morbidity and mortality. This suggests that preoperative CGA and frailty were indicators of postoperative morbidity and mortality (5) (Figure 3).

Current publications explain the importance of examining the feasibility of using a frailty index (FI) based on CGA to assess the level of frailty in preoperative surgical patients and evaluate the association of the FI-CGA with worse postoperative outcomes.

In a study conducted by Lin et al., 246 patients over 70 years old undergoing intermediate to high-risk surgery in a tertiary hospital were recruited. Frailty was assessed using a 57-item CGA form, classifying patients as fit, intermediately frail, and frail with FI  $\leq 0.25$ ,  $>0.25$  to  $0.4$ , and  $>0.4$ , respectively. Adverse outcomes were determined at 30 days and 12 months post-surgery, documenting greater frailty associated with increased 12-month mortality (6.4%, 15.6%, and 23% for fit, intermediately frail, and frail patients, respectively,  $P=0.01$ ) and hospital readmissions at 12 months (33.9%, 48.9%, and 60% respectively,  $P=0.004$ ). This suggests that it is feasible to use the FI-CGA to assess preoperative frailty and that the FI-CGA can identify patients at high risk of long-term adverse outcomes (6).

A systematic review and meta-analysis conducted by the Brookdale Department of Geriatrics and Palliative Medicine analyzed nine studies evaluating a total of 2,281 patients aged 61 to 77 years who were candidates for various types of surgery. The study concluded that frailty in these surgical patients was associated with poor postoperative outcomes, higher complication rates, increased mortality, and prolonged hospital stays (3).

The studies reviewed show evidence linking elderly patients with frailty syndrome to postoperative complications. For example, a prospective longitudinal study conducted by Rana Atun et al. included 108 patients aged 65 and older, documenting that CGA and frailty assessment were useful and necessary tools to predict postoperative complications and delirium. This underscores the importance of preoperative management of risk factors to improve postoperative outcomes, in comparison to the ASA scale, which does not predict postoperative outcomes (4).

Comprehensive geriatric assessment and frailty evaluation in older adults are valuable preoperative tools. These assessments have shown that very frail patients are associated with long-term complications such as hospitalization within 12 months and mortality. This information allows us to focus on addressing risk factors and improving postoperative outcomes (5,6).

An accurate assessment of frailty involves considering its various components: physical, nutritional. Although there are various validated tools to measure frailty, the one established as the standard is Linda Fried's frailty criteria, which are explained as a global functional deficit in the present (Table 2).

Despite improvements in surgical outcomes for geriatric patients, the evaluation of postoperative functional recovery remains insufficient. Only a small proportion of studies focus on perioperative function, revealing a lack of attention to functional recovery in clinical practice (7).

The evidence supports the further development of preoperative frailty assessment as a risk stratification tool in older adults undergoing general surgery and highlights the need to investigate and quantify the predictive capacity of validated frailty instruments in the context of different general surgical procedures and medical severity, along with existing widely used surgical risk indices in clinical practice (8).

This research emphasizes the importance of properly managing polypharmacy and proposes specific interventions such as prehabilitation, rehabilitation, and delirium prevention based on preoperative assessment findings. Structured discussions about care goals and the involvement of family members and interdisciplinary teams are

essential to improve patient understanding of surgery and postoperative outcomes (9,10).

## Conclusion

A comprehensive geriatric assessment helps identify frailty syndrome in older adults and is a valuable tool for predicting postoperative complications. By identifying and addressing potential issues early, we can reduce risks such as prolonged hospital stays, postoperative complications, and morbidity and mortality. Understanding and incorporating the concepts of prehabilitation and rehabilitation into preoperative evaluations of older adults can significantly improve postoperative outcomes.

The present research synthesizes evidence across multiple surgical specialties and demonstrates that frailty is an underestimated prognostic indicator that strongly correlates with the risk of postoperative morbidity and mortality. This suggests the formal incorporation of preoperative frailty assessment to improve surgical decision-making (11).

Additionally, it is recommended to implement an alert system to identify frail patients, which would be useful for surgeons to document a shared decision-making process based on frailty and achieve a significant reduction in mortality (12).

## Conflicts of interests

The authors have no conflicts of interest in the development of this research.

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