CHAPTER – 4

Frailty and Pre-op Optimization, Prehabiltation, and Informed consent

Background:

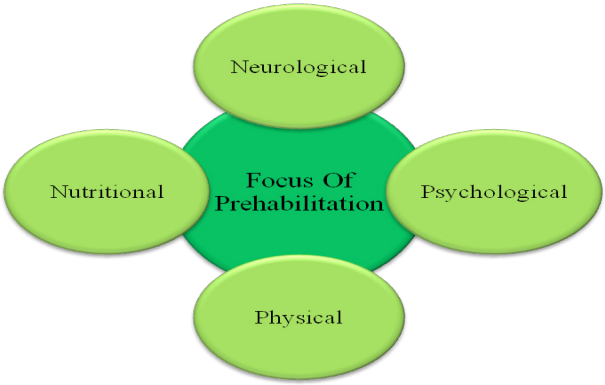
Frailty meansdecreasedcompetence to maintain the homeostasis and to react to any stressors and is related to poor clinical outcomes and amplified need for healthcare admissions. During perioperative care in the hospitals, frailty assessment seems to be an indispensable part of risk profiling, primarily because it is independentlyassociated with increased morbidity and mortality followingsurgery. Hubbard and Story refer frailty as the "elephant in the operating room: easy to spot but often ignored" (1). This phrase was suggested because many anaesthetists do not explicitly ponder frailty during their pre-operative evaluation or consider interventions intended to reduce the level of frailty in the pre-operative phase. Therefore, analysis of frailty in patients before they undergo any surgical procedure should be carried outto strategize the risk reduction and to enrol the diagnosed patients in prehabilitation programs.

Prehabilitation of frail patients:

Prehabilitation isa concerted term that describes the methods of interventions that reduces the extent of frailty by fuelling the patients' physiological reserve before the commencement of any surgical procedure. Prehabilitation programcapriciouslycomprises of various interventions such as neurological, psychological, physical andnutritional concerns of the patients, thereby reduces postoperativecomplications, curtails the duration of hospital stay and enhances the overall quality of life

(Figure 1) (2, 3, 4).

Figure 1: Frailty and concerns of prehabilitation



Significance of frailty:

When a patient enters the operating theatre with better physical health, the post-operative complications, the duration of hospital stay, and chances of morbidity are potentially reduced as the patient will be able to withstand the surgical insult and heals faster.

In order to achieve the better pre-surgical physical health of a frail patient, certain prehabilitating methods have been adopted (5):

1. Enhancingthe aerobic and functional capacity of the patient by advising specific exercises
2. By treating the ailments that are known to augment the perioperative risk
3. Creating awareness amongst the patients by educating them andencouraging them to involve actively in the process

This chapter will focus on each component of prehabilitating

a frail patient pre-operatively

Prehabilitation and exercise:

Exercise mandates a multifaceted interaction of the muscles and the multi-organ systems thereby modifying and promoting the functional status of these systems. Exercising hasnumerous advantages such as improved muscle strength and coordination, thus achieving enhanced physiological reserve.

The recommended exercises are (5, 6, 7):

- Robust exercising for at least 75 minutes or moderate level of exercising for a minimum of 150 minutes per week
- 10 sessions of aerobic exercises, the duration being evenly distributed throughout the week
- Resistance training, (for example, leg presses in both concentric and eccentric movements) to increase the muscle function and flexibility
- Balance training exercises at least 3 times a week
- 3 sessions of respiratory exercises that includes inspiratory/expiratory cycles per day to improve the lung capacity

A well planned programme is crucial forexercise prehabilitation (Table 1).

Table 1: Scales and devices to plan the exercise programme

Percentage of heart rate reserve (HRR)	Karvonen formula Target Heart rate (HR) = [(maximum HR – resting HR) × %intensity] + resting heart rate).	Precaution: In patients with low physical fitness, it is recommended to commence exercise at 55% heart rate reserve.
Assessment of intensity	Borg Scale (8) The scale values ranges from 6 to 20 and the scores denote the HR ranging from 60 to 200 beats/ minute	7 Very, very light 8 Very light 9 Fairly light 10 Somewhat hard 11 Hard 12 Very hard 13 Very, very hard

Step counting devices	Accelerometers and pedometers	These are used to monitor and encourage ambulatory activity

Prehabilitation and nutrition:

The term malnutrition and under-nutrition are terminologies referring to inadequate quantity of food intake or consuming food that lacks nutrition. Though malnutrition is distinct from frailty, both conditions overlap and co-exist.Similar to frailty, malnutrition is also associated with frequent hospitalizations, increased duration of stay in hospitals,and dependency on others (9). Malnutrition presents with generalized weakness, reduced ability to perform daily activities and hence can be a contributor for frailty in older individuals.

On the other hand, over-nutrition or metabolic syndrome due to excessive consumption of food can also lead to numerous health problems such as cardiovascular diseases, obesity, chronic inflammatory processes, etc. So both the ends of the nutrition spectrum can place the patients at the risk of developing frailty due to sarcopenia, inflammatory process, and oxidative stress. Therefore, adapting healthy eating habits is of prime concern. Prehabilitating and optimizing the frail individuals on the importance of eating clean and healthy will hasten their recovery post-operatively.

The inter-relationship of frailty and nutrition is described in the forthcoming sections.

i. Diet quality:

Healthier diets comprising fruits, vegetables, whole

grains, foods rich in proteins and less of carbohydrates are considered to be of higher quality and are linked with lower risk of frailty. Various cross-sectional, longitudinal studies, and meta-analyses suggest that frailty is associated with unhealthy food habits and reversal of frailty can be achieved by adapting healthy dietary pattern (10).

ii. Inflammatory potential of diet:

A healthy diet is said to have a balanced proportion of pro-inflammatory and anti-inflammatory components. Nutrition rich diets comprising of vitamins and minerals, poly- unsaturated fatty acids, Omega-3 fatty acids, and increased quantity of proteins and fibres with adequate quantity of carbohydrates are said to maintain and enhance someone's health. However, consuming sugary foods, foods containing saturated fats, fried and processed foods tend to increase the oxidative stress in the body and hence promoting the process of inflammation.

Any discrepancy in this balanceisanticipated to cause frailty because a number of studies have proved that pro-inflammatory diets (assessed by Dietary Inflammatory Index (DII) scores) are accompanied withincreased levels of circulating inflammatory markers such as C-reactive protein (CRP) and interleukin-6(IL-6) (11, 12).

iii. Other influences on frailty risk:

- Appetite

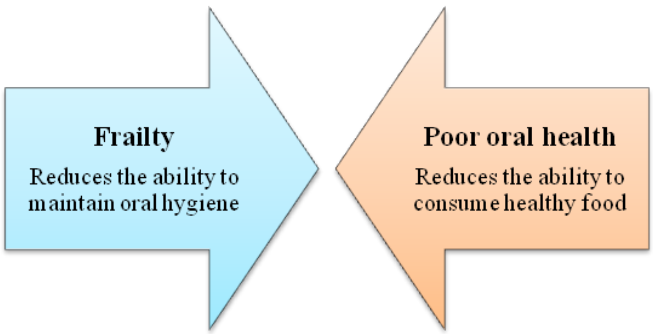
Appetite is generally low in older adults. However, loss of appetite leads to reduced intake of nutrition rich foods and further contributes to anorexia of aging. This in turn leads to developing or worsening of frailty and increases the risk of hospitalization and duration of hospital stays post-operatively.

- Oral health:

Advancing age is also associated with oral health problems such as gingival and periodontal disease, extensive caries,

and tooth loss. Xerostomia and loss of taste are also other features commonly noted in older adults. Poor oral health and frailty co-exist (Figure 2)

Figure 2: Oral health and frailty



Older adults with frailty are more susceptible to oral disease and have poorer access to dental treatment. Dental diseases will further aggravate frailty, therefore stressing upon theprerequisite for primary and secondary prevention of dental diseases, andenhanced management of oral health in pre-frail and frail individuals is vital.

Prospective studies and few case series provided exercise programs and nutritional modifications and optimizations prior to surgical therapy. The results of the studies suggested that modifying the diet and functional capacity reduced the duration of hospital stay and hastened their recovery post-surgically (7, 13). More emphasis was made on consuming diets rich in micro-nutrients, anti-oxidants and vitamin D (14, 15).

Prehabilitation and respiration:

Inspiratory muscle training (IMT) increases the respiratory musclestrength and improves the endurance by gradually

raising the intensity,starting at 20% to 30% of maximal inspiratory pressure and progressing to 60% of maximal inspiratory pressure (16). Emphasizing on prehabilitation programs to improve the respiratory muscle strength and function has been proved to be effective in reducing post-operative pulmonary complications, duration of stay in hospital, and necessity for re-intubation (17).

Pharmacological optimization:

A systematic review and meta-analysis evaluated the drug therapy for the betterment inphysical performance, increased muscle strength (18). To assess this, single-drug regimen to achieve positive impact on physicalperformance comprised of the following drugs were evaluated in various studies:

- alfacalcidol (a vitamin D analog),
- teriparatide (an anabolic parathyroid hormone fragment),
- piroxicam (a nonsteroidal anti-inflammatory drug),
- testosterone (an anabolic steroid) or
- capromorelin (a growth hormone secretagogue).

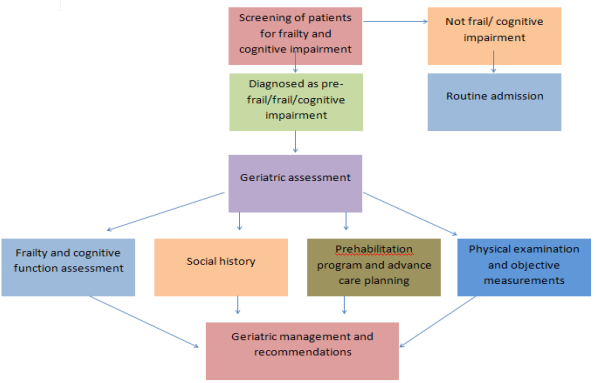
However, the results of the studies trying to establish the causal relationship amongst these above-mentioned drugs and frailty were inconclusive and recommended the need for randomized controlled clinical trials on pharmacological optimization of patients prior to surgical procedures (18).

Recommendation for prehabilitation:

Though it is mostly approved that prehabilitation of the older adult patientsmustinvolve physical, nutritional and psychological modifications, there is an increasing need for evidence-based recommendations. The Society

from Perioperative Assessmentand Quality Improvement (SPAQI) hasstipulated an outline for the geriatric centres that includes comprehensive frailty assessment and management of susceptible older adults (Figure 3) (19)

Figure 3: Recommended preoperative evaluation pathway for older adults



[Adapted from Cooper L, Abbett SK, Feng A, Bernacki RE, Cooper Z, Urman RD, Frain LN, Edwards AF, Blitz JD, Javedan H, Bader AM. Launching a geriatric surgery center: recommendations from the Society for Perioperative Assessment and Quality Improvement. Journal of the American Geriatrics Society. 2020 Sep;68(9):1941-6 (19)]

Currently, itis considered that prehabilitation through unimodel and multimodel approaches comprising of proactive care of older people undergoing surgery (POPS) and preoperative comprehensive geriatric assessment (CGA) should be planned for duration of at least 4 weeks before planning the surgical procedureand the plan must be tailored according to individual patient's condition. The baseline factors such as functional andcognitive status, medical and psychologicalcomorbidities must be evaluated before planning the programme (20). Geriatric

co-management has showed enhanced clinical outcomes by interdisciplinary approaches of the geriatric,anaesthetic, and surgical specialities.

Summary:

Prehabilitation and optimization of patients prior to planning surgical therapy has been proved to be effective in improved post-operative clinical outcomes, hastened healing, reduced post-operative complications and morbidity rate. It must be carried out sequentially involving all the aspects of therapy focusing on physical, nutritional and psychological aspects of the older patients. Frailty assessments tools and multimodel approaches must be employed to achieve prehabilitation and pre-operative optimization.

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